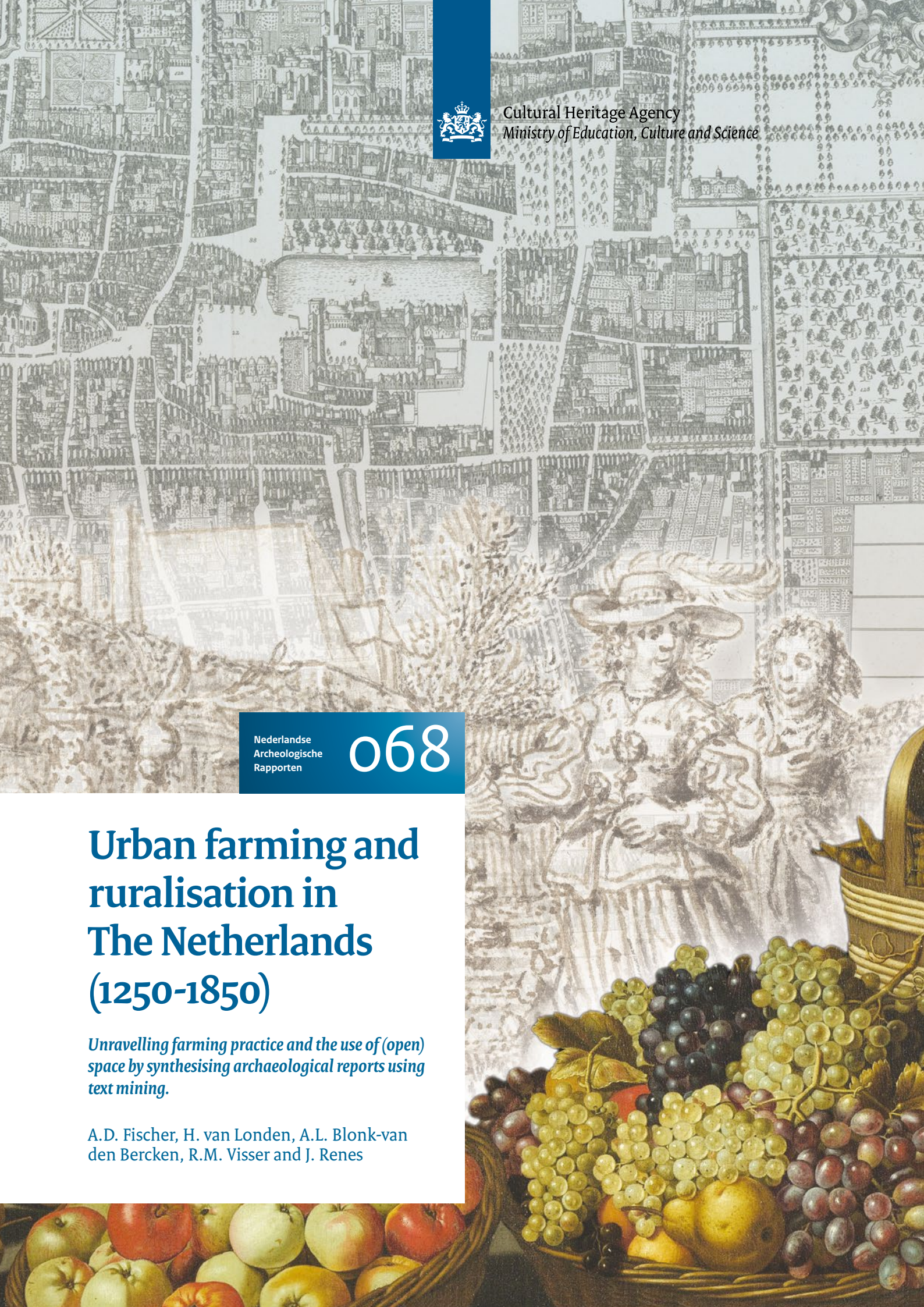

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Urban farming and ruralisation in The Netherlands (1250-1850)

Unravelling farming practice and the use of (open) space by synthesising archaeological reports using text mining.

A.D. Fischer, H. van Londen, A.L. Blonk-van den Bercken, R.M. Visser and J. Renes

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Colophon
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Content

Summary

Urban farming is about food production for and by town dwellers. Small-scale farming is known to have been a feature of medieval and later towns from documentary evidence. An historical and geographical framework for urban farming in the Netherlands is offered in Chapter 2.

The topic of urban farming has nevertheless remained relatively underexposed in terms of archaeological research. This study surveys archaeological reports from commercially funded urban excavations in the Netherlands carried out in the period from 1997 up to and including 2017.

The volume presents evidence for urban farming in Dutch towns between 1250 up to 1850. The data has been assembled and analysed using text mining. This digital technique has been used to search for keywords that describe archaeological correlates of urban agriculture, such as 'layer of arable soil', 'orchard', 'animal grave' or 'fruit tree'. A total of 1380 reports were examined, generating data on historic farming in 84 towns (Chapter 3).

Most of the data relate to animal husbandry (31%), closely followed by horticulture (27%) and more general or unspecified rural activities (21%). Arable farming is less represented in the data (16%). Surprisingly, orchards are not much in evidence, and fish farming is a rarity. The scale and extent of commercial urban excavations in different regions has influenced the amount of data that is available. For towns in Zeeland, Limburg, Friesland and Drenthe comparatively little archaeological data is available and this makes comparisons with patterns of farming in other regions difficult (Chapter 4).

Most indications of local animal husbandry are small-scale and incidental (Chapter 5). Primary evidence of animal husbandry within towns can nevertheless be found in the form of complete skeletons of stillborn, new born or diseased animals. There is abundant evidence for arable farming and horticulture but this fluctuates over time (Chapter 6). When the indicators for arable farming decrease in the late Middle Ages a corresponding increase can be seen in evidence for horticulture in peripheral urban areas. The presence of former fields that have been built over can be seen in fossilized urban boundaries, ditches and fences. Buried soil horizons often contain evidence for soil improvement. The most common indicator for urban livestock farming is the presence of manure in soil layers and pits. The reports that we examined also contained evidence for stables, barns, and animal cages (Chapter 7).

There were numerous farms in towns between 1250 and 1850. It is often not possible to reconstruct what agricultural activities took place on such urban farms. However, our study shows that urban farming activities evolved over time (Chapter 8):

- Indicators for urban farming increased during the period of urban development (up to 1450) and remained in evidence thereafter.
- Prior to the sixteenth century, town dwellers were mostly engaged in arable and livestock farming, but in later stages arable farming declined and horticulture increased.
- In terms of evidence for urban farming, the sixteenth century is the least represented in the available archaeological indicators. In this century more food was imported from outside the town walls.
- In the period of de-urbanisation (1650-1850) the indicators for urban farming once again increased.

The patterns that have been found by text mining archaeological reports are broadly in line with known historical and demographic trends. Thus, the historical differences that are often noted between coastal and inland towns are also clearly visible in the archaeological evidence.

Major historical events can also be seen to have influenced the behaviour of town dwellers. Most towns were given new defences during the Eighty Years War, leading to an upsurge of farming in peripheral areas.

The urban functions of twenty towns were analysed on the basis of Jacob van Deventer's maps, where we examined the ratio of built-up and undeveloped space. Towns had an average of 70 to 75% of their area built-up during this period. Gardens made up about 15 to 16% of the urban plan.

The future study of urban farming requires a strategic approach, with a detailed sampling strategy (Chapter 9). Traces of agricultural activity are often hidden in unspectacular archaeological layers and features which are often not selected for sampling during commercially funded interventions. In order to unlock the potential for new insights into urban farming practices we suggest that new guidelines are needed to investigate *the*

archaeology of urban backyards. Our study also concludes that more archaeological attention should be paid to farming activities in the near outskirts of towns, and that land use in general deserves more attention during archaeological investigations. The importance of soil sampling to detect the presence of manure or other evidence for urban farming must be underlined.

In terms of a national overview it is clear that some catching up is needed in the towns and regions that have been under-represented in commercial archaeological interventions in the last twenty years. Only then will it be possible to make better comparisons through time between the various regions of the Netherlands.

Samenvatting

Stadslandbouw gaat over voedselproductie voor en door stedelingen. Uit historische bronnen is bekend dat kleinschalige landbouw veel voorkwam in middeleeuwse- en vroeg-moderne steden. In hoofdstuk 2 is een historisch-geografisch kader opgenomen, omdat in deze discipline een traditie over stadslandbouw in Nederland bestaat.

Het thema is tot nu toe in archeologisch onderzoek onderbelicht gebleven. In deze studie worden archeologische rapporten van opgravingen in Nederland uit de periode 1997 tot en met 2017 geanalyseerd. Concrete aanwijzingen voor stadslandbouw in Nederlandse steden tussen de dertiende en negentiende eeuw zijn verzameld en geanalyseerd door middel van *text mining*. Deze techniek is gebaseerd op zoektermen die archeologische correlaten van stadslandbouw beschrijven, zoals 'akkerlaag', 'boomgaard', 'diergraf' en 'fruitboom'. In totaal zijn 1380 rapporten onderzocht die gegevens over historische stadslandbouw in 84 steden opleveren (Hoofdstuk 3).

De meeste gegevens hebben betrekking op veeteelt (31%), op de voet gevolgd door de tuinbouw (27%) en algemene of niet-gespecificeerde rurale activiteiten (21%). Akkerbouw komt minder vaak voor (16%). Boomgaarden zijn slechts in enkele gevallen aangetoond en viskwekerijen nog minder. De schaal en omvang van commercieel stadsarcheologisch onderzoek in verschillende regio's heeft de beschikbare hoeveelheid informatie sterk beïnvloed. Van steden in Zeeland, Limburg, Friesland en Drenthe zijn verhoudingsgewijs weinig archeologische gegevens beschikbaar, en dat maakt de vergelijking met patronen van stadslandbouw in andere regio's lastig (Hoofdstuk 4).

De meeste indicatoren voor veeteelt zijn kleinschalig en incidenteel (Hoofdstuk 5). Primair bewijs voor veeteelt kan desondanks gevonden worden in de vorm van complete skeletten van doodgeboren, pasgeboren of zieke dieren. Aanwijzingen voor akker- en tuinbouw zijn veelvuldig gevonden, maar dit fluctueert in de loop van de tijd (Hoofdstuk 6). Als in de loop van de late middeleeuwen de aanwijzingen voor akkerbouw afnemen, is een toename zichtbaar in tuinbouw in perifere stedelijke gebieden.

De aanwezigheid van inmiddels afgedekte akkers kan aangetoond worden met begrenzingen, sloten en hekwerken. Begraven bodemhorizonten bevatten vaak aanwijzingen voor bodemverbeteringen. De meest voorkomende indicator voor veeteelt in de steden is de aanwezigheid van mest in bodemlagen en kuilen. De archeologische rapporten die we hebben doorzocht noemen ook bewijzen als paardenstallen, veestallen en dierenkooien (Hoofdstuk 7).

Er waren talloze boerderijen in steden tussen 1250 en 1850. Over het algemeen is het niet mogelijk om te reconstrueren welke landbouwactiviteiten op dergelijke boerderijen plaatsvonden. Desondanks toont onze studie aan dat stadslandbouwactiviteiten in de loop van de tijd een ontwikkeling doormaakten (Hoofdstuk 8).

- Gedurende de periode van stadswording (tot 1450) nemen de aanwijzingen voor stadslandbouwactiviteiten toe en ook daarna houden deze aan.
- Vóór de zestiende eeuw hielden de meeste stedelingen zich bezig met akkerbouw en veeteelt, maar in latere fasen nam de akkerbouw af en tuinbouw toe.
- De zestiende eeuw is het minst vertegenwoordigd in de beschikbare archeologische indicatoren. In deze periode werd waarschijnlijk meer voedsel van buiten de stadsmuren geïmporteerd.
- In de periode van ontstedelijking (1650 – 1850) nemen de indicatoren voor stadslandbouw weer toe.

De patronen die door middel van *text mining* zijn gevonden in archeologische rapporten sluiten aan op regionale, historisch bekende demografische trends. De historische bekende verschillen tussen steden in de kuststreek en in het binnenland zijn ook zichtbaar in archeologische gegevens.

Grote historische gebeurtenissen hebben ook hun invloed op het gedrag van stedelingen. De meeste steden werden voorzien van nieuwe verdedigingsstructuren tijdens de Tachtigjarige Oorlog, wat leidde tot een opkomst van landbouwactiviteiten in perifere gebieden.

Van twintig steden zijn de stedelijke functies geanalyseerd op basis van de kaarten van Jacob van Deventer, door de verhouding tussen bebouwde en onbebouwde ruimte te meten. Hieruit blijkt dat steden in deze periode gemiddeld 70 à 75% bebouwde areaal hadden. Tuinen maakten ongeveer 15 à 16% uit van het stadsplan.

Toekomstig onderzoek naar stadslandbouw vereist een strategische aanpak met een gedetailleerde onderzoeksstrategie (Hoofdstuk 9). Sporen van landbouwactiviteiten gaan vaak schuil achter minder spectaculaire archeologische lagen en sporen die vaak niet geselecteerd worden voor bemonstering tijdens commerciële archeologische opgravingen. Om het potentieel van nieuwe inzichten in stadslandbouwactiviteiten te ontsluiten, doen we de suggestie dat nieuwe richtlijnen nodig zijn om de *archeologie van stedelijke achtertuinen* te onderzoeken. Dit onderzoek concludeert ook dat meer archeologische aandacht moet worden gericht op landbouwactiviteiten in de directe nabijheid van steden en dat het landgebruik over het algemeen meer aandacht vergt tijdens archeologisch onderzoek. Het belang van bodembemonstering om de aanwezigheid van mest of andere aanwijzingen voor stadslandbouw te onderzoeken moet worden onderstreept.

Wat betreft het landelijke beeld is een aantal steden en regio's ondervertegenwoordigd gebleken in de uitvoering van commercieel archeologisch onderzoek in de laatste twintig jaar. Duidelijk is dat voor deze steden en regio's een inhaalslag nodig is. Pas dan kunnen verschillende regio's beter met elkaar worden vergeleken.

1 Introduction

A.L. Blonk-van den Bercken and H. van Londen

As part of the 'Archaeological Knowledge Map' programme[1], the Cultural Heritage Agency of the Netherlands (RCE)[2] initiated the 'Valletta Harvest' project.[3] Following the implementation of the Valletta treaty in a new Monuments and Historic Buildings Act in 2007[4], this project seeks to determine what two decades of developper-funded archaeological research has yielded scientifically. What did we learn from all the excavations and other archaeological research projects? Which of the main research questions have been answered? And what do we want to know next from our archaeological record?

After careful assessment, the RCE selected 14 research topics (*kenniskansen*) that presently form major gaps in our knowledge, as defined in the *National Research Agenda Archaeology 2.0*, and which have a high potential to be bridged with the data of recent archaeological excavations.[5] This report addresses one of these topics: 'Urban farming and ruralisation in (post-) medieval towns (1250-1850)'. Following the goals of the Malta Harvest project this study aims to:

1. make an inventory and assessment of recent excavations relevant to this topic;
2. provide answers to our present questions on this topic;
3. generate input for the upcoming update of the *National Archaeological Research Agenda* (NOaA 2.0).

Through this programme, knowledge and tools for future research are offered both to the archaeological field and to initiators of spatial development.

Urban farming can in general be understood as the use of land in, and directly around a town for agricultural activities with the aim of producing food. Ruralisation is a relatively new concept in archaeological research may need some explanation.[6] In a general sense the term refers to what may seem like a counter intuitive development from an urban to a rural land use. This can be spatial – houses replaced by farms or open land – or functional – a shift from urban to agricultural functions – and even cultural – from an urban to a rural way of life. In many cases, this goes hand in hand with a population decline in (parts of) the town. On the scale of a town the process of ruralisation can be seen as a readjustment from a town to a village. Ruralisation can also occur only partially, for example in the event of a sudden decline due to war or disease, and in some towns agricultural activities may have always been part of urban life. The topic will be further examined with a perspective from historical geography (Chapter 2).

This synthesis offers insights into the different types of agricultural activities that were carried out in historic Dutch towns, as well as the scale and manner in which these activities took place, such as small-scale arable farming inside and just outside the towns, horticulture, orchards, livestock farming or fish farming. Furthermore, the research contained in this report will provide insights into the interaction of rural components in towns due to food production on the one hand and the increase in ruralisation due to a decline in urban development on the other hand. It will also contribute to an understanding of the role of towns as economic centres within the regions in which they were located and in relation to intra-regional contacts. And finally, this study hopes to contribute to a more nuanced view of urban history, which is too often regarded as a process of continuous growth. Traditionally, historical emphasis has been given to urbanisation processes, as a way of understanding and explaining typical urban characteristics. The shrinkage of towns, possibly resulting in ruralisation in periods of decline, has remained underexposed.

For this reason, the *National Research Agenda Archaeology* 2.0 does include the topic of urban farming.[7] Historical maps of town centres, such as the maps of Jacob van Deventer (produced between 1549 and 1570), show plenty of green open spaces.[8] It is clear that town dwellers were often part-time farmers, even more so in the smaller towns and rural villages. During economic crises and decline urban farming increased. How, why and when is probably dependant on local factors as is the case with village formation processes.[9] In the eastern parts of the Netherlands this way of life resulted in typical housing architecture and spatial development (see Chapter 2).

This research has been executed in two phases. Firstly, through an exploration of the nature and extent of the data[10] and, secondly, through an analysis and synthesis of the selected research data. Archaeological publications from a large number of towns were selected in GIS and recorded in a database. Subsequently, the reports were collected and scanned in terms of

1 Program 'Kenniskaart Archeologie'.
2 Rijksdienst voor het Cultureel Erfgoed (RCE).
3 Groenewoudt 2015; Eerden *et al.* 2017, 195-209.
4 Wet op de Archeologische Monumentenzorg 2007.
5 De Groot & Groenewoudt 2014, 7.
6 RCE tender document.
7 NOaA 2.0-question 88.
8 Rutte & Vannieuwenhuyze 2018.
9 Verspay *et al.* 2018.
10 Blonk *et al.* 2018.

content by means of text mining. The research questions for this volume are:

A. Urban farming

1. What are the archaeological (including bio-archaeological) manifestations of urban agriculture? Examples are tillage, fertilization, dung storage, pollen, primary processing waste, storage, livestock housing, tree planting.
2. How much open space was there in towns and to what extent, and how, was it used for food production?
3. What forms of urban agriculture were practised?
4. How was urban agriculture organised spatially, both inside and just outside the walls?
5. Which social groups were involved in urban agriculture?
6. What was the economic significance of urban agriculture?
7. To what extent was there (full-time) specialisation?
8. What are the differences between towns and areas in terms of 1 to 7, and what are the backgrounds of these differences?

B. Ruralisation

1. Where and when did ruralisation occur?
2. What shifts took place in the rural component of the urban economies?
3. How did ruralisation influence the spatial structure of a town?
4. To what extent did ruralisation relate to changes in the economic basis of a town and/or changing trade networks?
5. To what extent can ruralisation be inked to demographic change?
6. To what extent can ruralisation be linked to changes in the landscape and infrastructure of a town?
7. What are the differences between towns and regions in terms of questions 1 to 6, and what are the reasons for these differences?

C. The relationship between archaeology, historical geography and historical architecture

1. How does the archaeological evidence for urban farming and ruralisation relate to the available historical-geographical and historical architectural data?

This report consists of nine chapters. First, we begin by placing the study in a broader context by elaborating on the research topic from a historical geographical perspective. Then, we briefly present indicators and explain the research framework which has been adopted for this study (Chapter 2). This is followed by an explanation of the methodology and how the data for this study was collected (Chapter 3). The quantitative outcomes are presented in a series of inventories based on the various datasets that have been assembled to examine urban farming and ruralisation (Chapter 4). Next, the quantitative data are elaborated thematically with qualitative information regarding animal husbandry (archaeozoology, Chapter 5) and arable farming and horticulture (archaeobotany, Chapter 6). In Chapter 7 the general findings connected to urban farming and ruralisation are discussed. These findings could not be assigned to the specific activity themes of the earlier chapters. Chapter 8 deals with spatial analysis, regional and chronological trends regarding the themes of urban farming and ruralisation. In the final part of this report, the outcomes of this study are presented and used to create a series of recommendations for the updated *National Research Agenda Archaeology* 2.0 (Chapter 9).

This research was supervised by a scientific advisory panel which consisted of:

- dr. B. Groenewoudt (Cultural Heritage Agency of the Netherlands, RCE);
- drs. F. Veenman (council archaeologist, Groningen);
- M. Walda MA, PhD candidate Architectural History, VU University Amsterdam;
- Prof. dr. J. Symonds (University of Amsterdam), who also took care of English language editing;
- dr. C. Cavallo (University of Amsterdam).

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2 General framework: urban farming and ruralisation

J. Renes, with contributions by M. Walda

2.1 Introduction

In this chapter we give backgrounds to the existence and types of urban farming. We also introduce the main concepts of urban farming, urbanisation and ruralisation. The next section (2.2) contains a short historical overview of towns and urbanisation (including urban decline) in the Netherlands. Section 2.3 presents the origins of urban farming. Section 2.4 extends the argument by looking at different types of agrarian land-use in towns, including farm buildings. A wider view is given in Section 2.5, which looks at agriculture by urban landowners outside the town, including agrarian activities in urban fringes. This is important within the scope of the present project not only because the farmers and farmhouses were often located within the town, but also in the urban fringe. Many of these farms and their land later became incorporated into expanding towns.

2.1.1 Definitions

Urban farming is agriculture that is carried out within or around towns.[11] Farmyards can be situated within towns or in the urban fringe. This area of the rural-urban fringe, or outskirts directly surrounding the town, forms a transitional zone from town to rural hinterland. Often this zone has a less densely built character reflecting the agrarian activities that took place there. Therefore, some authors use the term 'urban and peri-urban agriculture'.[12] In the medieval and early modern Netherlands many families grew some vegetables, had one or two fruit trees and held a cow, a pig or some geese or ducks, all for their own consumption or to produce some surplus for trade (at markets) or barter trade. On a larger scale, agricultural activities include arable farming, horticulture (including orchards), animal husbandry and fish farming.

An urban farmstead (in Dutch *stadsboerderij*) is defined as a building within the walled or otherwise fortified area (or, when no fortifications existed, in urban streets) of a settlement with a town charter.[13]

Ruralisation is the opposite of *urbanisation* and can be defined as being a development from an urban state or form to a rural one. Nowadays, the concept or ruralisation is mainly used in the context of literature concerning developing studies, although the term is also used to describe land use in modern towns that are in decline. The most published of these can be found in the North-American so called 'donut towns', in which the population moved to the suburbs leaving the town centres partly deserted. Some of the most striking examples of this can be seen in Detroit and other towns in the 'Rust Belt', where the decline of industry provided room for urban agriculture to sustain the impoverished population.[14] Such ruralisation is usually defined from an urban perspective, with terms such as reverse urbanisation, counter-urbanisation and de-urbanisation.[15]

The existing literature shows a heavy bias towards urban growth and supplies few definitions of developments that go the other way, from urban to rural. When we define ruralisation as the opposite of *urbanisation*, it may be helpful to look at definitions of urbanisation, a concept that is used and defined more frequently. Textbox 1 gives some of these definitions. Most of these mention the growth of the percentage of the population that lives in towns, mainly as a result of people moving from the countryside to the towns. Some of the definitions mention additional factors, that can be functional as well as cultural. The change from a rural towards an urban culture is called mental urbanisation. In a functional sense, urbanisation means a development from rural sources of income (usually agriculture) towards urban occupations such as trade and industry. Of the definitions, the second one limits the process of urbanisation to the period since the Industrial Revolution. The other definitions don't give a time span, implying that the term urbanisation can also be used for pre-industrial societies. The authors of the present report share this last viewpoint.

Textbox 1 Definitions of urbanisation

- The process by which more and more people leave the countryside to live in cities (www.dictionary.cambridge.org/dictionary/english/urbanization; 24-8-2018).

11 Agrarian historian Soens (2019, 17) defines urban agriculture as 'food production by urban dwellers', but that definition is not practical for archaeology, in which the relation between landowner and land use is usually difficult to establish. Moreover, the focus of the present study is agriculture *in* towns, not *by* townspeople.
12 Soens 2019, 16.
13 Erdin 2011.
14 Groenendijk 2007, 185.
15 Chigbu 2015.

- An increase in a population in cities and towns versus rural areas. Urbanization began during the industrial revolution, when workers moved towards manufacturing hubs in cities to obtain jobs in factories as agricultural jobs became less common. (www.businessdictionary.com/definition/urbanization.html; 24-8-2018).
- Urbanisation refers to the population shift from rural to urban residency, the gradual increase in the proportion of people living in urban areas, and the ways in which each society adapts to this change. It is predominantly the process by which towns and cities are formed and become larger as more people begin living and working in central areas. [...] Urbanization can be seen as a specific condition at a set time (e.g. the proportion of total population or area in cities or towns) or as an increase in that condition over time. So urbanization can be quantified either in terms of, say, the level of urban development relative to the overall population, or as the rate at which the urban proportion of the population is increasing. [...] Urbanization is not merely a modern phenomenon, but a rapid and historic transformation of human social roots on a global scale, whereby predominantly rural culture is being rapidly replaced by predominantly urban culture. (www.wikipedia.org/wiki/Urbanization; 24-8-2018)
- Urbanization: [1] increase in the proportion of a population living in urban areas; [2] process by which a large number of people becomes permanently concentrated in relatively small areas, forming cities. (stats.oecd.org/glossary; 24-8-2018).

When we look at types of land use there is a sliding scale from rural to urban (Table 2.1). All such activities have been present in historic towns. Even hunting took place within town walls, as is shown by the hunting park (warren, in Dutch *warande*) adjacent to the ducal palace in Brussels.[16] On this basis we could speak of urbanisation in case of a downward movement along this scale, as we can speak of ruralisation when the movement goes in the other direction. However, the theme of urban agriculture can best be limited to categories two and three.[17]

Table 2.1 A range from rural to urban activities.

Range	Land use	Human activity
1	(semi) natural ecosystems	extensive animal husbandry (ranching), hunting
2	farms, arable, pasture, meadows	agriculture
3	gardens, orchards	horticulture, market gardening
4	pleasure gardens and parks	recreation
5	buildings	housing, industry, services etc.

The main process behind urbanisation is the growth of towns by people moving from the countryside to live in towns. In many cases these people did not immediately cut all ties with the countryside, as they, or their families, often kept some agricultural land that they rented out or that was managed by relatives. Krause made the remark that when people from the countryside move to towns, or visit towns, it is probably not only the rural people who change. When we look at the contemporary world, we see peasants in growing towns, as well as new types of agriculture in declining towns.[18] Even today many new town dwellers still have some land in the countryside as part of a risk management strategy. Some go back to the countryside to help their relatives during harvest. Others maintain a plot of rural land with a small summer house, such as the Russian *dacha*. Such complex modern interactions between rural and urban activities have their predecessors in urban history. Developments can be spatial (houses giving way to farms or open land), functional (from urban towards rural functions) or cultural (from an urban towards a more rural way of living and thinking). In many cases ruralisation is probably connected to population decline in (parts of) an urban area.

The discussion above shows that urban agriculture is part of the wider theme of urban-rural relations. The large majority of literature on historic urban-rural relations focuses on urban activities in the countryside, such as rural industries and the efforts of towns to make an

16 Liesenborghs 2004-2005.
17 Of course this classification is rather rough and reality is often more complex, with each type of 'green' land use having multiple functions. Orchards, for example, are sometimes described as 'recreation landscapes' (Zantkuyl 1982, 9).
18 Krause 2013, 234.

end to that.[19] Rural land ownership by townspeople has also attracted attention, with a strong focus on landed estates and the ideals of living in the countryside. Few scholars have written about agriculture in towns and by town-dwellers. For the Middle Ages, Hoppenbrouwers[20] wrote that much is still unclear. The most important recent publication on urban farmers is from Bouwer.[21]

Of course, this situation is complicated by the question: what exactly is a town? Traditionally the main criterium is the legal argument of the existence of a town charter. However, there are important urbanised medieval settlements that never received such a charter. The old capital of Holland, The Hague, only received a town charter in the Napoleonic period. On the other hand, particularly during the thirteenth and fourteenth centuries, many small settlements received a town charter as an investment in a future urban development, that not always took place.

Therefore, among geographers a wider definition is used, with five criteria: [1] the legal argument of a town charter, [2] population size, [3] morphology, including a large building density in the centre end the existence of walls and gates, [4] an economy that is dominated by non-agrarian activities, and [5] an urban way of life and life style.[22] This leads to a gradual difference, in which some settlements, take early modern Amsterdam for example, suit all criteria, whereas other settlements conform to only a few of criteria, or even to none.

19 Brünner 1918.
20 Hoppenbrouwers 2001, 67-69.
21 Bouwer 2016.
22 Hoekveld *et al.* 1978, 10-12.

Fig. 2.1 Neeritter, first mentioned in 1143, was a densely built village, with the status of vrijdorp. It was probably planned as a market place by the owner, the Chapter of St. Lambert at Liège. An earthen wall was built in 1584, during the Eighty Years War. The village is shown here on the oldest cadastral plan (1832) (RCE Beeldbank MIN11072VK1).

A typical intermediate group are the so-called agro-towns, in German geographical literature known as *Ackerbürgerstädte*, that often have a town charter, walls and gates and are densely built, but are socio-economically and culturally completely dominated by farmers. The *Lexikon des Mittelalters* gives the following description of an Ackerbürgerstadt: *Nach Max Weber ('Wirtschaft und Gesellschaft') sind unter dieser Bezeichnung solche Kleinstädte zu verstehen: welche als Stätten des Marktverkehrs und Sitz der typischen städtischen Gewerbe sich von dem Durchschnitt der Dörfer weit entfernen, in denen aber eine breite Schicht ansässiger Bürger ihren Bedarf an Nahrungsmitteln eigenwirtschaftlich decken und sogar auch für den Absatz produzieren.* The inhabitants lived mainly from agriculture. Most Ackerbürgerstädte were planned as towns or were former villages that were raised to become towns. In some cases towns sank to the level of agro-towns by economic changes.[23] Another German term for this category is 'Minderstadt' (minor town).[24]

Many comparable settlements were mentioned *Freiheit* (in German)[25] or *vrijheid* or *vrijdorp* (in Dutch), an intermediate legal status between town and village (Fig. 2.1). The dividing line between towns and non-towns is blurred further by the existence of walled villages. Particularly densely built villages could decide to build a defence wall in times of war.[26]

2.1.2 Feeding towns: spatial patterns of production

Although parts of agrarian production have always been used to feed the farmers and their families, there is also a long history of market-oriented production. A large number of studies have shown the geographical patterns of such production. A starting point may be the model by Von Thünen, who (re)constructed a pattern of agrarian production in an isolated state with a

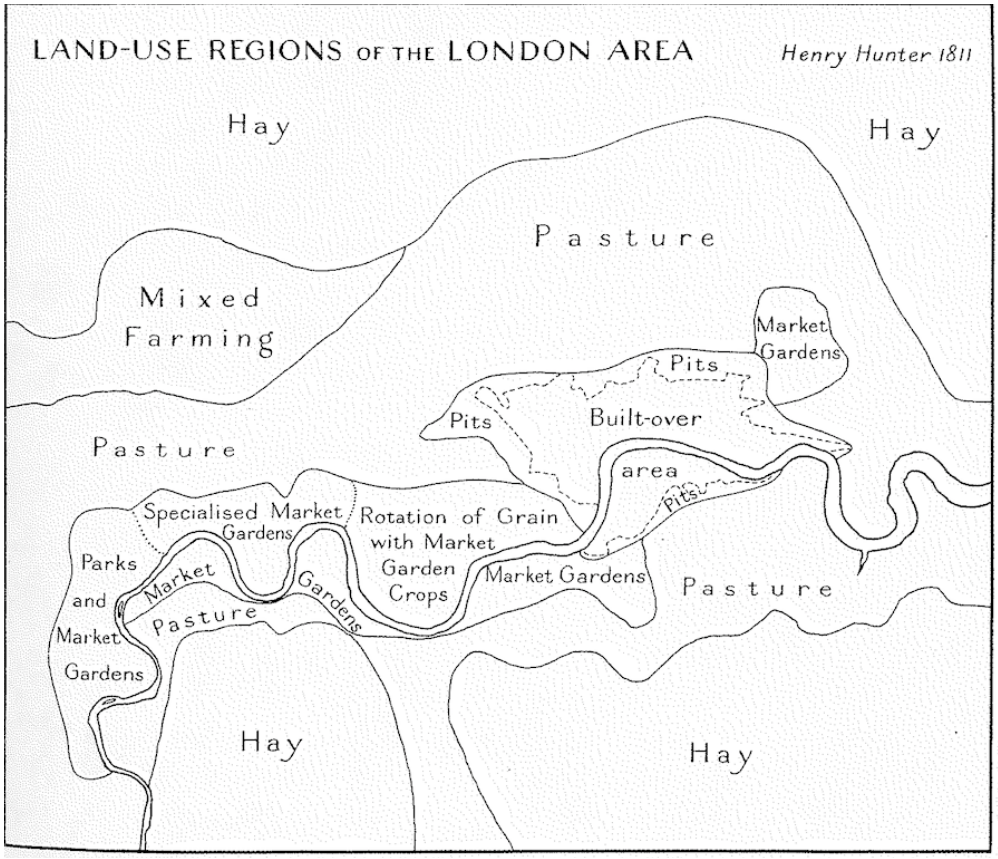


Fig. 2.2 The idea of a series of concentric circles around a town was not new, but can already be found in the work by Reverend Henry Hunter: *History of London and its Environs ... Likewise an account of all the towns, villages, and country, within twenty-five miles of London* (1811). The map is republished by Bull 1956, 26-27. See also Chisholm 1968, 77, and McKellar 2013.

23 Bockholt 1987. An example is Duisburg, which lost its trade after the harbour silted up during the thirteenth/fourteenth century, and the fair was moved to Frankfurt am Main (www.mittelalter-lexikon.de/wiki/Ackerburgerstadt, 11-4-2019).
24 Dutch examples are Eijsden (Van Hall 2011) and Neeritter (Renes 1999).
25 Bockholt 1987, 11.
26 Welters 1950/'51.

Fig. 2.3 George Scharf, *A Cowkeeper's shop in Golden Lane*, London (1825). The dairy shop sold milk, eggs, butter, and cream. At the back of the shop a stable with a few cows is visible (British Museum).

single, centrally located, town.[27] The model is based on transport costs and shows circles around the town, with the inner circle used for the intensive production of high value and perishable goods, including fruits, vegetables and milk. A second circle was used to produce fuel (wood or, particularly in the Low Countries, turf): necessary but too low in value to be transported over long distances (Fig. 2.2). Further from the town arable products, particularly grain, were produced, whereby the intensity of production declined with the growing distance from the town. Even further away were the grazing lands that supplied meat. The model was nuanced by introducing landscape features such as a navigable river and a secondary town.

Von Thünen's publication became popular among economic historians, particulary after an English translation was published.[28] For the Middle Ages, the model has been used to provide insight into the food supply of large and small towns. Studies of London and Istanbul stand out.[29] For the early modern period, interesting efforts have been made to use the model on a European scale.[30]

Of course, real life is always more complex than a model. Arable, grassland, orchards, vineyards and gardens could exist within towns, partly for own consumption by the owner of the land. However, there was also commercial agriculture in towns, even in large and densely populated towns. Even in a large town as Rome, milk was supplied from cowsheds in the town and the suburbs and was sold from the farm as well as on the street, until this system was banned from the town in the early twentieth century (Fig. 2.3).[31]

Urban agriculture that was at least partly commercial had to take high land values into account and therefore had to be rather intensive. An example is Paris during the second half of the nineteenth century, in which one sixth of the urban area was used for the production of vegetables, with very high production levels made possible by stable dung from the horses that provided the power for the town's transport system.[32] The use of urban waste as manure must have been a general feature of agriculture in and around towns.[33] This urban waste was not only produced by the population and their animals, but also by industry, for example by the many breweries.[34]

27 Von Thünen 1875.
28 Hall 1966.
29 Campbell *et al.* 1993; Hendy 1985.
30 Nitz 1993.
31 d'Errico 2018.
32 Stanhill 1977, 269.
33 See also: McKellar 2013, 13-15.
34 Krings 1972, 41.

Concentrations of market gardens have existed around many towns. A well-researched North-American example is Brooklyn, where a farming population (many of Dutch descent) developed a commercial horticultural region before finally being engulfed and overrun by the growing city of New York.[35]

Typical, and often intensive, forms of farming took place even around small towns. This could also involve cash crops (which are not part of Von Thünen's model). Some small towns in the German Rhineland grew flax on a large scale for the larger industrial towns.[36]

2.1.3 State of research

The history of urban agriculture is an under-researched topic in the Netherlands, as well as internationally. However, the recent interest in modern urban farming has given rise to research into the history of this phenomenon. In Belgium, Soens has developed a new research project since 2007 on the Environmental and Rural History of Urbanized Societies within the Centre for Urban History and the Urban Studies Institute at the University of Antwerp. Next to Soens, Vermoesen, affiliated to the Centre for Urban History, has also published on the subject of urban farming.[37] At the 2018 conference of the European Association of Urban History, held in Rome, Griffiths (Cardiff University) and Soens (Antwerp University) organised a session on 'Feeding the Town. Comparative histories of Urban Agriculture.' In Sweden, where most towns until quite recently had a strong agricultural basis, it was the theme of a PhD study.[38]

In his article on urban farming in early modern Antwerp Vermoesen argues that the main spatial focus of the international literature on urban farming is the rural-urban fringe.[39] 'Rural' activities within this zone close to the town included market gardens, allotments and pleasure gardens, used for the commercial and private production of food, horticulture and recreation. A recent addition is 'care agriculture', in which working and living on farms is used as a therapeutic treatment for people with mental illnesses.[40] In addition, many English towns possessed common grounds outside the walls, for general use by the town's farmers.[41] In Dutch literature Hendriks and Selles have described the particular agrarian character of the town of Kampen.[42] Snieder has shown how even during the late medieval period of growth and prosperity new farms were built within the walled town of Amersfoort.[43] Comparatively little research has been undertaken on urban gardens and food production and the green open spaces within many towns. Existing literature focuses mainly on case studies of individual towns.[44] A more general, comparative research on urban farming and ruralisation from historical geography is still missing.

2.2 Background: a short history of towns and urbanisation in the Netherlands

2.2.1 The development of Dutch towns

The large majority of research into the spatial development of Dutch towns focuses on their growth and the ever-growing density of housing and street patterns within towns. The best cartographic summary of these processes is the map J.C. Visser made for the second edition of the national atlas (Fig. 2.4).

The main stages in the development of towns in the Netherlands may be defined as follows:[45]

- In the Roman period (57 BC to AD 406) a few settlements developed into towns or, at least, settlements with an urban character.
- During the Early Middle Ages, until 1100, some urban settlements developed on international transport routes and mainly on the basis of long-distance trade. The most spectacular were the so-called *emporia,* trade settlements that could reach a substantial size and that definitely had urban characteristics.
- During the twelfth century this pattern further developed and the number of towns increased. Successful settlements received an urban charter, that usually also included the right to build town walls.
- During the thirteenth and fourteenth centuries a large number of new towns were founded, in many cases not based on existing commercial or industrial success but as a basis for further development. The large

35 Linder & Zacharias 1999.
36 Krings 1972, 41.
37 Vermoesen 2015.
38 Björklund 2010. See also Björklund 2008.
39 Vermoesen 2015, 535.
40 Druijff 2005.
41 Vermoesen 2015, 535; French 2000.
42 Hendriks, 1953; Selles, 1996, 1997, 1998.
43 Snieder 2010.
44 Hendriks 1953; Zantkuyl 1982; Van der Wiel 2015; Vermeer & Koeman 2018; Renes 2018.
45 Mainly based on Renes 2005 and Rutte & Abrahamse 2016.

Fig. 2.4 The development of towns in the Netherlands (after Visser 1984, map 16).

majority of these new towns remained small. In this group we find the best examples of towns that remained agrarian (Ackerbürgerstädte).

- Only a few new towns have developed since the fifteenth often in the form of fortified villages that were given a town charter. Between 1400 and 1650 most towns in the south-eastern half of the country showed evidence of stagnation. During this period, however, the towns in the low, north-western half of the country showed a strong growth. This changed in the middle of the seventeenth century, when the economic boom ended. In the following centuries, only Amsterdam, Rotterdam, The Hague and Schiedam still saw a growing population.
- Finally, a group of town charters were given by King Louis Napoleon in 1809, to well-developed villages (including The Hague).

However, a new period of urban growth only started in the Netherlands after 1860.

The present situation shows a mixed picture, with most urban regions still growing, but with decline in parts of the periphery of the Netherlands, including some towns (Den Helder, Delfzijl, Heerlen).

Urban decline has never been restricted to specific times, but a few periods stand out. The urban settlements from the Roman period all showed decline from the third century onwards. Some survived, in most cases as religious centres, but as 'a town without urban life'.[46] Some centuries later, the first generation of medieval towns all went into decline after a longer or shorter period of prosperity. Most of the site of Dorestat became agrarian land until the second half of the twentieth century. The town of Kampen, founded during the twelfth century and

[46] The term was coined by the French urban archaeologist Henri Galinié for Tours (Clarke & Ambrosiani 1995, 7).

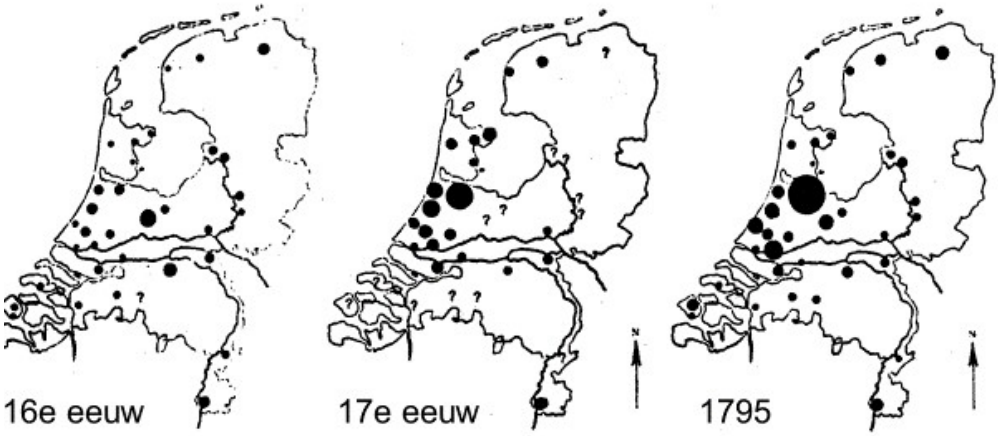


Fig. 2.5 Population size of towns from the sixteenth century until 1795 (De Vries 1987, 70, after Faber *et al.* 1973).

quickly growing into a major port, later lost most of its trading function and became the archetypical farmers' town.[47] A later period of decline – or at least stagnation – for many towns was the period between the middle of the seventeenth and the middle of the nineteenth century (Fig. 2.5). In many towns around the Zuiderzee agriculture became more important during this period. In the regional open-air museum at Enkhuizen, some urban farms were rebuilt: a row of farms and handworkers' houses from Harderwijk and an urban farm from Monnickendam. One of the farms from Harderwijk was built during the sixteenth century as a merchant's house and was converted into a farm during the nineteenth century; other houses in this row have similar histories.[48] An example of a complex history of rise and decline may be seen in the case of Stavoren (Friesland) (Fig. 2.6 a, b, c, d). The town of Stavoren in Friesland has a troubled history. The site of the oldest settlement, that prospered during the ninth century, was lost by coastal erosion. The first map shows the town by Jacob van Deventer (between 1549 and 1570) (Fig. 2.6a). During the twelfth and thirteenth century, the area on the south side of the town was raised and built over. This town quarter was deserted during the fifteenth century, rebuilt during the seventeenth century and deserted again around 1800. During the nineteenth century it was part of the urban pastures (*Stadsfenne*). The second map shows Stavoren by Braun & Hogenberg, with the new *blokhuis* (fortress) added (Fig. 2.6b). The third map by Blaeu (1649) shows new fortifications and a small extension on the south side (to the right, cutting through and earlier, later deserted and partly rebuilt) medieval

Fig. 2.6a Stavoren in the map of Jacob van Deventer (between 1549 and 1570).

Fig. 2.6b Stavoren by Braun & Hogenberg, with the new *blokhuis* added.

47 Kreek 2020; Van der Horst 2010.
48 nl.wikipedia.org/wiki/Lijst_van_bouwwerken_in_het_Zuiderzeemuseum, 21-6-2020.

Fig. 2.6c Stavoren by Blaeu (1649).

Fig. 2.6d Stavoren by Eeckhoff (1849).

town part (Fig. 2.6c). The last map, by Eekhoff (1849) shows the town after two centuries of decline, with the Stadsfenne (Fig. 2.6d).[49]

2.2.2 Population size, urban area and land use

Almost all towns in the Netherlands (as elsewhere in Continental Europe) were surrounded by earthen or stone walls from the Middle Ages until the nineteenth century, giving a clear limit of the town area. That makes them different from modern towns, but also from most towns on the British Isles that were not walled and that therefore had a much more gradual urban-rural continuum. However, also around many walled towns an urban fringe can be distinguished (see below).

Visser's map and the medieval population sizes he reconstructed, are based on the area within the town walls. The relation between population size and urban area is, however, complex. Particularly when the original town included a number of older settlements, extensive amounts of open space were available within the walled area. This had an additional advantage in case of a long siege, when food production within the town became a matter of survival. In practice it meant that some of the farms that were included in the town could continue functioning, at least for the time being.

In most towns the open spaces were gradually filled in with houses and, particularly in the open spaces in the periphery of the walled area, by religious institutions. These often-owned substantial plots of land, that were at least partly used for agriculture and that were inaccessible for the urban population. In successful towns the open space was ever more under pressure. When a town became too crowded and the prospects for further growth seemed good, an urban extension could be

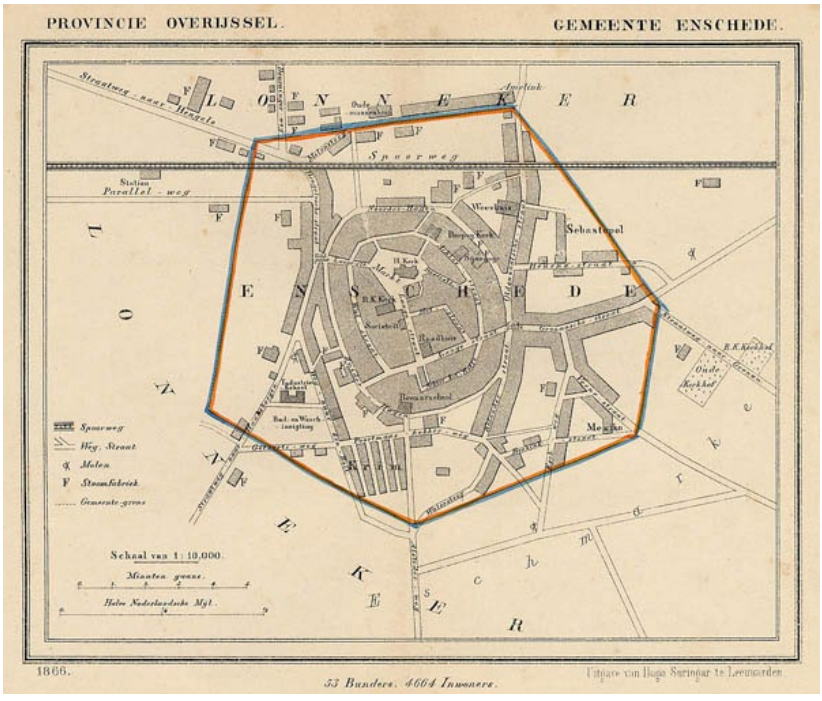


Fig. 2.7 The municipality of Enschede (1866). The maps from Kuyper's atlas shows that the municipality of Enschede was a small urban enclave within the huge rural municipality of Enschede.

[49] Sarfatij 1990, 167. The dating of the Van Deventer map is taken from Rutte & Vannieuwenhuyze 2018.

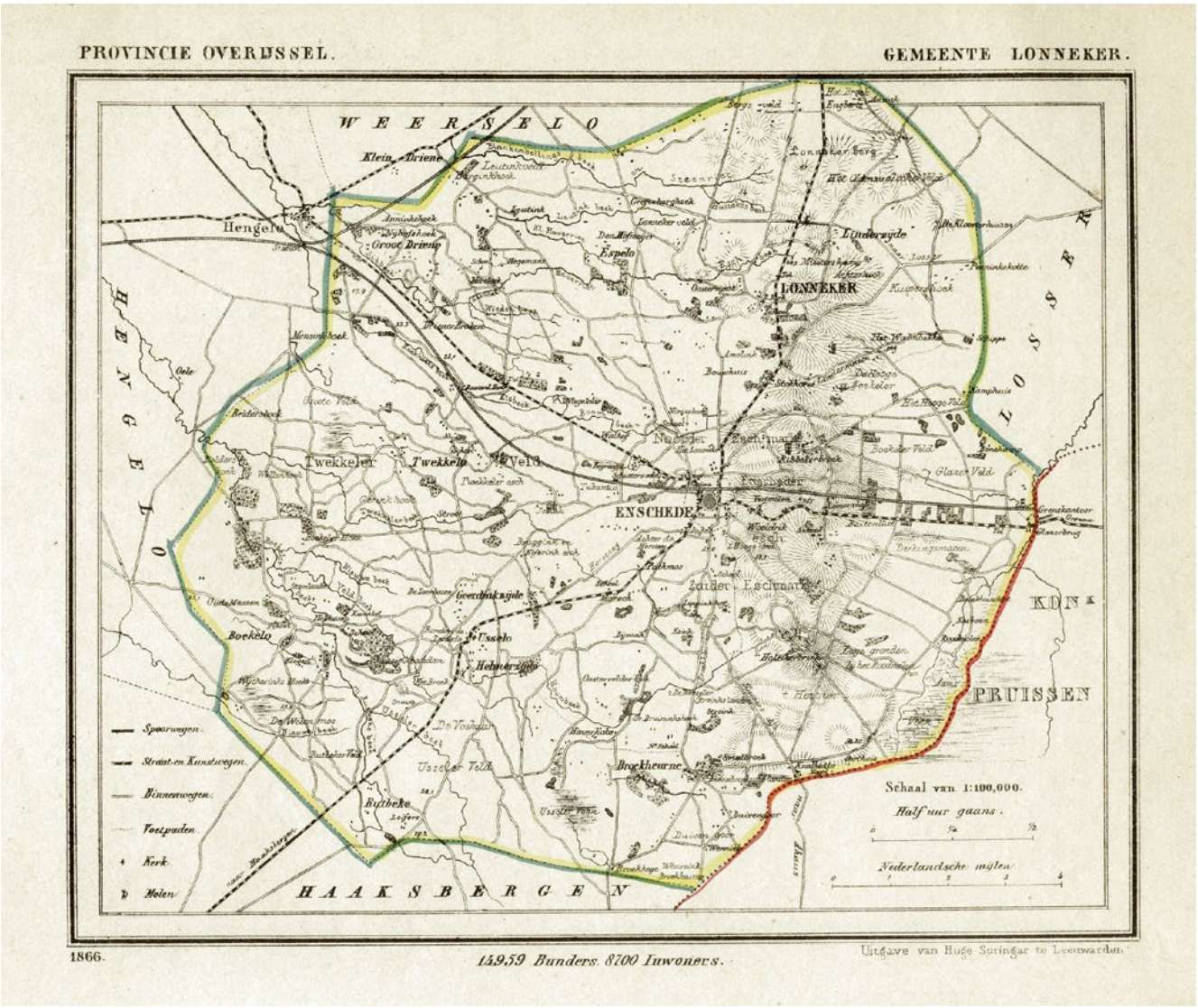


Fig. 2.8 The municipality of Lonneker (1866).

planned. During the Middle Ages this was a costly operation and when such an extension was realised space for further population growth was included. In the meantime (and that period could take centuries) this space could be used for agriculture. During the early modern period, when systems of fortification became ever more extensive, complex and expensive, an extension became almost impossible.

Land outside the town walls could be part of the urban territory. Nineteenth century maps of municipalities show many cases in which large areas of countryside were governed by the towns.[50] Examples are Venlo and Weert. Interestingly, in many other cases the urban area itself at a certain point in time received its own government, separated from the surrounding rural area. Examples are Zwolle, surrounded by the rural municipality of Zwollerkerspel, Enschede surrounded by Lonneker and Stad Delden by Ambt Delden (Fig. 2.7; Fig. 2.8). The reason must have been the different interests of rural and urban communities. In some cases, the effort of the rural area to govern itself independent from the town went on for centuries.[51]

2.2.3 Urban decline

As noted above, the historic literature has a strong bias towards growth. Still, there have

50 Kuyper 1867.
51 Henkens 1978.

always been towns in stagnation or even decline. In their publication *Towards a new template for Dutch history. De-urbanisation and the balance between city and countryside* (2011) historians Paul Brusse and Wijnand Mijnhardt define urban decline in demographic and economic terms: 'Urban decline is about a city's demographic and economic decline as such, or rather, the internal process of degeneration.'[52] With this emphasis on urban decline as an internal process, the authors highlight the distinction between urban decline and de-urbanisation. While urban decline is 'a downturn in the fortunes of a city, from within', de-urbanisation is defined as 'a shift in the economic and demographic balance between city and countryside, to the city's detriment'.[53] In this section we will focus on the internal process of urban decline and the impact of this decline on the urban structure and townscape.

It is a truism that not only urban growth, but also urban decline generates its own spatial pattern.[54] Although the causes and duration of urban decline vary greatly in place and time, some comparable spatial characteristics could be deduced from the international literature on urban decline in premodern towns, related to the ruralisation of a town.[55] It is however important to remain critical of the archaeological and building historical data, and to always contextualise data within the economic, demographic and spatial history of the individual town. Evidence of new building, vacancy, demolition or empty plots is not necessarily a sign of urban growth or decline, but could also reflect a broader transformation of the social or economic composition of a town.

Literature on towns in decline shows that spatial consequences manifest themselves both at the level of the individual building, the building plot and the urban structure as a whole. There are many examples of shrinking towns, enduring long-term vacancy and dilapidation of once occupied tenements, ultimately leading to the collapse or demolition of buildings and even complete building rows or neighbourhoods. Two towns in the Netherlands almost completely disappeared: Reimerswaal (Fig. 2.9 and 2.10) and Het Gein. However, growth and decline could also occur simultaneously within the town walls. In this case particular areas within a town endured economic and demographic crisis whilst others did not.[56]

It is often assumed that the peripheral or suburban areas of medieval towns were most sensitive to change.[57] An example, from England, is medieval Winchester. In his survey of the English town Derek Keene concluded that in the early sixteenth century the town was in a manifestly decayed condition and about a third the size it had been 400 hundred years earlier.[58] During successive periods of decline, caused by a substantial depopulation due to the Black Death, coupled with a longer term decline of the town as a political and commercial centre, the built-up area contracted towards the town centre. The decline would have been clearly visible for visitors and residents in the closure of parish churches, the empty streets within the walls and in the deserted suburbs, where redundant houses were demolished. The contraction of the occupied area and the amalgamation of vacant-plots created more and larger open spaces for gardens, orchards and meadows, increasing the rural character of the town.[59] This process of contraction of the built-up area could also be stimulated by urban regulation. Both in early modern Bruges, Hoorn and Enkhuizen demolition permits, granted by the town treasury or town council, were granted much easier in the minor streets outside the town centre, while demolition along the main streets was considered undesirable.[60] In 2000 archaeologist Grenville Astill advocated both for more research to outer suburbs, where evidence of urban decline might be expected to be more obvious than in town centres, and for comparative research within core and suburban areas, to understand parallel processes of growth and decline within a town.[61]

On plot level demolition and ruralisation could also occur on the back of the plot, or 'plot tail', in accordance with the 'burgage or plot cycle' used by geographers. Within this cyclical process a plot is gradually filled with buildings, from the plot head, at the street front, to the plots tail, after which it again decays. Using the method of town plan analysis historical geographer Keith Lilley has developed an alternative narrative of urban change for late medieval Coventry. Lilley argues that a large-scale contraction of the city's suburbs did not take place in the medieval shrinking town, challenging the view that suburban areas were most suspectable to urban change. Instead the peripheral buildings on the rear of the plots

52 Brusse & Mijnhardt 2011, 13.
53 Brusse & Mijnhardt 2011, 33.
54 Renes 2011, 24.
55 The following paragraphs are based on the research master thesis of Minke Walda (Walda 2014; see also Walda 2016).
56 Lilley 2000, 256.
57 Astill 2000, 219; Lilley 2000, 236.
58 Keene 1985, 86-105.
59 Keene 1985, 105, see also 139-155; Astill 2000, 216.
60 Deneweth 2007, 534; Walda 2016, 203-204.
61 Slater & Higgins 2000, 14; Astill 2000.

– approached through a narrow passageway and hidden out of sight behind the street frontage – were most vulnerable to vacancy and demolition, while the more high-quality buildings on the street front remained intact.[62] He concluded that in Coventry, demographic contraction was accommodated within individual plots, without affecting the city's landscape overall.

Some people also took advantage of the urban decline. In early modern Bruges wealthier residents benefited from the decreasing housing demand and low housing prices, purchasing neighbouring buildings or plots to extend their own living space or gardens, in particular in the town centre and along the main streets and squares. Some amalgamated houses were embellished with a new façade – consolidating the building row – while the small houses and buildings on the side or back of the plot were demolished or converted into stables or coach houses.[63] Here, ruralisation manifested itself as an increase of private open and green space within the town, used as a yard, bleach field, kitchen or pleasure garden. Examples of these practices are also known from eighteenth- and early-nineteenth century Hoorn, Enkhuizen, Haarlem and Leiden and from Middelburg, Veere, Brouwershaven and Zierikzee.[64]

Fig. 2.9 Reimerswaal mapped by Jacob van Deventer (c. 1555). At that time the town was still largely intact, although the hinterland was lost by the flood of 1530. Even after a series of inundations and after extensive war damage (1574), the town was still inhabited. The last inhabitants left in 1631 (Zuurdeeg 1995).

62 Lilley 2000, 242-248.
63 Deneweth 2007, 534, 536-537.
64 Meischke *et al.* 1993, 92; Van Maanen & Groeneveld (ed.) 2003, 41; De Winter 2016; Vermeer & Koeman 2018; Walda forthcoming.

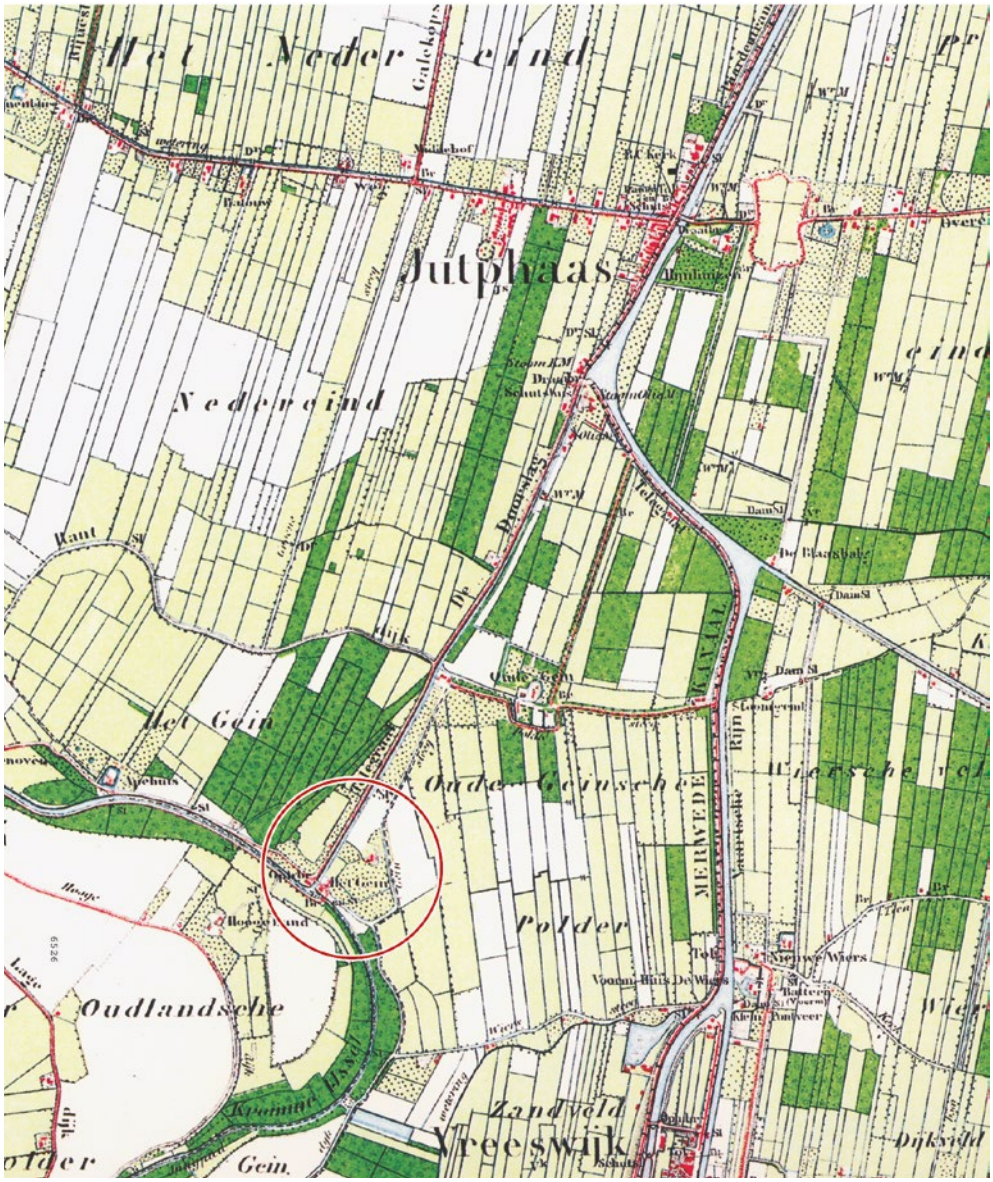


Fig. 2.10 The site of Het Gein on a topographical map of c. 1900 (Kadaster). The town started as a harbour settlement at the junction of the Hollandse IJssel and the canal Vaartse Rijn (dug c. 1126). Het Gein received a town charter in 1294. When the Hollandse IJssel silted up, the canal was extended to the river Lek (1331), after which the town was deserted. In 1423 a monastery settled around the still largely intact church, but was moved in 1572. In 1900 only one farm was left, the rest of the site being used as orchards.

2.3 The origins of urban farms and farming

Urban farmers live in towns, but generally have parts of their land outside of the towns. The existence of farms in towns may have different backgrounds.

2.3.1 Relics from the pre-urban period

Most early modern towns in the Netherlands have a pre-urban history, usually starting as a rural settlement. Generally, the process of town development went slowly and for many farmers little changed. They continued to farm their land as they did before. An example is the town of Utrecht, where the new town walls, that were built from 1122 onwards, included a number of semi-urban areas and religious enclosures separated by undeveloped open areas (Fig. 2.11). The last of these can be recognised by names such as Oudekamp, Nieuwekamp, Jansveld and Sint-Nicolaas Eng (translated into English as old enclosure, new enclosure, John's field and Saint-Nicholas open arable field), some of which were known for centuries after.[65]

Until the twelfth century, the process of becoming a town usually started with the development of trade and industries, leading to a nucleated settlement that became eligible to

[65] Stroeken 2012, 27.

Fig. 2.11 Utrecht around 1200, with still many agrarian activities (Stroeken 2012, 26).

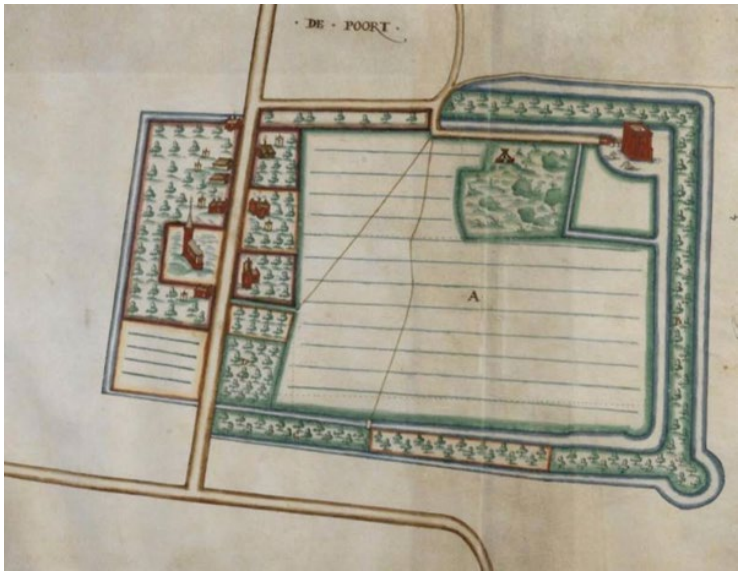


Fig. 2.12a Hagestein in 1583 (HUA, Oudmunster, Inv. nr 1300 fol. 18, VA 3709).

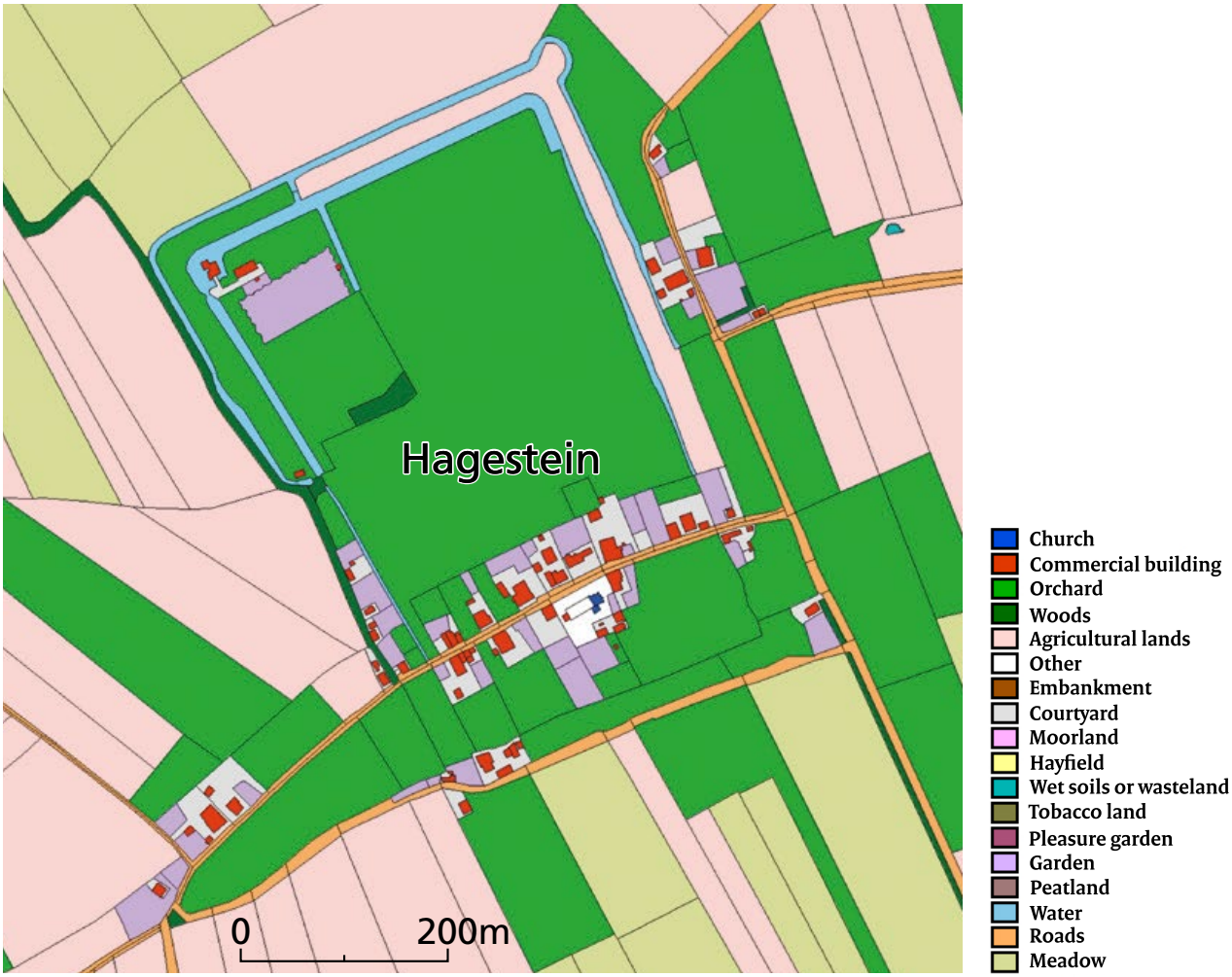


Fig. 2.12b Hagestein in 1822 (www.hisgis.nl, based on the oldest cadastral map). The cadastral map shows two parallel streets, a typical structure of villages in this part of the riverine region.

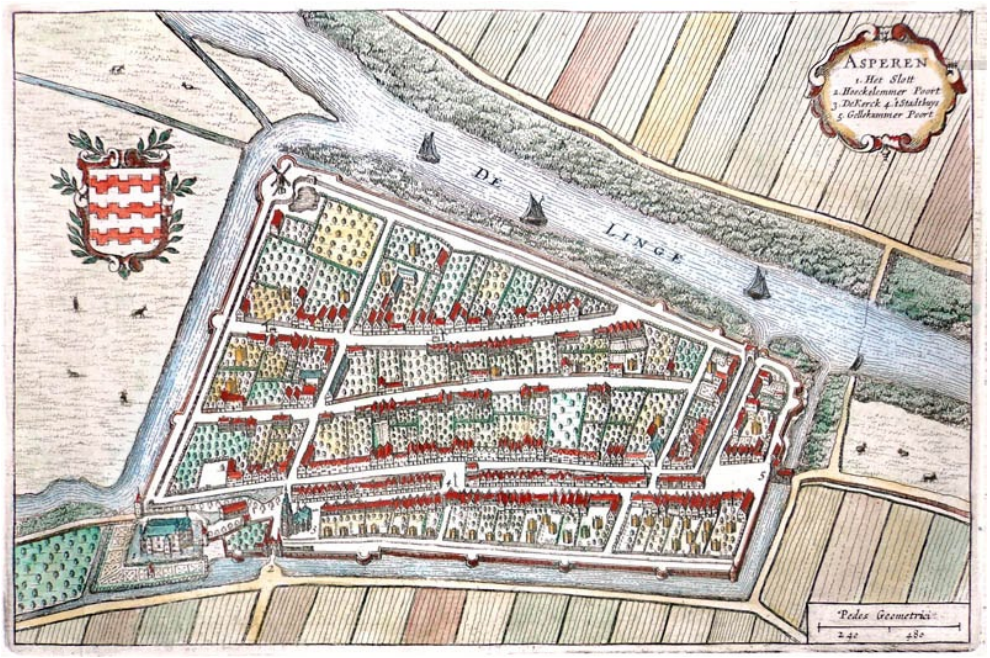
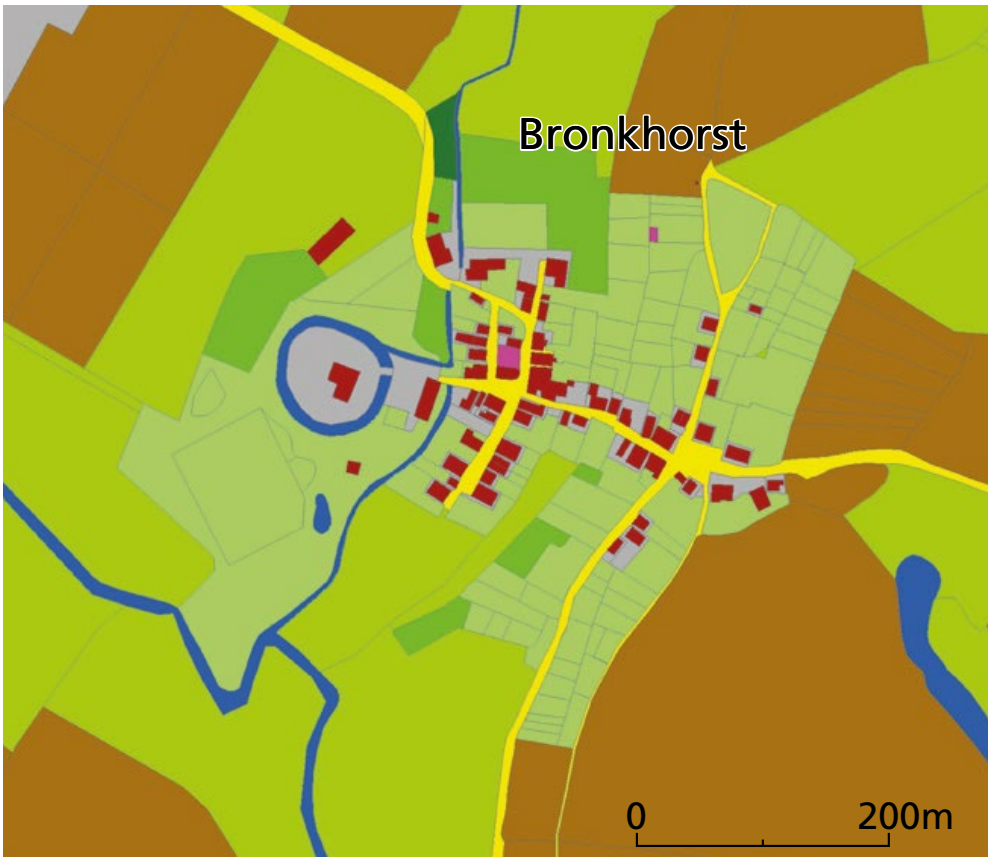


Fig. 2.13 Joan Blaeu's map of Asperen (1649) is not very accurate but shows the many orchards and haystacks in the town.



Commercial buildings
Orchard
Woods
Agricultural lands
Dikes
Courtyard
Moorland
Hayfield
Ecclesiastical
Swamp
Wet soils
Garden
Fortification
Water
Roads
Meadow

Fig. 2.14 Another example of a town that remained agrarian is Bronkhorst (Gelderland). This typical rural settlement (with a town charter dated 1482), attracts tourists by proclaiming itself (without justification) as 'the smallest town in the Netherlands' (www.hisgis.nl).

receive an urban charter. During the thirteenth and fourteenth centuries, the development usually started as a top down process, with landlords giving a town charter to the rural settlement next to their castle, in the hope that it would grow through trade and develop into a town. In many cases this process was unsuccessful, and several of these new towns remained completely rural and agrarian.[66] A large number of urban farms were located within these small towns, which are often described as 'failed towns'. In many cases this term is not justified, as we don't know the aims of the founders. It is quite possible that they were happy with a town of 1,000 to 1,500 inhabitants, which provided a small army in case of emergencies, whereas a larger town would probably escape the lord's control. In general, the term 'failed town' is therefore most often used by geographers and historians to describe towns that should or could have been potentially larger, but where town development and growth can be seen to have stopped.

The town plan of Nieuwstadt, near Sittard (Limburg), shows two concentric circles. The outer area has been described as a failed extension (which implies initial success)[67], but can as well be the result of a shrinking process in which the original, overambitious, town shrunk to become much smaller. In this case, we have a good example of a town that could indeed be described as failed.[68]

One example of a town that failed without doubt was Hagestein, the old village of Gasperden, which received a town charter from the local castle owner Otto van Arkel in 1382 (Fig. 2.12a and 2.12b). The place gradually took over the name of the castle, Hagestein. The new town must have shown some dynamic growth during its early years but was destroyed in 1405 and never recovered. A sixteenth-century map shows the village consisting of a church, the *rechthuis* and six farms.[69]

The Van Arkel family was responsible for a number of town foundations, as part of an ambitious programme to consolidate their territories. They were also responsible for the small towns of Heukelum and Asperen (Fig. 2.13). Their ambitions were halted by the counts of Holland during the Arkel Wars. Heukelum as well as Asperen remained small and almost completely agrarian (Fig. 2.14). In Asperen fifty active farms were still located within the town in the middle of the twentieth century and two farms are still working today.[70]

2.3.2 The foundation period of towns

The international literature contains several examples of farms and even complete villages whose populations were forcibly moved into a newly founded town, for reasons of safety or simply to populate the newly established town.[71] In the Netherlands no examples have been proven. Archaeologically this process should be traceable by a combination of urban farm buildings from the period of the town charter, and farm sites in the surrounding countryside that have been deserted around the same period.

2.3.3 The Integration of rural settlements in expanding towns

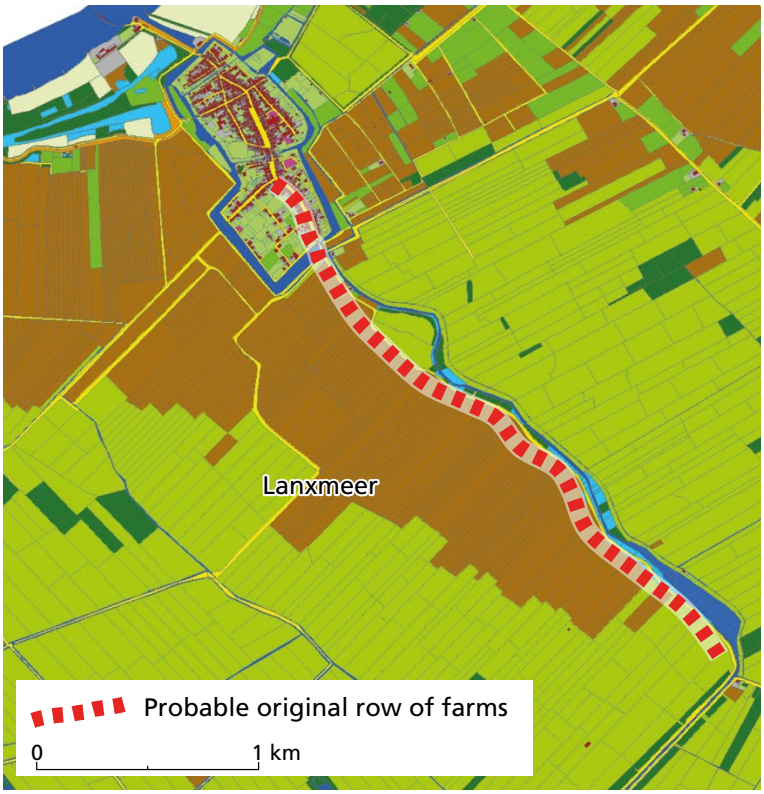
The physical expansion of towns often meant that rural settlements, including farms, became surrounded by urban activities and buildings. In the twentieth century, this process took place on a larger scale than ever before.

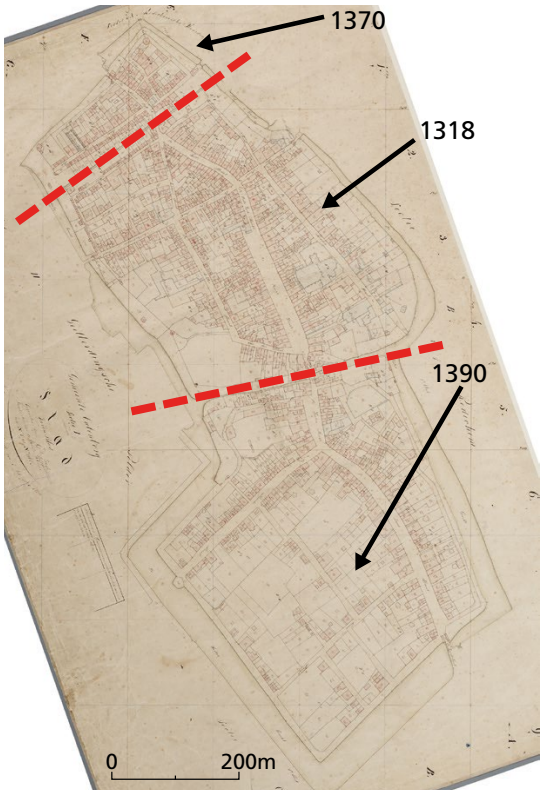
During this process, farms lost (parts of) their agrarian lands and sooner or later lost their agrarian function (Fig. 2.15a, 2.15b). The buildings, however, could still reflect their former function for a long period. Some farms even survived as urban farms, sometimes with an educational function (as petting zoos) or as a local supplier of milk or vegetables (Fig. 2.16).

2.3.4 Urban decline and ruralisation

The process of ruralisation of (parts of) towns is usually related to population decline, and or a shift from urban to rural occupations. An example of this is the northern part of the town of Gennep (Limburg), where old maps show an empty area. Archaeological research has shown that this area was being built over between the eleventh century and the fire of 1057, but after that remained empty for centuries.[72]

66 Examples in Van Engen & Rutte 2007.
67 Steegh 1985, 157.
68 There are few examples of towns that have been shrinking by downsizing the ring of fortifications. The only other known example is Rotterdam, essentially a successful town, that shortened the line of town walls around 1500, giving part of the urban area 'back to the countryside' (Van de Laar & Jaarsveld 2004, 23).
69 Van Acquoy 1982; Koenhein 1982.
70 Renes 2018.
71 Boerefijn 2018. Boerefijn mentions the example of San Giovanni Valdarne (Tuscany, Italy), founded by the town of Florence in 1299, where the inhabitants of six hilltop villages were forcibly resettled in the new town.
72 Mars 1991, 19; Schotten 1993.





Commercial buildings
Orchard
Woods
Agricultural lands
Dikes
Courtyard
Moorland
Hayfield
Ecclesiastical
Swamp
Wet soils
Garden
Fortification
Water
Roads
Meadow

Fig. 2.15a The Nieuwstad (new town) was the second extension of the town of Culemborg. It was situated in the northern corner of the medieval wetland reclamation of Langsmeer, named after an old river course. A row of farms was probably located where the long strip-fields bordered the stream. Later on, most of these farms were relocated to the new town quarter (www.hisgis.nl, RCE Beeldbank, cartography Ton Markus, Faculty of Geosciences Utrecht).

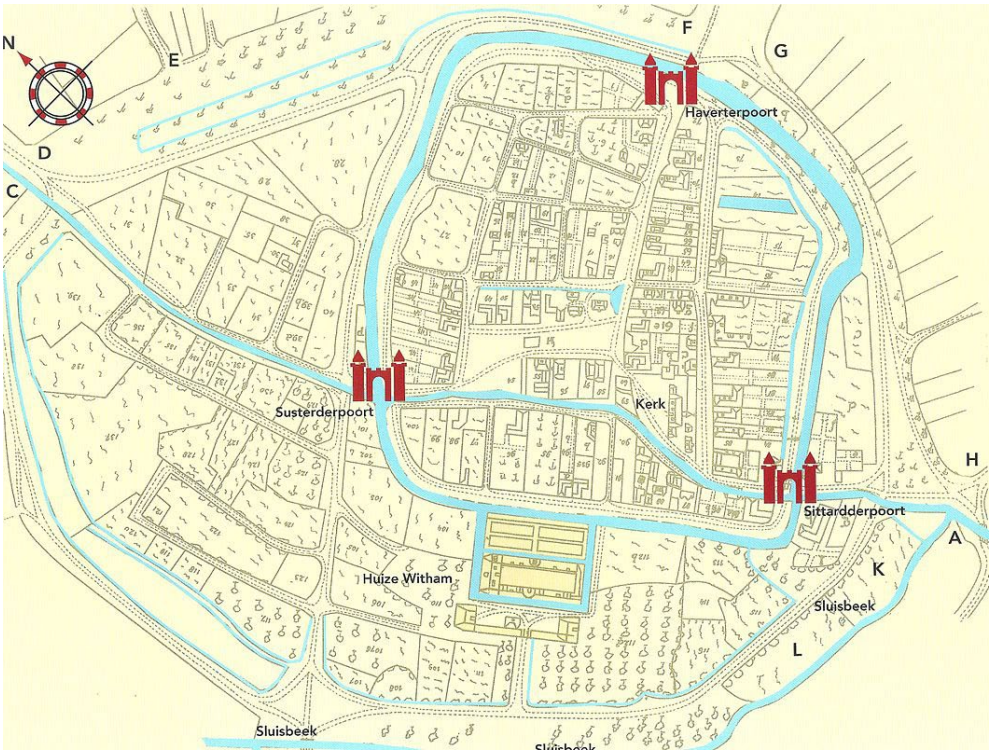


Fig. 2.15b Nieuwstadt (near Sittard, Limburg) seems to be an example of a failed town. The central area, surrounded by walls with gates, is for a large part agrarian. The outer area is usually seen as a failed extension (what would mean initial success), but can as well be the result of a shrinking process in which the original, too ambitious, town was made much smaller. Based on a map from 1640 (cartography Jan van Witham, nl.wikipedia.org/wiki/Huize_Witham#/media/Bestand:Kaart_met_kasteel_anno_1640.jpeg; 29-8-2018).

Fig. 2.16 Enkhuizen, the Oudegracht with boat houses on the canal. The farmers used boats for transport of their horticultural products from their plots outside the town to the inner-town farms.

Enkhuizen is a textbook example of a town that has seen demographic decline. Between 1650 and 1850 the population declined from c. 25,000 to c. 5,000 inhabitants.[73] From an estimated 3,615 houses in 1630 more than 2,500 houses, stables and warehouses had disappeared in 1840.[74] A comparison of the map of Blaeu (1649) with the first cadastral map of the town (1832, measured in 1823) shows the impact of the demographic and economic decline on the morphology of the town (Fig. 2.17; Fig. 2.18, Fig. 2.19a, b, c, d). The *slooperij-storm* (demolition wave), as local chronicler Brouwer called it, resulted in a strong reduction of the built-up area within the town.[75] The built-up

[73] De Vries 1987.
[74] De Vries 1987, 84, 86. In the tax records of 1630 3.615 houses were registered within the town walls of Enkhuizen. In 1840 the number had decreased to 1.026 buildings.
[75] Brouwer 1938, 170.

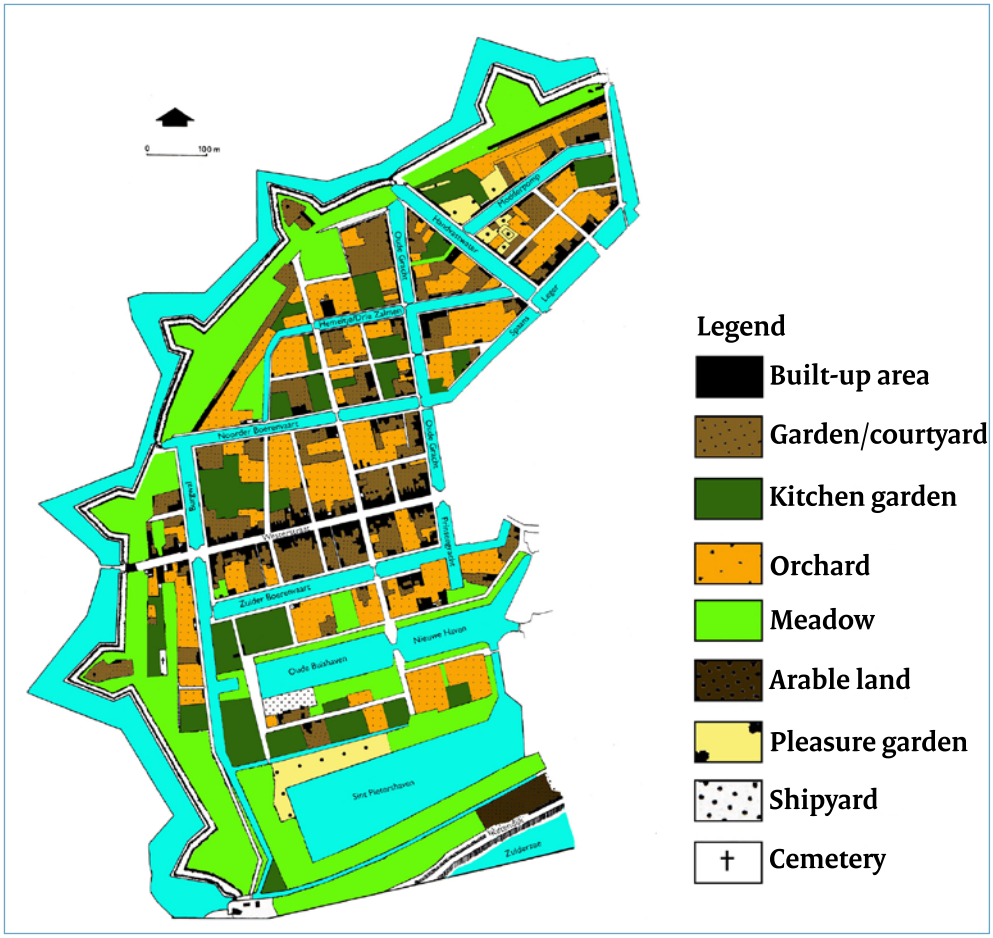


Fig. 2.17 The Nieuwstad (New town, the 1599 extension) of Enkhuizen, was never fully built. In particular the north western corner preserved a green character, housing rope walks and gardens, visible on the map of Blaeu. In the long eighteenth century demolition in this area was severe, in particular in the harbour area. De Vries calculated 72.8% of the surface was unbuilt in 1832 and used as pasture (40.8%), orchard (18.9%), vegetable garden (*moesland*, 9.7%), garden or yard (1.9%) and arable land (1.5%) (Vermeer & Koeman 2018, 206; De Vries 1987, 98). Private pleasure gardens of more well-to-do inhabitants were mixed with vegetable gardens and orchards of craftsmen and laborers, who possibly were able to sell surplus produce (Vermeer & Koeman 2018). In the same year at least thirty farmsteads were located within the town walls (De Vries 1987, 100). A few years later the land consolidation project meant the end of most urban farmers. Some of the old farm buildings are still recognisable.

Fig. 2.18 The Boerenhoek at Enkhuizen (RCE Beeldbank nr. 77.168).

area contracted to a more compact form, enhanced by urban regulation.[76] The late-medieval core and the main streets were least affected by the demolition, while demolition was most severe in the harbour regions and outskirts of the town, including most of the extension of 1593-1607.[77]

As in Bruges, the wealthier residents of Enkhuizen benefited from this contraction, buying neighbouring houses and plots to enlarge their own living space or garden. Sometimes the garden plots were even extended across the full depth of

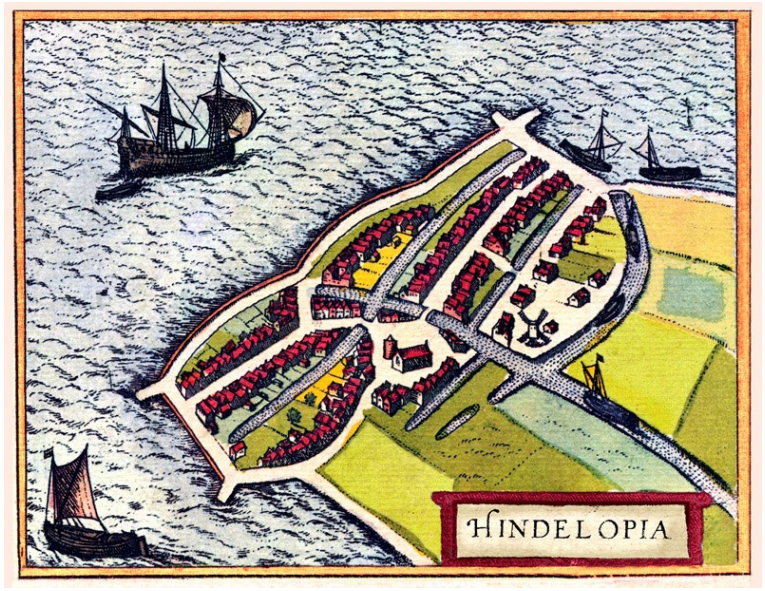


Fig. 2.19a

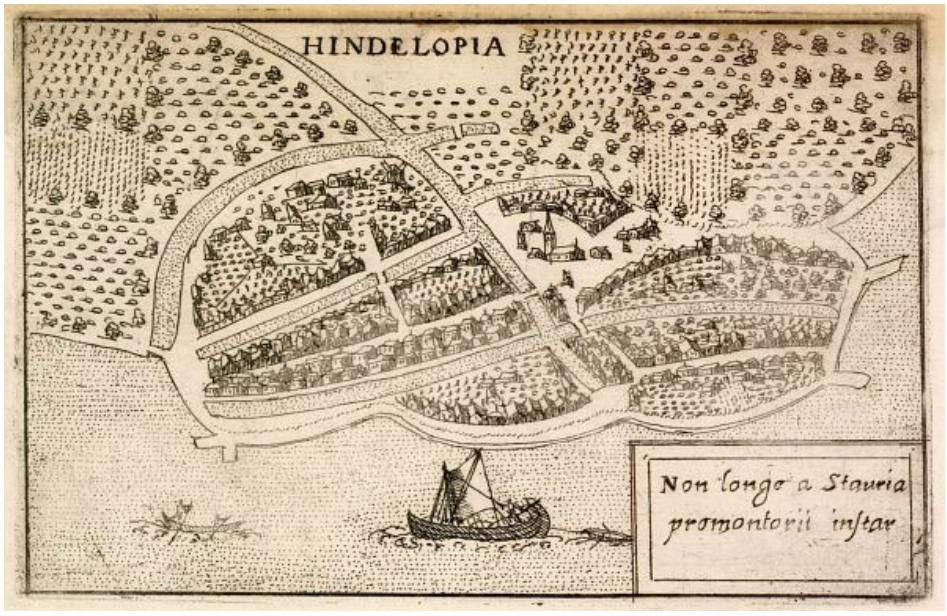


Fig. 2.19b

[76] Walda 2016.
[77] Stenvert 2010.

Fig. 2.19c

Fig. 2.19d

Fig. 2.19 a, b, c, d Another example of ruralisation is Hindeloopen (Friesland). Legend: Fig. a The town is shown in 1564 (Braun & Hogenberg); Fig. b during growth (ca. 1600); Fig. c at its summit (Schotanus, 1664); Fig. d after a long period of decline (www.hisgis.nl, based on the situation in 1832). Fig. d shows open spaces, particularly around the church. Only the Nieuwstad (the new town, the seventeenth-century addition) kept an urban character. Bottom right are the urban common pastures.

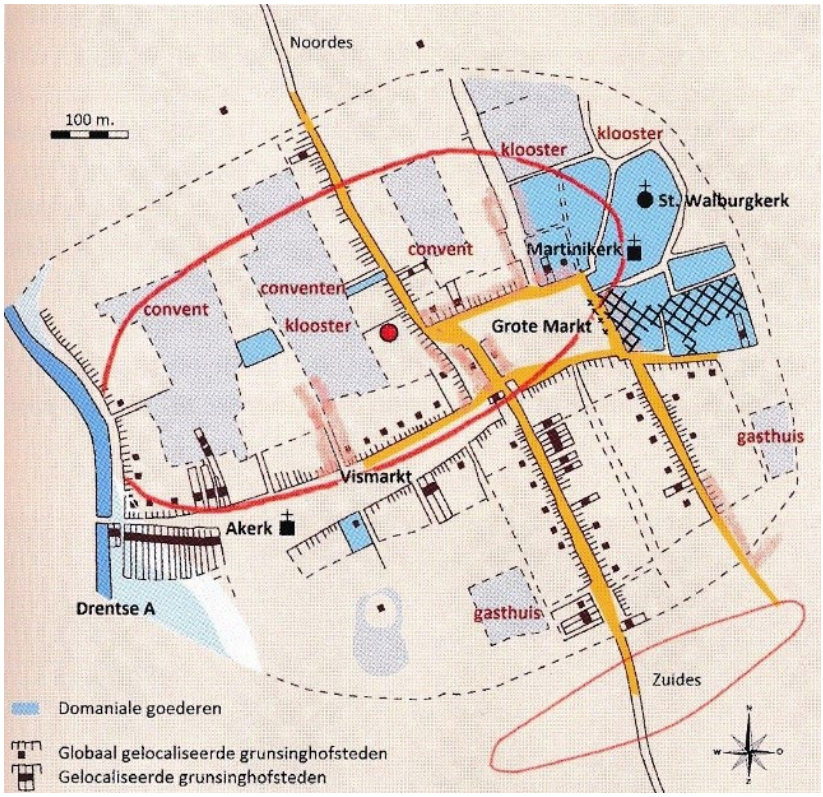


Fig. 2.20 Early-medieval Groningen was a royal estate, described in 1040 as the villa Cruoninga. The map shows the demesne (in blue colour) with St. Martins church (g, next to – and perhaps on – the site of a graveyard that went back to the seventh century and St Walburgis church (h, demolished 1627)). West of the demesne one of the greens, the present Grote Markt. This edges to another green with the A-church (f). The 'grunsinghofsteden' were farms that paid a certain tax that connected them to the oldest phase of the town (After Huis in 't Veld *et al.* 2019, 27).

the street block, transforming the hierarchy in the street from main street to secondary street, or back alley.[78] The many empty plots were re-used as pasture, vegetable garden, orchard or pleasure garden, sometimes with a garden house or summerhouse, which could be adorned with one or two bay windows. These garden houses were often very shallow, made of stone or wood and ran the full width of the plot, forming a tall screen shielding the garden behind.[79]

2.4 Agrarian land-use in towns

2.4.1 Pre-urban structures

The role of agriculture changed over the course of time. The rural background of many towns is often still recognizable in the road-pattern. Sometimes the roads taken by cattle to the urban market are still visible in street names: the Koestraat (cow street) in Amersfoort), the Kalverstraat (calf street) and the Koepoort (cow gate) at Enkhuizen.[80] Some of these streets may have started as drove roads in the pre-urban settlement.[81]

Urban archaeologists will often find traces of the pre-urban agrarian settlements in archaeological excavations.[82] In the centre of Groningen, archaeologists have discovered a complete agrarian village, including farms and arable fields. The early medieval core of Groningen included a royal *curtis*, later belonging to the bishop. The main squares in the town of Groningen started as village greens (Fig. 2.20).[83] Also in Amersfoort the bishop owned a curtis. When the town grew, agriculture gave way to other activities. Some farm buildings received new functions, but were still recognizable. However, economic and demographic decline could also mean a return of agriculture: ruralisation.

Towns can be important for the study of rural settlements for two reasons. Firstly, there is archaeological research in towns which also includes rural elements. Secondly, the dense building in towns may have fossilised early village structures.

2.4.2 Farms and farm buildings

In many towns, houses and other buildings exist that can still be recognized as former farm buildings. Within a middle-sized town as Zaltbommel, around 1900 some forty farms still existed. Nowadays all agrarian enterprises have gone, although some of the buildings still exist.[84] The same is true for almost all other urban farms. Only a few of those have been thoroughly researched with the methods of building historians (building archaeologists), sometimes with surprising results. The house Achterstraat 18 in the small town of Wijk bij Duurstede was originally dated eighteenth century (still the date given in the image library of the National Heritage Agency), but has been dendrochronologically dated 1495 and counted for some years as the oldest known farm building in the Netherlands (Fig. 2.21).[85]

78 Walda 2014; Vermeer & Koeman 2018. Comparable examples of this 'downgrading' of a main street to a secondary street by demolition of the building stock and transformation of the plot tail into a stable, coach house or garden, closed off with a fence, are known for the towns of Zeeland and Leiden (De Winter 2016; Van Maanen & Groeneveld 2003, 41).

79 De Vries 1987, Vermeer & Koeman 2018. The bay windows are known as 'koepels' (domes) in Enkhuizen.

80 nl.wikipedia.org/wiki/Lijst_van_straten_in_Amersfoort, 8-4-2019; nl.wikipedia.org/wiki/Kalverstraat, 8-4-2019.

81 We always have to be careful with such names. The Koestraat at Maastricht, mentioned 1524, may have taken its name from a house sign with a cow (although this in itself points at a rural connection). (www.maastrichtdigitaal.com/stadsdelen/maastricht-centrum/jekerkwartier/straten-en-pleinen-van-het-jekerkwartier/koestraat, 8-4-2019). The Koestraat in Amsterdam may refer to a convent that fattened cows for the dish of the local militia (www.joodsamsterdam.nl/koestraat, 8-4-2019).

82 Sarfatij 1990.

83 Boersma, Kortekaas & Noomen 1990; Huis in 't Veld, Tuin & Kortekaas 2019; Bouwer 2016, 22-23.

84 Van Tussenbroek 2003, 176-177.

85 Gaasbeek, Kooiman & Olde Meierink 1991, 85-87.

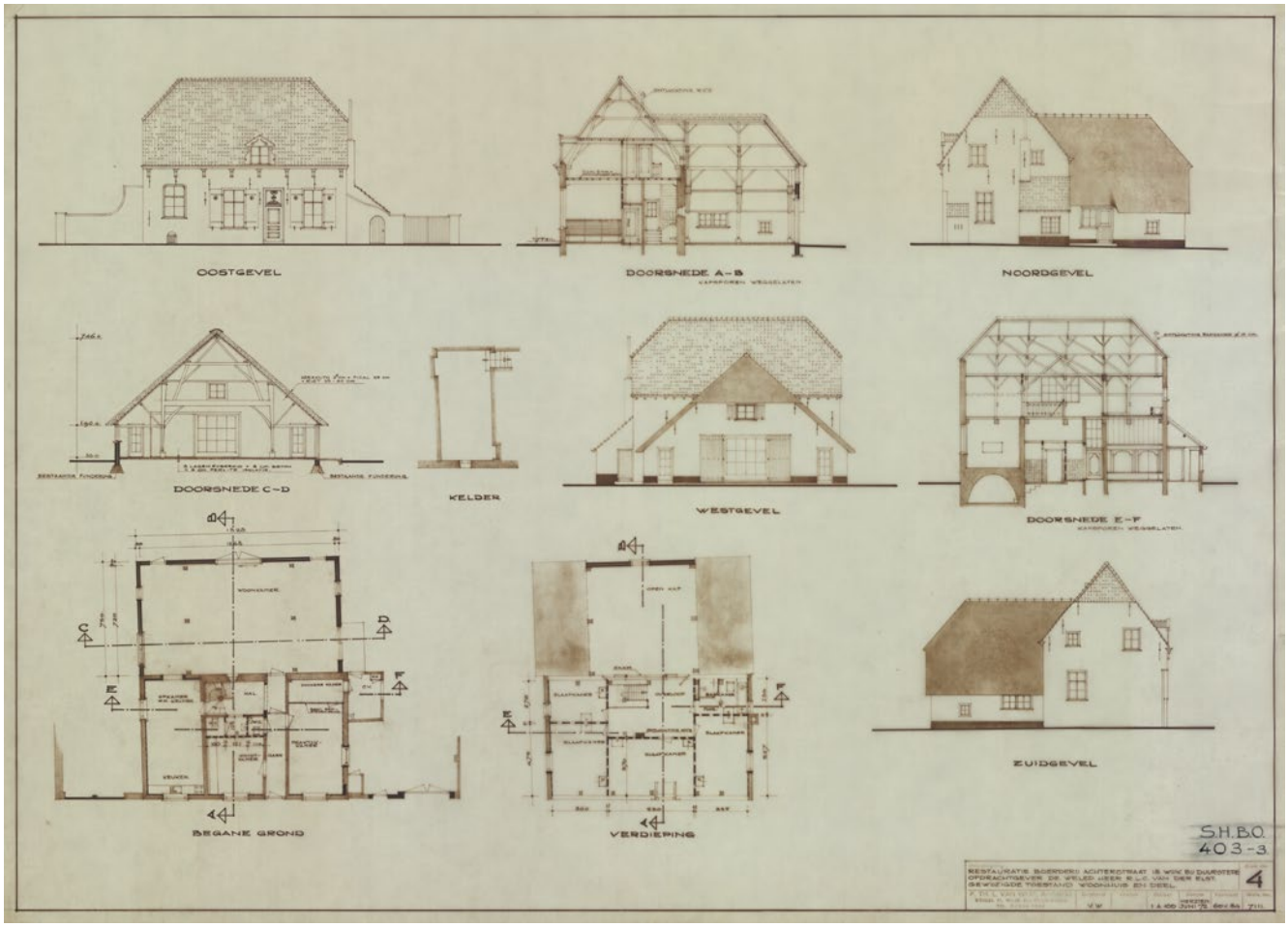


Fig. 2.21 The former urban farm Achterstraat 18, Wijk bij Duurstede, now in use as a dentist's practice. The building has been dendrochronologically dated to 1495 (RCE Beeldbank, nr. SHBO 0403.003).

Parts of a farm in the town of Leiden proved even older, where one farm roof has been dated to c. 1409. This roof belonged to a farm in a linear agrarian settlement on a dike along the Rhine. In time, shortly after 1350, it became incorporated into the second town extension. The farm was rebuilt in brick around 1409, at which time the dated roof timbers were added. There were additional phases of rebuilding, but the building remained in use as a farm until 1671.[86]

Archaeologists are able to identify early-modern farms in parts of the sandy landscapes as their stables had deepened floors to collect dung during the year (in Dutch *potstallen*).[87] Other buildings related to farms include various types of sheds and haystacks (Fig. 2.22). The siting of haystacks within urban areas was not without danger. We have already noted the large number of haystacks within the town of Asperen (Fig. 2.13), where children playing caused the last large town fire in 1896. For this reason, some towns (Hasselt) moved their haystacks to the fields (Fig. 2.23). In Delft farmers had to store their hay on the attic of their houses after the town fire of 1536. Haystacks themselves were banned and later forbidden within the town.[88] In Kampen most of the hay was stored in the fields outside the walls or in the winter partly at the attic of the cattle farmers residences.[89]

2.4.3 Agrarian land within towns

Archival sources are not always clear whether a field was situated inside or outside of a town. An example of this is the *hopkamp* (hop garden) that was mentioned at Venlo, a town with

86 De Vos 2016.
87 Bouwer 2016, 23; Schabbink 2015, 8.
88 Groenewoudt 2011, 187-197; Van der Wiel 2015, 16-17.
89 Hendriks 1953, 86.

Fig. 2.22 Haystacks in the town of Genemuiden on an old postcard (Archief gemeente Zwartewaterland).

Fig. 2.23 A postcard with haystacks outside the town of Hasselt (Historische vereniging Hasselt).

extensive rural land, in 1564.[90] Orchards were a normal sight within towns, as is shown on many old maps. In North-Limburg they are mentioned during the fifteenth century in and around Roermond, Venlo and Thorn.[91] Indeed, on seventeenth century maps of many small towns orchards are dominant (see the maps of Hagestein and Asperen, elsewhere in this chapter). In the centre of Thorn, a vineyard, nowadays still referred to with the street name Wijngaard, existed in 1566.[92]

2.4.4 Gardens and boundaries

An enormous amount of literature exists on field boundaries in rural landscapes, whereas this theme has hardly been addressed in urban contexts. One of the main treatises of this subject can be found in Deneweth's PhD thesis on Bruges.[93] She investigated the development of three neighbourhoods of differing levels of

90 R.A.L., Archief Kruisherenklooster, Venlo, inv. nr 78.
91 Orchards are mentioned (but unspecified) in the foundation charter of the Munsterabdij at Roermond (OGZ-1994, charter 1224.02.28). In 1439 two orchards outside Roermond on the river Roer are mentioned (R.A.L., Losse charters Roermond, nrs. 19 and 20), in 1440 and 1447 also around the small town of Thorn (R.A.L. Archief abdij Thorn I, nrs. 321 and 350) and in 1465 near the Crosiers monastery at Venlo (R.A.L. Archief Kruisherenklooster Venlo, inv. nr 50).
92 R.A.L. Archief abdij Thorn II, nr 23.
93 Deneweth 2008.

prosperity in Bruges from the late Middle Ages until the nineteenth century. Over this time period many of the houses made use of pleasure gardens, orchards and kitchen gardens. These same uses can be found on a larger scale in the monastic gardens that were mainly located in the edges of towns, adjacent to the town walls. Urban gardens were surrounded by walls, hedges (of thorns or berry bushes) or wooden fences. The boundaries were used to delineate properties, to keep animals in or out and to give privacy, but could also limit the available sunlight in the garden. They were sometimes a source of conflict, making them visible in the archives. During the middle of the sixteenth century – and probably earlier – brick walls were already characteristic for the richest of the neighbourhoods, but in the other two neighbourhoods hedges or wooden fences were still being planted or erected. In poorer neighbourhoods some gardens remained unenclosed during the sixteenth century, as the inhabitants of the houses still shared wells or toilets. Gradually most garden boundaries were rebuilt in brick. Brick fences were more expensive to build, but were more durable and asked for less maintenance than the other types.[94]

2.5 The wider picture: urban agriculture outside the towns

There are several reasons to include areas outside of the medieval towns in this report. One is that agricultural activities within the towns were connected by activities outside the walls. The town commons, which were owned by all urban communities, were an integral part of urban agriculture. Another, perhaps even more important point is that the large majority of former urban fringes and substantial parts of former countryside are now part of the urban area and therefore belong to the domain of urban archaeologists.

2.5.1 The urban fringe

Many towns were surrounded by what would in the twentieth century come to termed urban fringe: a zone close to the town that was exploited from the town and that showed a

Fig. 2.24 Amsterdam by Blaeu (1649). The map shows an extensive urban fringe on the southern and eastern side of the town (the north is below). On the western side of the town the urban fringe had disappeared shortly before under the urban extension (the third extension, that included the Jordaan quarter).

mixture of 'urban' activities evicted from the town (such as polluting, or smelly or dangerous industrial activities, or activities that took up too much space) and 'rural' activities aimed at the urban market (Fig. 2.24). On the northern side of Bruges tenter fields were used to hang and dry woollen clothes on tenterhooks; later, from the mid-sixteenth century as cloth production changed to spun and weaved fustian, these became bleaching fields.[95] Other examples include land used for horticulture and allotments. In 1266 a vineyard was located near Roermond, and shortly before 1399 a field outside the Nielerpoort (a town gate) was turned into another vineyard.[96]

In the sixteenth century commercial horticulture expanded quickly in the urban fringe around Leiden and Delft. This was followed in the seventeenth century by areas such as Langendijk, the Streek (West-Friesland), de Oude and Nieuwe Wetering and the area around Beverwijk and Amsterdam, producing fruit, herbs and vegetables for the swiftly growing towns of Holland. In particular, the area around Leiden developed into the most important centre for market gardening in the Dutch Republic.[97] Private allotments produced fruits

94 Deneweth 2008, 465-481.
95 Vandamme *et al.* 2018, 445-484.
96 OGZ (1988), oorkonde 1266.07.31; R.A.L., Archief Kruisheren Roermond, inv. nr 112.
97 Harten 1978, 115, 118, 120-121; De Jong 2000, 124.

and vegetables, mainly for consumption by their owners.[98] This offered poor urbanites the possibility to produce their own food and, by doing so, to become more independent and in some cases to be recognised as citizens.[99] Glasshouses and sheds can be found in many allotments.[100]

The number of allotments grew during the nineteenth century, in the countryside as well as in towns. In the United Kingdom allotments were made available to the increasing numbers of urban poor in the booming industrial towns by the *Allotment Acts* that were introduced from 1887 onwards.[101] Allotments subsequently became part of a world-wide movement.[102] In the Netherlands, a number of allotment-societies (*Volkstuinverenigingen*) were founded after 1928 by those cooperating in the political lobby group *Algemeen Verbond van Volkstuindersverenigingen in Nederland (AVVN)*.[103]

Allotments were often pushed outwards by the growth of towns or, particularly during the early modern period, by an increase in the areas that were used for fortifications. Nevertheless, allotments have remained a feature of the urban fringe in the Netherlands until the present day.[104]

2.5.2 Urban controlled agrarian land in the countryside

Town dwellers have always owned land in the countryside. In many cases that may have been land that was kept in the family after family members moved to the town, or land that they inherited from rural relatives. In other cases, rural land may have been bought as an investment, or as the basis for a country seat. This process is well-known in the Early modern period, but was already underway in the Late Middle Ages.[105] Table 2.2 shows that halfway through the sixteenth century in the region around Utrecht a substantial part of the land was owned by institutions (most of which were located in the town) and by citizens. These lands are left out of the present report.

More interesting is land in the countryside that was exploited by townspeople. In most cases this land was situated close to the town. The land could be privately owned or could be rented from the town or from urban institutions. Many town charters contained regulations that allowed townspeople to spent time out of town

Table 2.2 Land ownership in the present province of Utrecht around 1540. After Dekker (ed.) 1997, 24.

Land	Land ownership (%)				Region
	institutions	nobility or citizens	farmers/users	other (unknown)	
Houten and 't Goy	45	29	21	5	Kromme-Rijngebied
Neerlangbroek	44	25	13	10	Kromme-Rijngebied
Werkhoven	33	48	4	15	Kromme-Rijngebied
Lopik	32	22	33	13	Lopikwaard
Gerverskop	53	21	13	13	Midwesten
Harmelen c.s.	52	30	6	12	Midwesten
Galecop	70	16	8	6	Midwesten
Vleuten	51	43	2	4	Midwesten
Nigtevecht	27	12	48	13	Vechtstreek
Abcoude-Staten Gerecht	19	7	44	30	Vechtstreek
Zuilen	84	14	2	1	Vechtstreek
Bunschoten	7	34	48	11	Eemland
Asschat	24	55	4	17	Eemland
Hamersveld	20	64	5	11	Eemland
Stoutenburg	43	53	0	4	Eemland

98 Björklund 2018.
99 Lottrup Rasmussen 2018.
100 Way 2008.
101 Way 2008, 15.
102 Way 2008, 47-53.
103 nl.wikipedia.org/wiki/Volkstuin, 2-7-2019.
104 Way 2008; Segers & Van Molle 2007.
105 Groenewoudt 2013.

for their agrarian work without losing their rights as citizens. In Beverwijk a citizen could stay out of town for 28 days in a year, in Haarlem and Delft 40 days.[106]

2.5.3 Town commons

A common is an area of land, in private or public ownership, over which people have customary or traditional use rights. The main rights were those of pasture (grazing animals), pannage (feed pigs on acorns or beech mast), estover (small wood), and the right to take turf, sand or gravel.[107] Many towns disposed of common lands, which were generally used as pastures, for the cattle of their inhabitants. It is possible that some of these urban pastures also had a role in the long-distance trade in cattle. As in commons in general, some of these areas were open for use by all inhabitants, whereas others were monopolized by a group of citizens. The origins of many urban commons must go back to the pre-urban period, and this is an interesting topic for further research.

Little is known archaeologically about town commons in the Netherlands although some have been described by historians.[108] The urban pastures of Utrecht, known as the Hoge and Lage Weide (High and Low Pastures) started as commons on which the citizens were allowed to pasture their cattle. Later these areas were rented out, providing additional income for the town. In 1432-1434 the town sold the urban pastures.[109] The common urban pastures of Amersfoort, together with pastures owned by the town's citizens may have been used in the extensive trade in oxen, in which the town was an important link in the national supply chain.[110]

A very different picture can be seen in the town of Kampen, where the new lands that silted up in the delta of the river IJssel, the so-called Kampereiland, remained under the ownership of the town. In the course of time a large number of farms were established on this new land. Next to the 'Eilandboeren' ('Island farmers') another type of farmers, the so-called 'stads- or koeboeren' ('town or cow farmers') lived in Kampen (Fig. 2.25).[111] These farmers made use of the town meadows on the southern side of the IJssel river, but lived within the town walls. The strong agrarian character of the town was related to the town charter. All inhabitants who possessed citizenship of Kampen had permission to graze their cattle on one of the town meadows, but these rights were lost when the owner went to live outside the walled

106 Bouwer 2016, 23.
107 Bowden, Brown & Smith 2009, 1.
108 Postma, 1928; Prakken 1952.
109 Acket 1931.
110 Snieder 2010.
111 Hendriks 1953; De Vries 1987, 105.

Fig. 2.25 Kampen, Farm nr 36 on the Kampereiland in 2005 (RCE Beeldbank 20380750).

town.[112] In the course of time the organisation of urban farmers started to see itself as the owner of the town commons, but in 1901 it was decided that the town itself owned these lands and that pasture of cattle was only allowed to farmers who owned a stable within the town.[113] This 'meadow right' proved to be an attractive pull factor and attracted migrants to the town. The milk was sold within the town (the Dutch term for milkman is still *melkboer* ('milk farmer').[114]

From 1769 onwards 'koeboeren' were obliged to possess a stable within the walls.[115] Contrary to Enkhuizen, the cattle farmer houses were difficult to distinguish from neighbouring civilian houses. Only a hay hatch on the upper floor marked the existence of a cowshed. The cattle were housed at the back of the house, behind a formal living room with bed boxes at the front. Dung was often collected in the yard behind the house. Most of the houses lacked a passage at the back of the house. Therefore, cattle, hay and dung had to be transported through the front door and passage to the back of the house.[116]

A recent report by English archaeologists shows that town commons can be an interesting subject for archaeological research.[117] This is in part due to the remains ancillary activities that may have taken place on the town commons, such as gravel extraction and stone quarrying. As commons have often remained under grass and not been ploughed for centuries, they also have the potential to contain well-preserved prehistoric remains, such as tumuli, or old field systems. Unfortunately, the limited amount of archaeological research that has been undertaken on (former) urban commons in the Netherlands, such as those at Hindeloopen and Roermond, has failed to produce any significant archaeological results.[118]

2.6 Archaeological correlates

A.D. Fischer

2.6.1 The visibility of transitions

As rural or proto-urban settlements often grew into towns, earlier agricultural components often remained preserved within the town plan for a long time. Indeed, in some cases former agricultural features never disappeared from medieval or early modern towns. The problem in archaeological terms is that there is never a clear turning point that can be pin-pointed as a moment of transition. The decline in agricultural land use, and changes to buildings and the spatial layout of building complexes are more visible. However, the production of food for personal use took place on a relatively small scale at the household level, which may also limit its archaeological visibility.

2.6.2 Urban farming themes

Urban farming encompasses all activities associated with the growing of food crops and rearing of animals for food and farming in urban spaces. This includes growing, harvesting and marketing food in or near a town. The rearing and keeping of livestock and the rearing of fish for consumption are also included. These activities can be arranged thematically. The different facets of urban agriculture will therefore be elaborated in the following themes:

- animal husbandry and fish farming;
- arable farming;
- horticulture;
- orchards;
- general urban farming and ruralisation.

2.6.3 Categories

Within these themes, different types of information are available from reports that are either:

- archaeological;
- historical;
- pictorial;
- cadastral.

These different sources of information will be processed in the theme chapters (Chapters 5, 6 and 7) using a recurring structure, with questions to be answered as a guideline. These are the very basic questions starting with what, how, who and why. Their relation to the research questions introduced in Chapter 1 is explained below. It should be noted that the focus of this report lies firmly on the available archaeological information. Information from historical, pictorial and cadastral information has been

112 Selles 1996, 159.
113 Selles 1997, 187.
114 Selles 1997, 193.
115 Hendriks 1953, 68.
116 Hendriks 1953, 86-88.
117 Bowden, Brown & Smith 2009.
118 Visser & Marinelli 2005; Van der Klooster & Helmich 2012.

added to provide additional and or supplementary information as required.

2.6.4 Elaboration of the research questions

What? (question 1) In the first instance, it concerns the facets of urban agriculture and the manifestations will also vary from theme to theme. This question lies at the core of the archaeological inventory. A spectrum of references to urban agriculture will be compiled from the data collected, from tillage, fertilization, dung storage, processing waste, cattle barns to tree planting. The archaeological information can be further subdivided into traces and structures and loose finds. As stated above, the clues are not only archaeological or historical in nature, but also include pictorial and cadastral sources such as historical maps. A deeper understanding of the subject can be achieved by collating archaeological evidence with information from other sources. This resulting synthetic overview will not only yield the multiple facets of the subject, but also the nature of the knowledge that is available from different disciplinary perspectives.

Where? (questions 2 and 4) This question relates to the spatial organisation of activities. The way in which open space within – and just outside – towns was used for urban agriculture will emerge from the data in the reports and differs for each town. As the possibilities for either livestock farming or arable farming/ horticulture will vary, it will be difficult to draw general inferences. However, it may be possible to identify regional trends for different periods or general overarching strategies. Hence, while the locations of stables or the storage of hay or harvests will not have been regulated in the same way in every town, general trends can be established, mainly from written sources. In order to gain insight into the potential, a spatial analysis of a sample of 25% of the selected towns will be carried out on the basis of historical maps in order to determine the relationship between built-up and undeveloped space in different periods of time. This spatial pattern analysis provides insight into the degree of administrative or economic planning, for example rules for fire prevention, hygiene or nuisance. Here, too, a chronological framework is necessary in order to be able to trace development through space and time, first by town, and then between towns and within regions.

How? (questions 3 and 6) In order to work out the various forms of urban agriculture (question 3), the data from the reports will be arranged by theme. The nature of production will also give access to the volume of agricultural production (question 6). From this, insights into the degree of self-sufficiency of the inhabitants and possible surplus for food production in the town itself or from the markets might be obtained (question 6). The economic significance of urban agriculture is usually underestimated, but will be approached by means of estimates based on spatial analyses.

Who? (questions 5 and 7) The ways in which urban agriculture was socially embedded is an important aspect of this research. The spectrum ranges from urban farmers who worked full-time in agricultural production to town dwellers who partly supplied themselves with vegetables through a vegetable garden in the backyard. The data will be arranged and presented both thematically and chronologically.

Why? (question 8) In the synthesis the similarities and differences between towns, regions, and periods will be put into a broader perspective.

2.6.5 Ruralisation

The intensification of agricultural activities within a theme can be an indication of either ruralisation or professionalization. The indications will be explained for each theme so that they can be integrated into the spatial analysis of the sample of selected towns at a later stage.

3 Method

A.L. Blonk-van den Bercken, A.D. Fischer and R.M. Visser

3.1 Selection of towns

The *Atlas of the Dutch urban landscape*, more particularly the map depicting urbanisation between the eleventh and fifteenth centuries, has been used in order to make a suitable selection of towns for this study.[119] In accordance with the assignment, the selection of towns is based on a diverse topographical distribution and differ the towns in foundation periods. A total of 84 towns has been selected (Table 3.1), of which thirty are referred to in literature as 'failed towns' (see Section 2.3.1). 80 towns do appear in the aforementioned atlas. Four failed towns have been added on the basis of literature research and do not appear in the atlas. The selection of towns is based on an equal and balanced distribution in terms of chronology, topographical and landscape setting throughout the Netherlands.

3.2 Selection of ARCHIS case-identification numbers

All archaeological finds, excavations and other reports of fieldwork in the Netherlands are stored in a centralised database, ARCHIS (the *Archaeological Information System*) since the early 1990s.[120] Most archaeological reports are also stored in or linked to ARCHIS. ARCHIS served as a main resource for reports that need synthesising. The database uses unique case-identification numbers (*zaakidentificatienummers*) and these are referred to during the analysis.

Of the 84 towns, all ARCHIS case-identification numbers were selected (see Fig. 3.1, Fig. 3.2 and Fig. 3.3). A GIS was used to make this spatial selection. The basis of the GIS is formed by the contours of the town maps drawn by Jacob van Deventer (c. 1560) with a buffer of 600 metres around each town.[121] As mentioned, four towns were not recorded by Jacob van Deventer and lacked historical maps.[122] For these towns, the historical centre was used and expanded by a buffer of 600 metres.[123] All ARCHIS case-identification numbers within these zones regarding test trenches (*Inventariserend VeldOnderzoek - Proefsleuven*, IVO-P), excavation investigations (*Definitieve Opgraving*, DO) and watching briefs (*Archeologische Begeleiding*, AB) have been included in a database. The selection was limited to archaeological fieldwork that has been carried out in the period from 1 January 1997 up to and including 31 December 2017 (20 years). This resulted in a selection of 2,278 ARCHIS case-identification numbers in the selected 84 towns.

Table 3.1 Overview 84 selected towns and failed towns. Towns which do not appear in *Atlas of the Dutch urban landscape* are marked with an *.

Towns		
Alkmaar	Enkhuizen	Oldenzaal
Amersfoort	Franeker	Purmerend
Amsterdam	Goes	Roermond
Arnhem	Gorinchem	Rotterdam
Bergen op Zoom	Gouda	Schiedam
Bolsward	Groningen	Sneek
Breda	Haarlem	Tiel
Coevorden	Harlingen	Utrecht
Culemborg	Hoorn	Venlo
Delft	Kampen	Vlaardingen
Den Bosch	Leeuwarden	Vlissingen
Den Haag	Leiden	Weesp
Deventer	Maastricht	Wijk bij Duurstede
Doesburg	Medemblik	Woerden
Doetinchem	Middelburg	Zaltbommel
Dordrecht	Monnickendam	Zierikzee
Edam	Naarden	Zutphen
Eindhoven	Nijmegen	Zwolle

Failed towns		
Ameide *	Hardenberg	Ravenstein
Asperen	Hattem	Rijssen
Batenburg	Heukelum	Sluis
Bredevoort	IJsselstein	Staverden *
Buren	Leerdam	Steenwijk
Delden	Megen	Veere
Gennep	Montfoort	Vianen
Goor	Nieuwpoort	Vollenhove
Grave	Ommen	Vreeland *
Hagestein *	Oudewater	Woudrichem

3.3 The availability of reports

The research data from the 2,278 ARCHIS case-identification numbers were collected by downloading all available archaeological research reports from Adlib (RCE), ARCHIS (RCE), the DANS e-repository (KNAW) and websites of municipal archaeological organisations (e.g. Amsterdam, Deventer, West Friesland, Leiden and Utrecht).

Various reports include the research data from more than one ARCHIS case-identification

119 Rutte & Abrahamse 2014, 2016; Rutte & IJsselstijn 2014, 174.
120 Roorda & Wiemer 1992.
121 Kosian, Van Lanen & Weerts 2016. Kaart van de verstedelijking, Nederland in 1575; www.landschapinnederland.nl/verstedelijkingskaart.
122 Rutte & Vannieuwenhuyze 2018.
123 Bouwmeester 2017, 114.

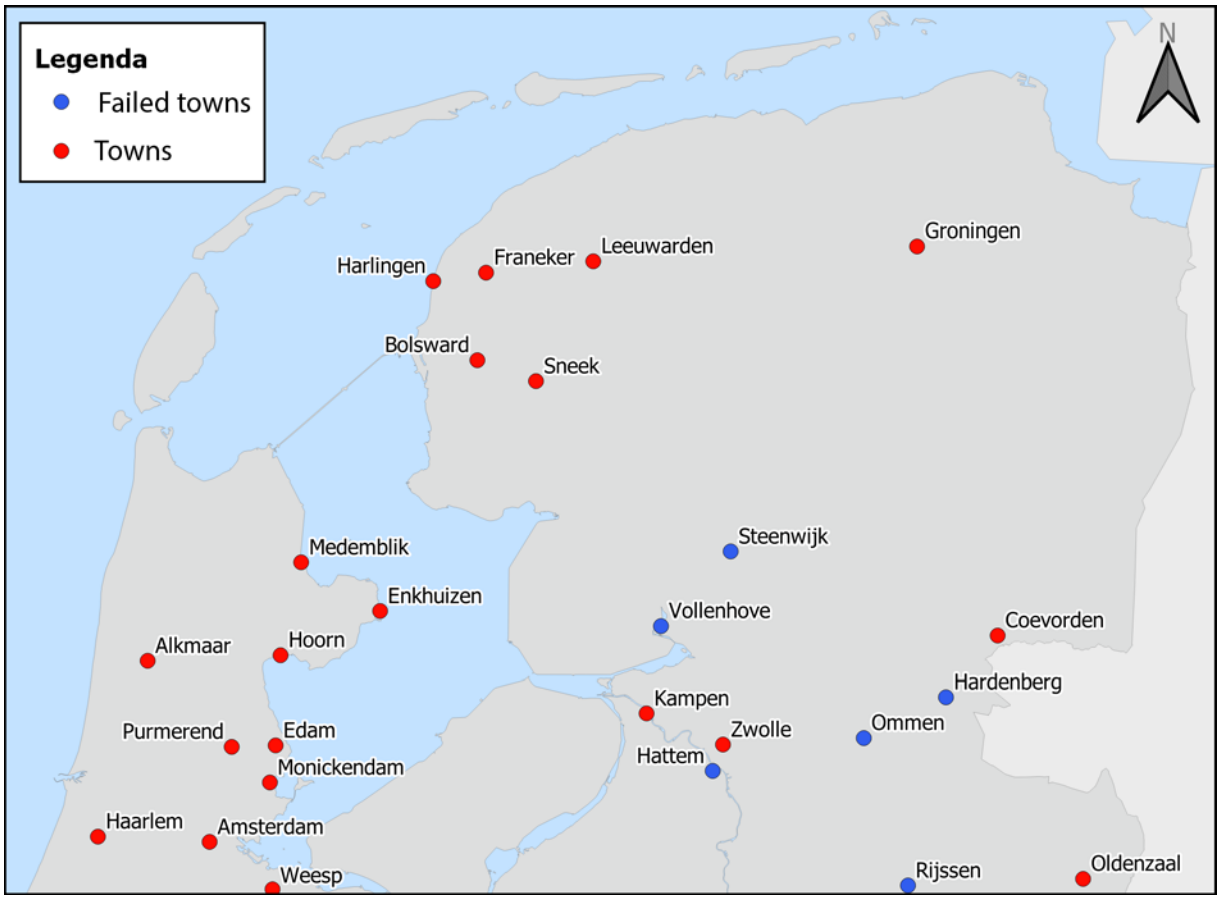


Fig. 3.1 Map of the northern part of the Netherlands showing all selected towns (N=84)

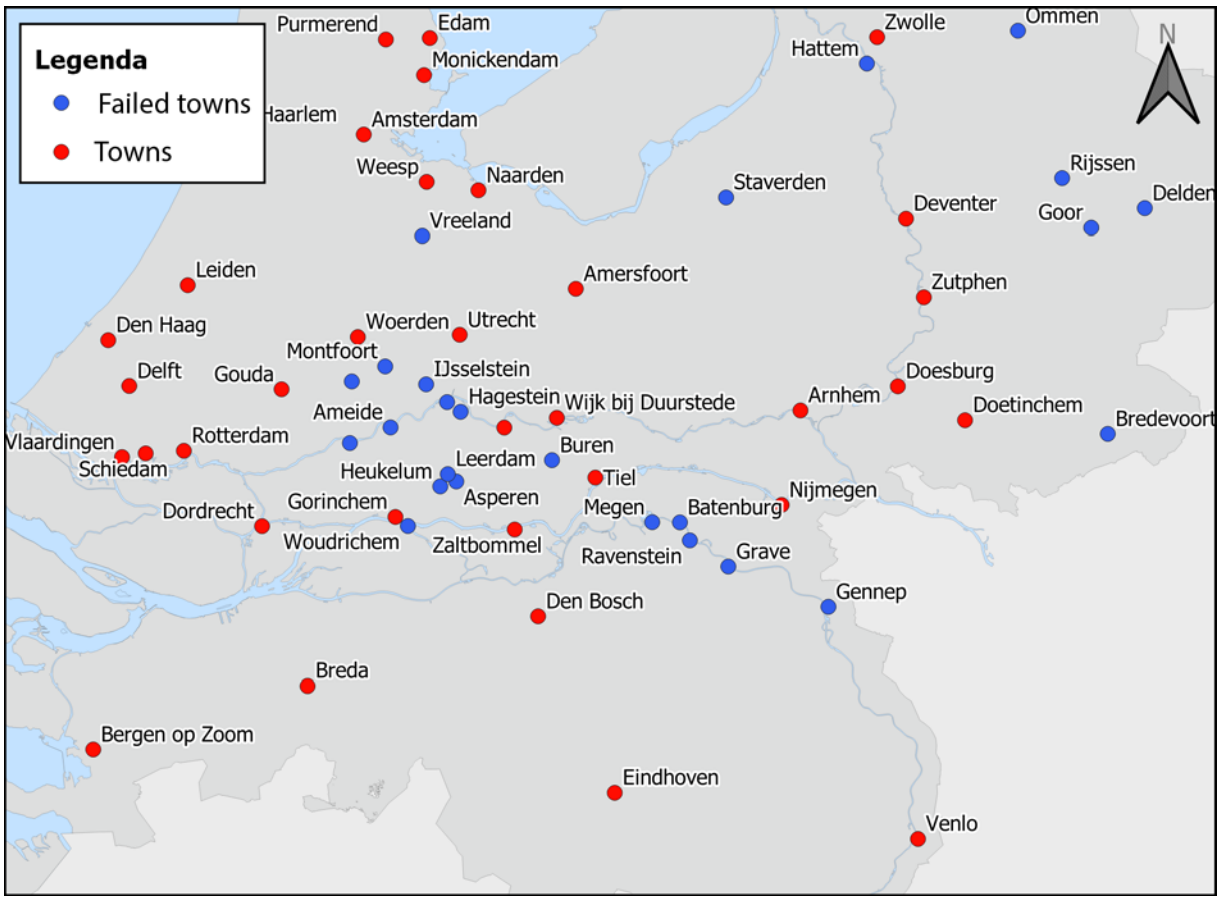


Fig. 3.2 Map of the middle part of the Netherlands showing all selected towns

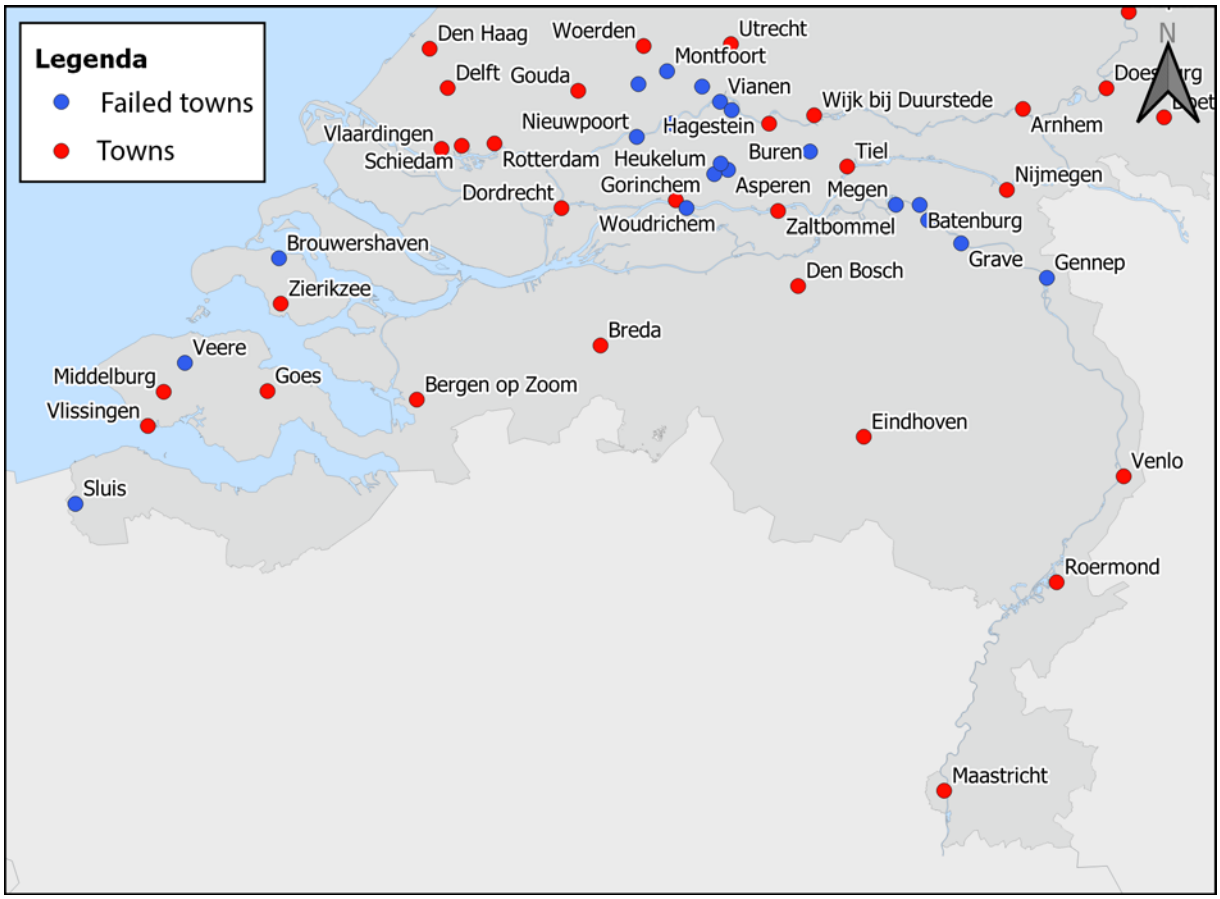


Fig. 3.3 Map of the southern part of the Netherlands, showing all selected towns.

Table 3.2 Overview of report availability (N=1,380).

	Total number of ARCHIS identification codes	Number of available reports	Number of ARCHIS case-identification codes published under different code	Number of unavailable reports
Towns	2,050	1,245	189	616
Failed towns	228	135	16	77
Total	**2,278**	**1,380**	**205**	**693**

number. Some organisations publish combined research results from both trial trenches and a final investigation. In order to prevent research data from being processed twice in the synthesising study, the publications are used as the primary source instead of the ARCHIS case-identification number. A total of 1,380 available reports were found (Table 3.2). A list of all available reports is attached to this report (App. I). For 693 ARCHIS case-identification numbers no report was available while collecting. This means that 30.4% of all archaeological fieldwork is not published (yet), leading to a possible bias in the dataset.

3.4 Inventory of research data: text mining

The number of reports available was too large to be viewed in full in the time available. In order to systematically address and speed up the research, all reports were consulted digitally using text mining techniques. Text mining is an interdisciplinary method that can either focus on:

1. extraction of information from text;
2. mining text for patterns;
3. *Knowledge Discovery in Databases* (KDD), which more or less combines definitions 1 and 2.[124]

[124] Hotho et al. 2005.

Text mining extracts information and knowledge from texts without a human reading it. There are several examples of text mining in archaeology and many of these combine machine learning with text mining (definition 3).[125] The latter is not necessary for this research and we have mainly used text mining to extract useful information from the available reports and select those that are suitable to answer the research questions (definitions 1 and partly 2).

3.4.1 Material

Of the total of 1380 reports, not all reports were suitable to be extracted (see Section 3.4.4). A total of 1,448 PDF files of 1,366 ARCHIS case-identification numbers were used. The number of PDF files differs from the number of ARCHIS case-identification numbers for two reasons. Firstly, some reports consist of several PDF files, for example appendices or in some cases specialist reports. Secondly, sometimes several investigations from different locations in one town (ARCHIS case-identification numbers) are included in a single report.

3.4.2 Method

All text from the reports was read automatically by using text mining techniques in R.[126] The results are stored in a PostgreSQL[127] database. The source code used and the database design are available via GitHub.[128] The following steps have been taken:

Step 1. The user choses folder with reports.

Step 2. For each report, the following descriptive data have been stored in the database (tbl_docs in Fig. 3.4):
- file name;
- file path;
- number of pages;
- ARCHIS case-identification number;
- town.

Step 3. Each report has been converted to plain text. When a report has been scanned as an image, it has been converted to text using Optical Character Recognition (OCR).[129]

Step 4. The plain text was filtered/edited for each report. The following items were removed:
- numbers;
- Dutch articles and prepositions (such as 'the' or 'it');
- punctuation;
- spaces.

Step 5. A Term Document Matrix (TDM) was created for each document. A TDM is nothing more than a table with the frequency of each word in a document. The TDM has been stored in the database for each document (tbl_term_docs).

Step 6. Based on the 200 most frequently used words in a document, a word cloud was created as a quick visual index for the document.

Step 7. The TDM of all documents is compared in the database with the list of keywords (for a description, see below). Each report has been scored based on the following formula: *doc_score = Σ(freq * value)*. Freq (frequency) is the number of times a keyword occurs. Value is the predetermined value of a term. Valuing

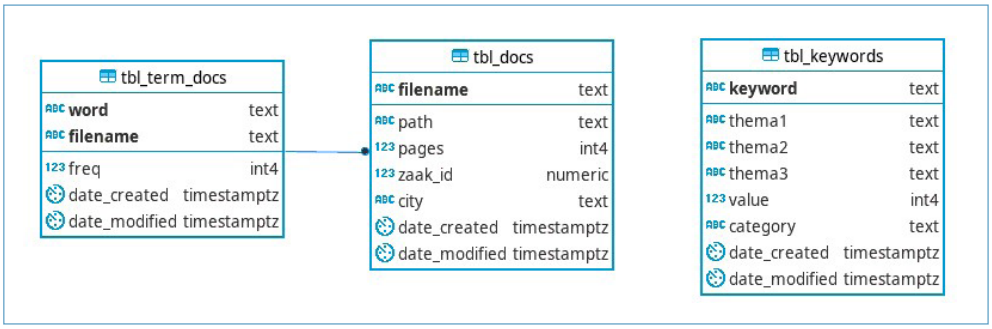


Fig. 3.4 ER diagram of the PostgreSQL database. The tbl_keywords is deliberately poorly normalised to simplify the work process of updating the keywords.

[125] Amrani *et al.* 2008; Brandsen *et al.* 2019; Kintigh 2015; Paijmans & Brandsen 2010.
[126] R Core Team 2018.
[127] www.postgresql.org/
[128] www.github.com/RonaldVisser/Mining_Archaeological_Reports
[129] Tesseract (www.github.com/tesseract-ocr/) has been used for OCR.

keywords has been kept simple by assigning very important keywords with value 4 and less important ones with value 1. The list of keywords is included in the database (tbl_keywords in Fig. 3.4).

Step 8. Themes were additionally scored, since keywords are attributed to one or more themes.

Step 9. Based on the total score of each report, the reports were ranked. Assuming a standard normal distribution, the ranking is based on the number of standard deviations (σ) from the mean (μ). This ranking runs from categories A to E, where A are the best scoring reports and therefore the most relevant. The relevance reduces with each following rank:

A. > μ+2σ (c. 2.5%);
B. > μ+σ and <= μ+2σ (c. 13.5%);
C. > μ-σ and <= μ+σ (c. 68%);
D. > μ-2σ and <= μ-σ (c. 13.5%);
E. <= μ-2σ (c. 2.5%).

3.4.3 Keywords for text mining

The selected reports for this study were searched on the basis of 273 keywords (App. II). These keywords were established by the research team. The keywords are single words. Combinations of two or more words were not included in this approach. Linguistic variants of these keywords were added to minimize the risk of missing data. After this, the keywords were validated in a short preliminary study of reports in the first phase of the project (see Section 3.4.5.).[130] The keywords are attributed to themes, like animal husbandry or horticulture (App. II). Some keywords are too general to fit into a specific theme, therefore the theme 'general urban farming' has been created. Other keywords can occur in more than one theme (see also Sections 3.5). The keywords in reports can relate to archaeological data but also to historical, pictorial or cadastral (map) information. By keeping records of the nature of the data in the database, the data related to this theme can be fully evaluated.

The relevance of terms was also taken into account. For the content value it is important that the keywords are sufficiently specific for urban farming. Keywords that are not very specific result in too many hits that distort the total score of the report. For example, some keywords include features associated with urban farming but also with individual archaeological finds like agrarian tools.

The Latin names of the most common (domestic) animals are not included, because the animal bone material recovered by an archaeological investigation could come from animals that were only slaughtered in the town and not reared in the town. A pit with a skeleton of a stillborn goat, on the other hand, makes it more likely that the animal was kept locally. Therefore, the terms neonate and fetus have been added to the keyword list. Latin plant names have been added as an indicator for orchards or horticulture. This is based on various considerations and assumptions. For example, the assumption that with a limited amount of space in the town, arable farming will only have had a small-scale character. Within the physical constraints imposed by an urban context, horticultural land or orchards, in particular, were often created. These assumptions have been taken into account in the keyword list. Cereals have not been included in the keyword list as these are known to be traded on a large scale. Cereal farming in the urban fringe may have produced some local supply but in most cases this would not meet the town's total demand. Plants that are eaten for their leaves, stems or roots have been included. Here, seeds are indicative of local horticulture. Macro-botanical remains (and in some cases also pollen) of such plants could indicate possible local cultivation. Another assumption is that plant species will have been grown that have a high yield per square metre, that can be harvested quickly, that do not have a long shelf life or that are too vulnerable to transport or are difficult to obtain.

Although this list is not exhaustive, this has not prevented the research from being carried out. The keyword list can be easily adapted to generate new research results by having the reports searched again.

3.4.4 The results of the text mining

The text was easily extracted from the majority of reports. Only 67 PDF's had to be converted using OCR. This resulted in a total of

[130] Blonk *et al.* 2018.

Fig. 3.5 Word cloud of the 200 most common words in the reports. Since this study is based on Dutch reports, all words are in Dutch.

Table 3.3 The 20 most common words appear in the reports.

Word (Dutch)	Word (English)	Occurrence
Eeuw	century	89,649
Aangetroffen	found	68,396
<e2><80><93>	<e2><80><93>	64,277
Afb	Fig	60,570
Onderzoek	research	60,206
Aardewerk	pottery	56,221
Archeologische	archaeological	55,288
Sporen	features	46,666
Twee	two	44,333
Spoor	feature	43,368
Deel	part	41,866
Mogelijk	possible	38,805
Tussen	between	37,627
Resten	remains	33,467
Archeologisch	archaeological	32,635
Werden	became	31,499
Ten	to	31,361
Muur	wall	30,812
Datering	dating	30,570
Laag	layer	30,226

3,315,416 words from the 1,448 PDF files. The words that were most counted are listed in Table 3.3 and visualized as a word cloud (Fig. 3.5). A text string such as '<e2><80><93>' was not expected as one of the most common terms. There were more peculiar words or strange characters in the database table with words. These are most likely caused after the conversion from PDF to text. The function pdf_text() from pdftools[131] is sensitive to fonts that are not properly included in a PDF. Badly formatted PDF's lead to inaccuracies in the layout and therefore badly readable files. The problem was more often found in text around or on images, or the front page. In addition, the problem is more strongly present using Microsoft Windows as operating system. Under Linux[132] this leads to fewer problems and errors. Therefore, all documents have been read under Linux. Most peculiar words are not corrected, since these will be ignored due to the comparison and assigning value to keywords (step 7 in the text mining method).

The most common keywords are an accumulated layer (in Dutch *ophogingslaag*) and its plural form (Table 3.4; Fig. 3.6). A keyword such as 'garden' (in Dutch *tuin*) is also quite common in all reports. Some words appear only once in all reports. These are: gardener, garden tools, rapeseed press cake, pigsty, storage building, dung pits, cattle breeding areas, plough marks, brewing cereals, chicken coop, pond, wine production, rake, dung heaps, bean garden plot, pigsties and hop gardens.[133] The presence of some words in reports seems fairly obvious. It should be noted that the authors' use of language can also play a role.

The total score of the reports ranges from 1 to 2,730 with an average of 97.11 and a standard deviation of 204.57. There are some extreme upward peaks. The distribution is not normal, but more or less log-normal (Fig. 3.7). Therefore, the ranking of reports (Step 9 in the method) was carried out after the scores had been transformed with a natural logarithm. This led to

[131] www.cran.r-project.org/web/packages/pdftools/.
[132] Distribution used: Arch Linux (www.archlinux.org).
[133] Dutch: tuinder, tuingereedschap, raapbrood, varkensstal, opslaggebouw, mestbereidingskuilen, veeteeltgebieden, ploegkras, brouwgraan, kippenhokken, kweekvijver, wijnproductie, harken, mestbochten, bonenhof, varkensstallen and hoptuinen.

Table 3.4 The 20 most common keywords in the reports.

Keyword (Dutch)	Keyword (English)	Occurrence
Ophogingslaag	accumulated layer	8,397
Ophogingslagen	accumulated layers	4,333
Tuin	garden	2,232
Mestkuil	dung pit	1,896
Mest	dung	1,420
Akkerlaag	layer of arable soil	1,417
Boerderij	farmstead	1,355
Esdek	plaggen soil	1,128
Agrarische	agrarian	1,082
Opslag	storage	1,002
Haksporen	hoe marks	983
Tuinen	gardens	839
Schep	shovel	837
Ophooglagen	accumulated layers	806
Bloempot	flowerpot	805
Tuinmuur	garden wall	797
Ophooglaag	accumulated layer	699
Vee	livestock	679
Stal	barn	641
Groenten	vegetables	633

Fig. 3.6 Word cloud of the 200 most common keywords in the reports. Since this study is based on Dutch reports, all words are in Dutch.

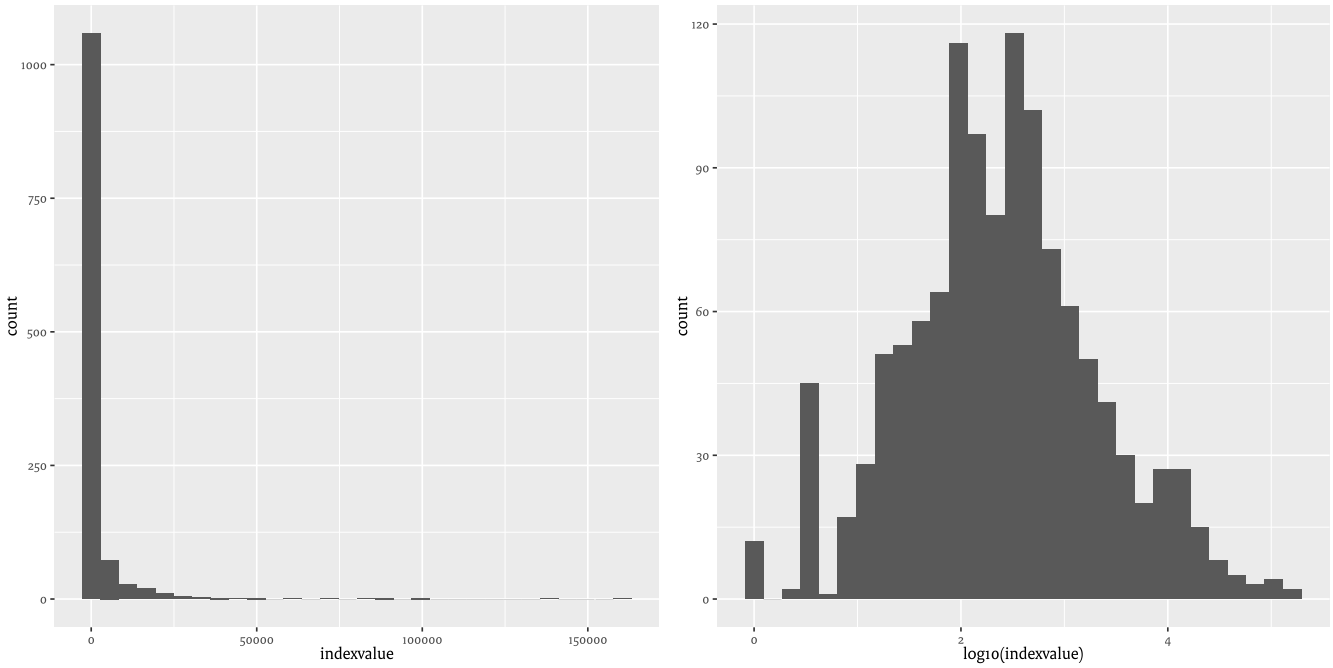


Fig. 3.7 The distribution of the total scores per report (left with a linear X axis, right with a logarithmic X axis).

the following number of reports in the different ranks:

- rank A: 26 reports;
- rank B: 183 reports;
- rank C: 899 reports;
- rank D: 152 reports;
- rank E: 48 reports.

3.4.5 Checking a sample of the ranked reports.

The ranking of the reports was only based on the occurrence of keywords and their respective score. However, the applied text mining method does not take the context of the words into consideration. Words can be mentioned in passing without actually referring to archaeological evidence. In addition to this a word can also be present in references.

To check the results of text mining and the keywords, a sample of 100 reports was physically read. From each rank (A-E), 20 random reports were checked (Table 3.5). This sample showed that the method with text mining and keyworks works very well. The useful reports are clearly differentiated from irrelevant ones. Ranks A and B were very relevant, while D and E were completely irrelevant. Approximately halfway, i.e., rank C was the turning point between relevant and irrelevant (see below).

Table 3.5 Description of suitability reports per group.

Group	Description
A	reports which are (very) suitable
B	reports which are likely to be suitable
C	reports which may be suitable
D	reports which are unlikely to be suitable
E	reports which are not suitable

3.5 Assessment of relevant reports

Following up the sample of 100 reports, a selection of 265 relevant reports (rank A, B and partly C) were read and analysed completely. The selection from rank C consists partly of reports from towns of which reports also appear in A or B (65 reports). The selection was supplemented with reports from towns from which there are no reports in groups A or B (34 reports). The minimum total score of analysed reports was 34. The irrelevant reports (ranks D and E) were not read. The total number of reports that were assessed was 265.

The results of the analyses of these reports were stored in a Microsoft Access database. This database is filled with the results of the text mining (tbl_waardering and the left ones in Fig. 3.7). Each relevant keyword from a document was described and rated in tbl_waardering_ detail. This description included, among other things (Table 3.6; Table 3.7):

- the context of the keyword;
- dating (using *ABR*-codes);[134]
- one of four type of sources (categories);
  1. archaeological;
  2 historical;
  3. pictorial;
  4. cadastral (maps);
- one of seven defined themes related to urban farming. These are:
  1. general urban farming;
  2. arable farming;
  3. horticulture;
  4. orchards;
  5. animal husbandry;
  6. fish farming;
  7. ruralisation.[135]

Each keyword was also rated by ranking 1, 5, 10 or 20. The relevance increases with each following rank:

1 low: hardly relevant.
5 medium: the keyword is present in the excavation report. The report may be suitable for follow-up research.
10 high: it can be stated with certainty that the theme occurs; specific keywords (indicators) occur at the excavation. The report is suitable for research.
20 textbook example: keywords with a score of 20 symbolise well-documented indicators that can be used as a guide (if the keyword is a concept) or as a textbook example (if the keyword is a find, trace or structure).

[134] Archeologisch Basisregister (ABR); thesaurus.cultureelerfgoed.nl.
[135] Ruralisation has been integrated with the theme general urban farming during the research process.

Table 3.6 Schematic overview of all fields in the database.

Data from Archis	
Case identification number	
Report identification (which is built up from case identification number _town _toponym)	
Data from text mining	
Total score report	
Ranking based on total score	
Status of checking	
Field for remarks	
List of keywords on which the score consists of	
The themes which the keywords scored:	
	arable farming
	general urban farming
	orchards
	ruralisation
	horticulture
	animal husbandry
	fish farming
Score per theme	
Entry fields database (per keyword)	
Keyword	
Theme	
Dating (periodisation by using ABR-codes): begin period	
Dating (periodisation by using ABR-codes): end period	
Value (5, 10 of 20)	
Type of information by source:	
	archaeological (from excavations)
	pictorial (paintings, prints, drawings)
	historical (written sources, archives)
	cadastral (cadastral information, maps)
Page number where the keyword with important information can be found	
Field for remarks	

Table 3.7 Example from the keyword list.

Keywords (Dutch)	Keywords (English)	Theme	Category (old)	Category (new)
Drenkplaats	watering place	animal husbandry	archeologicals features	archaeological
Drinkbak	drinking trough	animal husbandry	artefacts	archaeological
Druiventeelt	viticulture	orchards	ecofacts	historical
Eendenkooi	duck pen	animal husbandry	artefacts	cadastral
Eergetouw	plough	arable farming	artefacts	pictorial

3.6 Analyses and visualization of dated keywords

All keywords are dated using standardised codes (*ABR*-codes) (see before). For each analysed term a start period and end period has been stored in the database. The most exact period has been stored. For example, a flowerpot can be dated to modern times (nieuwe tijd: 1500-1999[136]) or to late modern times (nieuwe tijd laat: 1850-1999). Therefore, the date range of this flowerpot is 1500-1999. Since only the start- and end period of a keyword are known, there is no way to know if the flowerpot in the example is dated to the beginning or end of this long period. For a single keyword this is hardly a problem, but to be able to combine date ranges of keywords from a region, theme or town and analyse patterns, this poses a challenge. To discern patterns one method has been applied.

This method of visualisation assumes that the probability of a keyword in the dated period is normally distributed and that the chance that the exact date of a keyword falls in the middle of the period is higher than in the beginning or the end. The probability of each year in the date ranged can be calculated using the middle of the period as the mean and the standard deviation as 0.34 * (period_length/2), where period_length = end date – start date. The probability can be plotted for a single keyword or for multiple keywords together. The plotting of single keywords with their probability ignores however the common interval of the keywords. Therefore, the summarized probabilities give a better impression of temporal trends for a group of keywords (Fig. 3.8). It should be noted that smaller patterns can be averaged out by summing the probabilities, therefore it is better to use both methods at the same time.

[136] In this study 1999 is used as the end date of modern times (nieuwe tijd), although in the *ABR* this is changed to 1945 recently.

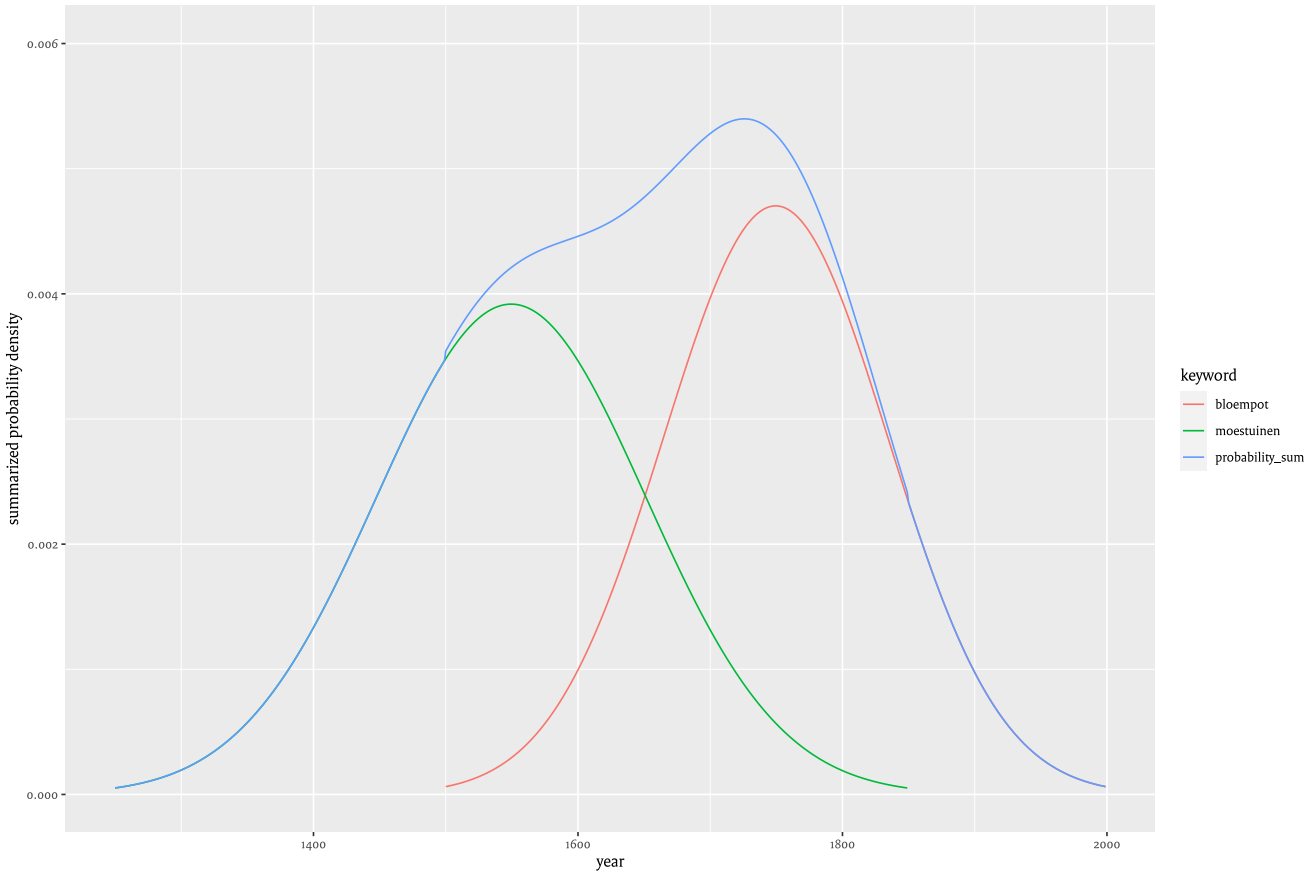


Fig. 3.8 The summarized probabilities of two keywords based on their respective start and end date of the *ABR*-code.

4 General quantitative results

A.L. Blonk-van den Bercken and H. van Londen

4.1 Archaeological reports

To recap, reports are selected from 2,278 ARCHIS case-identification numbers in regard to 54 towns and 30 failed towns.

4.1.1 Filtering

For some towns, no publications were available because they were either registered under a second number[137] or not complying within the set frameworks[138] (Table 4.1). This reduced the number of available reports to 1380. However, after further scrutiny some reports turned out to be technically unsuitable to be processed by means of text mining. This meant that in the end the reports of 1308 ARCHIS case-identification numbers were assessed by means of text mining, of which 1179 reports were from towns (90.2%) and 129 from failed towns (9.8%).

Table 4.1 Total number of reports suitable for text mining, based on available reports from towns and failed towns.

	Case identification numbers	
Type of town	**report available**	**report suitable for processing by text mining**
Town (54)	1,245	1,179
Failed town (30)	135	129
Total	**1,380**	**1,308**

Table 4.2 Number of reports in groups A, B or C, and reports that were suitable for evaluation.

Category of reports	Number of reports	Number of reports rated
Group A (highest score)	26	22
Group B (high score)	183	163
Group C (average score)	899	80
Group D (low score)	152	-
Group E (lowest score)	48	-
Total	**1,308**	**265**

After classifying, using the total score from the text mining, these were then clustered in groups A to E (Table 4.2). Only reports from groups A, B and part of group C were selected to be rated manually.[139] The evaluation shows that 265 reports, 20% of the 1308 available reports, are suitable for study. This number relates approximately to 11% of the 2,278 selected ARCHIS case-identification numbers. These 265 reports form the basis for this study.

4.1.2 Origin of selected reports

The 265 reports relate to 50 out of 54 selected towns and 20 out of 30 selected so-called failed towns (App. III). The majority of the reports (238 reports, 89%) came from towns, 27 reports (10%) related to failed towns (App. IV). No report was available for the town of Weesp. A total of three towns and ten failed

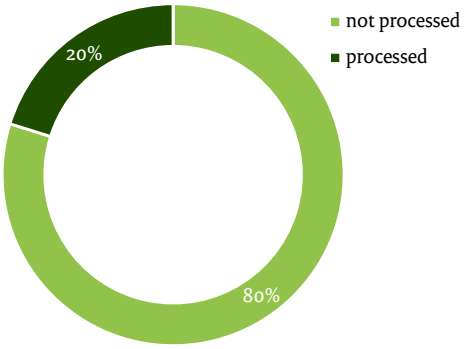


Fig. 4.1 Number of suitable reports (processed) from towns. N = 1179

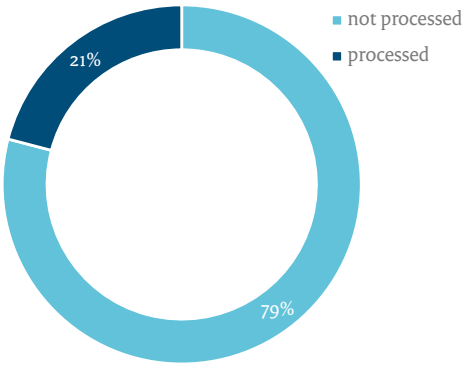


Fig. 4.2 Number of suitable reports (processed) from failed towns N = 12

[137] As in the case of test trenching and subsequent excavation. If both studies are described in one single report, this one report is then used for text mining.

[138] The investigations have to be located in city centres and failed towns with a zone up to 600 metres and have to have taken place in the period 1997 to 2017.

[139] Group D has been described as a group whose reports are unlikely to be appropriate, group E concerns reports that are not appropriate, see Chapter 3.

towns were excluded from manual evaluation due to their low classification in the ranking.

Although the number of reports available from the towns is much greater in absolute terms (1179 versus 129), both complex types are evenly represented with 20% (Fig. 4.1 and 4.2). On average, five reports per town were found to be suitable for analysis, against two reports per failed town. This phenomenon may be explained by the fact that there are more spatial developments in towns compared to failed towns. As a consequence, more archaeological research has been carried out and the chance of findings affecting the research themes is logically higher.

4.2 From keywords to data

Through the method of text mining we know how often certain keywords relating to urban farming and ruralisation occur in archaeological reports. A high overall score does not, however, immediately result in a high score for good data. There are a number of reasons for this. For example, dating can be outside the research scope, or the keywords correspond to archaeological jargon, such as the word 'shovel' (often used as a reference in lists of finds), or the term 'accumulated layer'. In other words, the context of the terms has not been assessed yet. Therefore, the actual value could only be determined by manually looking up the context in which the term has been used.

Appendix V contains an overview of all keywords used for text mining. A total of 138 different keywords have been evaluated. This number is lower than the pre-established list (N= 273, App. II.). It was decided that plant species names in Latin and Dutch would not be assessed due to redundancy and time constrains. In almost all cases the Latin and Dutch names of useful plant species were found in gardens which were already detected by other keywords. It was also decided that if several conjugations of words were found in one report, only one form would be evaluated. Nevertheless, compared to the manual evaluation, 61 keywords were not scored at all.

The 138 keywords together were assessed 1,211 times. Some terms are very common, such as the word 'flowerpot' (valued 80 times), possibly as a result of the way in which an archaeological report was drawn up in which the description of the ceramics forms an essential part. Table 4.3 shows a top 20 of the best scoring keywords. On average, the keywords are rated nine times. However, many terms are only rated once.

Table 4.3 Top 20 common keywords, in order of number of occurrences.

Keyword (English)	Occurrence	Score (%)
Flowerpot	80	6.61
Dung	66	5.45
Agrarian	64	5.28
Dung pit	51	4.21
Farmstead	51	4.21
Barn	44	3.63
Layer of arable soil	39	3.22
Garden	36	2.97
Vegetable garden	35	2.89
Orchard	35	2.89
Arable farming	32	2.64
Agrarian	28	2.31
Livestock	23	1.9
Garden wall	23	1.9
Vegetable gardens	22	1.82
Vegetable	22	1.82
Gardens	19	1.57
Fertilization	19	1.57
Cultivated	17	1.4
Arable farming	16	1.32

Table 4.3 shows that only twelve terms individually represent more than 2% of the complete dataset. This implies that the subjects of urban agriculture and rural development can be studied by means of a broad spectrum of keywords that vary in volume.

4.3 Nature of the data

The keywords are derived from four different types of sources (categories). These are archaeological (from archaeological excavations), pictorial material (paintings,

prints), historical (written sources, archives) or cadastral (cadastral data, maps) (Fig. 4.3). Many

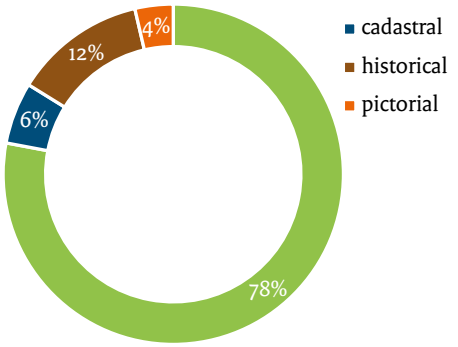


Fig. 4.3 Distribution of the 1,211 assessed keywords in regards to the types of sources.

keywords occur both as archaeological findings and as non-archaeological phenomena (i.e. as historical, cadastral or pictorial material). A good example of such a term is the word 'gardens'. This term occurs as an archaeological element, in cadastral data, in historical data and in image sources. A total of 51 (72% of all assessed data) of the 138 terms are derived from both archaeological and non-archaeological nature (Table 4.4).

However, most terms are archaeological in nature. No less than 71 out of 138 keywords occur only as an archaeological phenomenon. These 71 keywords were rated 312 times, i.e. 26% of all assessed data. Eight keywords only occur as historical data. Finally, four keywords only

Table 4.4 138 keywords related to types of sources. The 138 keywords together were assessed 1,211 times.

Does the keyword appear in archaeological sources?	Is the keyword related to different types of sources?		
	yes	no	total
Yes	51 keywords (72% of 1,211 rated keywords (n=873))	71 keywords (26% of 1,211 rated keywords (n=312))	122 (98% of 1,211 rated keywords)
No	4 keywords (0,8% of 1,211 rated keywords (n=10))	12 keywords (1,3% of 1,211 rated keywords (n=26))	16 (2,1% of 1,211 rated keywords)
Total	**55**	**83**	**138**

Table 4.5 Number of valued keywords that do not occur as an archaeological term but as a term derived from pictorial material, historical material or cadastral data.

Keywords (Dutch)	Keywords (English)	N (visual sources)	N (historic scources)	N (cadastral sources)
Achtertuin	backyard	-	1	1
Binnentuin	garden	-	-	1
Fruitteelt	fruit cultivation	-	2	-
Gaard	orchard	-	1	1
Groenteteelt	vegetable cultivation	-	1	-
Koehuis	cowshed	-	1	-
Meent	common	-	3	-
Oranjerie	orangery	-	1	-
Schaapskooi	sheepfold	-	-	1
Siertuinen	ornamental gardens	-	-	1
Stadstuinen	city gardens	1	-	1
Stadsweide	common	-	2	-
Tuinhuis	garden shed	-	2	2
Tuinman	gardener	-	1	-
Tuinmanshuisje	gardener's house	-	1	-
Veestalling	barn	-	-	1

Table 4.6 Number of keywords related to types of sources.

Group of reports	Keywords related to type of source				
	archaeological	pictorial	historical	cadastral	total
Group a	187	-	17	4	208
Group b	614	25	96	60	795
Group c	143	19	39	7	208
Total	**944**	**44**	**152**	**71**	**1,211**

occur in cadastral sources. A total of 16 keywords occur only in (at least) one non-archaeological source (Table 4.5). In total, these terms have been valued 26 times, i.e. 2% of all data.

It is interesting to see whether a correlation exists between the nature of the data and the report groups A-E (Table 4.6). As is to be expected, most of the keywords are found in archaeological data. It is striking, however, that the reports in group B, with the most valued keywords, also contain many keywords from historical or land registry data. It appears that although the reports in group A score best in text mining, no keywords for visual material have been derived from these reports.

4.4 Dating keywords

During manual evaluation, it was clear that dating traces and structures associated with urban agriculture and ruralisation is problematic. Firstly, context information often indicates a start date but no end date. This leads to clouded data: it seems as if many keywords have a long lead time, while this is not the case (the end date is not well delineated). Secondly, we decided to systematically record data in accordance with the *ABR* description method for dating. However, this method does not allow for a clear

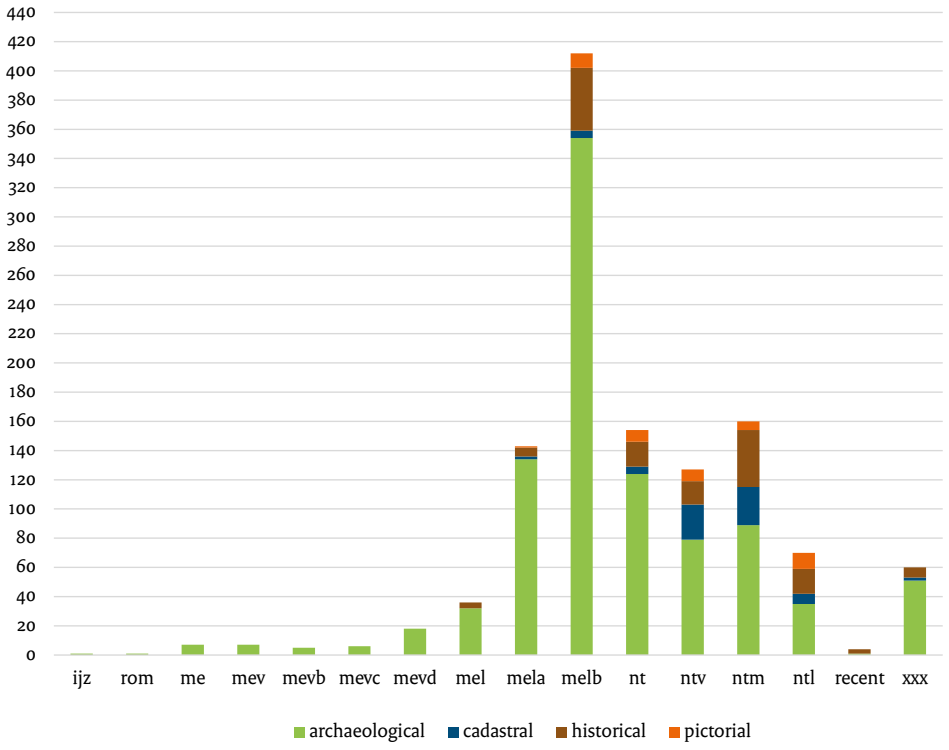


Fig. 4.4 Origin of keywords from types of sources, ordered by date (using starting period). See App. VI for an overview of the ABR codes, meanings and translations.

split because the period classification is not very specific. In this *ABR* description method, a period such as the thirteenth century, which is of great importance for the founding history of the towns, is even divided into two periods, namely late medieval period A (1050-1249) and late medieval period B (1250-1499). However, both problematic aspects are avoided by presenting the data on the basis of the starting date (Fig. 4.4). It is clear, for example, that after a start-up phase from the early Middle Ages onwards, the number of findings relating to agriculture-related themes increased enormously in the late medieval period B (1250-1499). The number of new findings decreases from the late modern period onwards (1850-1999). Most of the data are of an archaeological nature. Keywords derived from non-archaeological sources appear from the late Middle Ages onwards.

4.5 Themes

As described in chapter 3, the keywords are attributed to a theme. Many of the 138 keywords were linked to more than one theme, resulting in a large number of combinations of themes and keywords. By approaching the keywords from the themes, data can be analysed in combination, so that mutual relationships can be investigated.

The keywords can be clustered in sub-topics (themes) and in the different types of sources (the nature of the data). In this way, rankings are created between the occurrence of themes. For example, it is clear that in report groups A and B, the theme 'animal husbandry' scores best, while in group C it is the theme 'horticulture', albeit

Table 4.7 Distribution of keywords by themes and categories.

Ranking of reports	Themes	Type of data				
		archaeological	pictorial	historical	cadastral	total
group A	arable farming	29	-	1	-	30
	general urban farming	35	-	5	1	41
	orchards	3	-	3	-	6
	horticulture	40	-	6	2	48
	animal husbandry	79	-	2	1	82
	fish farming	1	-	-	-	1
subtotal		**187**	**-**	**17**	**4**	**208**
group B	arable farming	117	1	3	1	122
	general urban farming	115	9	39	19	182
	orchards	14	4	10	9	37
	horticulture	183	5	15	14	217
	animal husbandry	180	6	29	17	232
	fish farming	5	-	-	-	5
subtotal		**614**	**25**	**96**	**60**	**795**
group C	arable farming	35	-	5	-	40
	general urban farming	17	2	11	1	31
	orchards	4	9	3	-	16
	horticulture	49	5	7	2	63
	animal husbandry	38	3	13	4	58
	fish farming	-	-	-	-	-
subtotal		**143**	**19**	**39**	**7**	**208**
total		**944**	**44**	**152**	**71**	**1,211**

only slightly in regards to the theme 'animal husbandry' (Table 4.7).

4.5.1 What themes are scored?

The keywords are each related to specific themes. As said, some keywords do relate to more than one theme (see Section 3.4.4). To fully interpreted keywords relating to the theme 'ruralisation', it is decided they are best assessed as part of the theme 'general urban farming'. The themes are not scored evenly (Table 4.8). There is a clear difference between the themes 'animal husbandry', 'horticulture' and 'general urban farming' as the largest themes, compared to 'arable farming', 'orchard' and 'fish farming'. By combining themes into overarching subjects of a similar nature, such as arable farming with orchards and horticulture, it is easier to compare data and to see patterns in the themes. The thematic discussion regarding 'ruralisation' and 'general urban farming' follows in chapters 5, 6 and 7.

4.5.2 Dating themes

After sorting the themes chronologically, a number of striking things became visible (Fig. 4.5). First of all, a clear increase from the late Middle Ages onwards is demonstrated. Dormant

Table 4.8 Number of times themes appear in the reports, sorted in alphabetical order.

Theme	Number of keywords	Total (%)	Topic
Arable farming	192	16	crops; 48% of all data
Orchards	59	5	
Horticulture	328	27	
General urban farming	254	21	general; 21% of all data
Animal husbandry	372	31	livestock; 31% of all data
Fish farming	6	0	
Total	**1,211**	**1**	

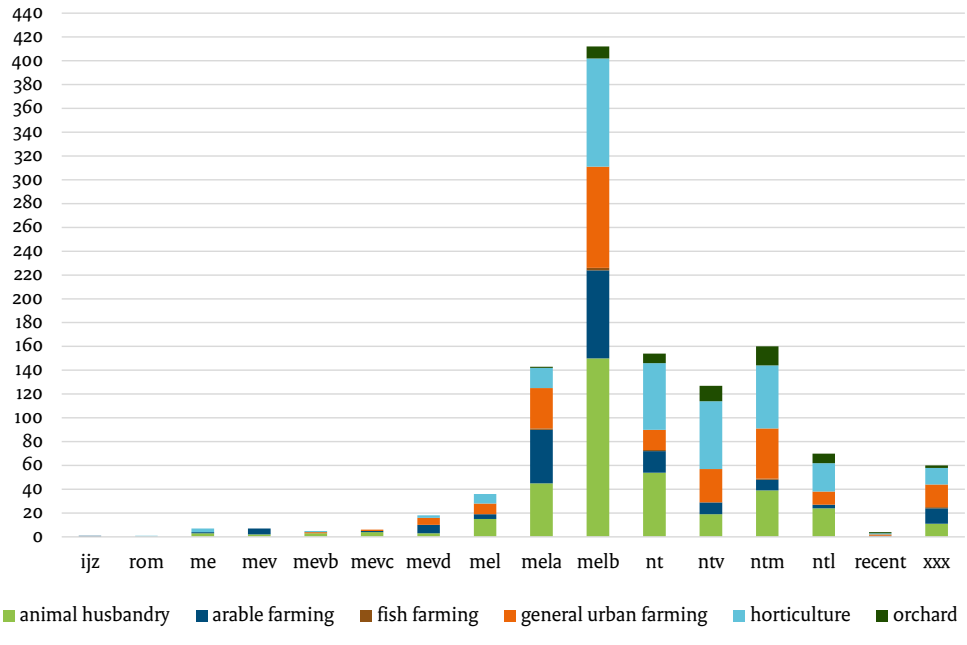


Fig. 4.5 findings sorted by starting date (period), per theme.

developments up to then have increased considerably, particularly in the fields of arable farming, general urban farming, horticulture and animal husbandry. Furthermore, there is a clear (explosive) increase in the number of indicators for livestock farming from the late Middle Ages onwards. This is also the case for the theme of arable farming and horticulture. The theme 'general urban farming', in which, among other things, many terms are registered that do not specifically fit in with one of the other themes as well as terms such as 'fallow', also shows a strong growth in the late medieval period B. These outcomes will be further explored in the following chapters.

This pattern is at odds with the early modern period. Here, the number of new findings is much smaller. The theme 'animal husbandry' decreases significantly, as do the themes 'arable farming' and 'general urban farming'. Nevertheless, horticulture remains more or less the same. It can be said that from the late Middle Ages B until well into the early modern period, horticulture played a continuously important role in urban farming and ruralisation. The role of orchards in the overall picture is small but increases slightly during the early modern period. Fish farming is virtually absent from the research data.

4.5.3 Comparing towns and failed towns

When the data from towns and failed towns was compared, a number of patterns could be observed, even though the data is unevenly distributed, as argued above (Fig. 4.6 and Fig. 4.7). It should be noted that in both figures the starting date of the features is decisive and leading. In many cases the end date is vague, as previously noted. Much urban land, for example, remained in use for long periods of time. Therefore, the following figures show phases of development.

Some data from the towns were already available referring to the period prior the late Middle Ages. In the failed towns, the earliest dated indicators (keywords) are from the late Middle Ages. Based on the available data, explosive growth can be seen in both towns and failed towns in the late Middle Ages. In the towns, this seems to be more evident due to an increase in cattle breeding, while in the failed towns, most of the indicators point to horticulture.

Immediately after the late medieval period B, the number of new indicators (keywords) decreased considerably. This obviously does not mean that no agricultural activities took place from this period; on the contrary, an agricultural character has often been attributed to failed towns since the fifteenth century.[140] With regard to the more agricultural background of failed towns, this function is not necessarily reserved for these towns. In the towns, too, agricultural activities continued for a long time. The spectrum and volume of activities in towns increased in the middle modern period (NTM). One point of interest for the research topic of ruralisation is that in towns references for 'general urban farming' keywords are seen to be on the increase from the early modern period (NTV), and especially in the middle modern period (NTM).

[140] Renes 2005.

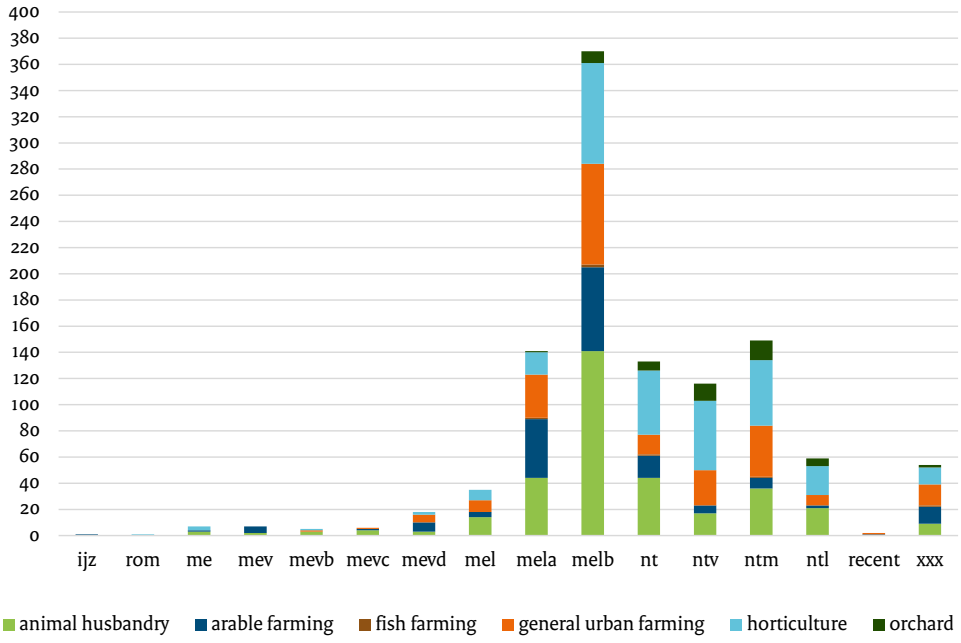


Fig. 4.6 Keywords of themes in towns, sorted by starting date.

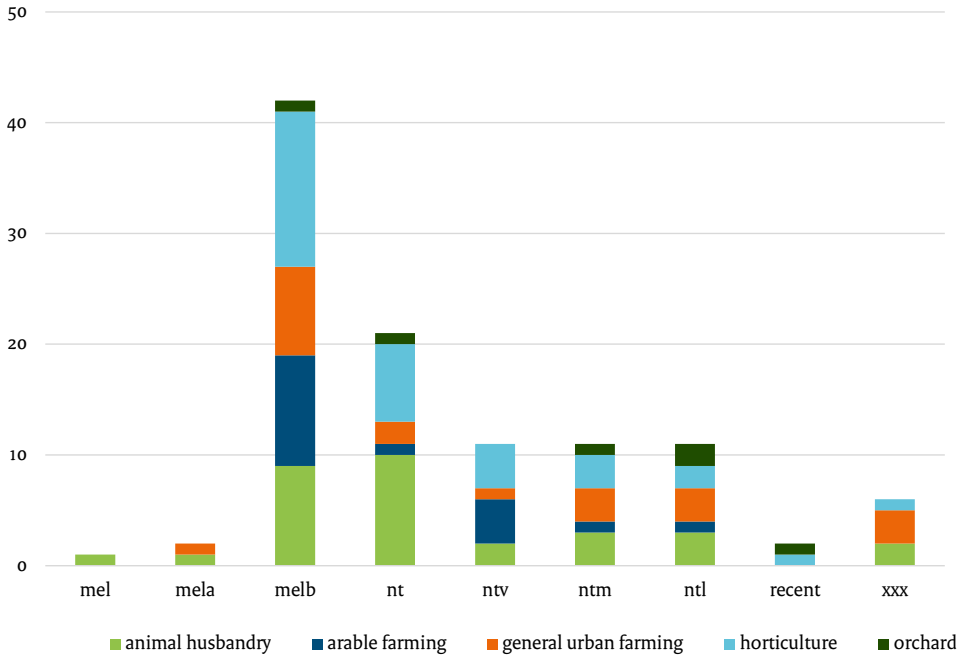


Fig. 4.7 Keywords of themes in failed towns sorted by starting date.

5 Animal husbandry and fish farming in towns

A.D. Fischer and H. van Londen

5.1 Introduction

Overviews of zooarchaeological research in Dutch medieval towns prior to the introduction of commercial archaeology were provided by Prummel, Groenman-van Waateringe, van Wijngaarden-Bakker and Audoin-Rouzeau.[141] After assessing the available information at the turn of the millennium, Roel Lauwerier observed that the zooarchaeological evidence from Dutch towns was varied and fragmented.[142] Only a few towns offered good information, and mainly in relation to the use of large mammals. According to Lauwerier, the poor data at that time was due to the methods of collecting, by hand instead of sieving. He interpreted the finds as evidence for consumption, while acknowledging the option of urban production.[143] The faunal remains that had been collected by excavators indicated that beef was most often eaten, followed by meat from sheep/goat and pigs. Horse was not on the menu, neither was fowl. In their 1990 publication, Groenman van Waateringe and van Wijngaarden-Bakker noted an increase in the quantities of pigs over sheep/goat mutton from the fourteenth century onwards in Dutch diets. They pointed to urban farming by way of explanation, and referring to the limited amount of space that favour rearing pigs. The varying quality of zooarchaeological evidence from medieval towns was repeated in the National Archaeological Research Agenda 1.0 of 2006.[144] Two case studies were highlighted, from Dorestad, and Eindhoven, but more generally, it was stated that zooarchaeological knowledge was of a local character and that a synthesis was lacking.[145] In his 2003 PhD thesis, Van Haaster found proof for horticulture in the early development of 's-Hertogenbosch (thirteenth century).[146] His analysis of large quantities of dung indicated that cattle were fed in a barn. For the later periods, Van Haaster assumed that products were mostly imported because of a shortage of space within the town walls.

A general overview of fifty years of zooarchaeology in the Netherlands was published in 2019.[147] The authors of this report discuss several themes, but make no particular reference to urban archaeology, or to zoological production indicators. The diet of the nobility and clergy is, however, touched on, based on the faunal assemblages from castles and monasteries. Beef, pork, poultry, fish and game are all represented. The authors state that even considering that clergymen are not likely to hunt, they ate hare and rabbit.[148] At first glance, the absence of fowl in urban contexts, as noted before, also stands out.

In this synthesis of 20 years of (pre-) commercial archaeological practice, urban livestock rearing for meat and secondary – products like wool, cheese, eggs and milk – the category of animals – is best represented in relation to other food categories, such as vegetables and fruits. In contrast to the earlier overviews, the focus in this research project lies on production indicators, and not consumption. Animal husbandry forms the largest group in the database and this may be influenced by how well archaeological indicators for food production have been recognized. Evidence for bones from smaller animals is also present in the reports that have been examined. In his survey of historical literature on urban farming, Vermoesen mostly described the production of fruits and vegetables.[149] The archaeological evidence assembled by this research offers a new and a many ways divergent perspective on urban food production to that presented by Vermoesen.

Quantitative information on zoological and other archaeological evidence for animal husbandry and fish farming in towns is given below. Following that, a qualitative framework is presented to contextualise the keywords, archaeological features and finds behind these numbers. The collected archaeological remains relate to cattle, pigs, sheep/goat and poultry. Fish farming is scarcely visible, but is present nonetheless. As noted above, it may be that a lack of soil sample collection and sieving has biased the available sample in terms of larger hand-picked bones from commercial urban excavations.

5.2 Quantitative information

Animal husbandry and fish farming are rather unequally represented in the database (Fig. 5.1, N=65). The evidence for fish farming is fragile (2%), however present throughout the historical

141 Prummel 1982; Groenman-van Waateringe & Wijngaarden-Bakker 1990; Audoin-Rouzeau 1993.
142 Lauwerier 1997, 481.
143 See also Payne 1972. For more recent work in the UK, see: O'Connor & O'Connor 2003.
144 Cavallo *et al.* 2006
145 Idem, 15.
146 Van Haaster 2003, 97.
147 Çakilar *et al.* 2019.
148 Çakilar *et al.* 2019, 12; Ervynck 1997. It has been reported that the twelfth to thirteenth-century cesspit of the abbot at Ename (Flanders) contained the bones of very young rabbits (Ervynck, Cooremans, & Van Neer 1994). Evidence from documentary sources suggests that unborn or newborn rabbits were eaten in monastic households during periods of fasting because, coming out of the watery environment of the uterus, they were considered to be fish (Robinson 1984).
149 Vermoesen 2015, 537-8.

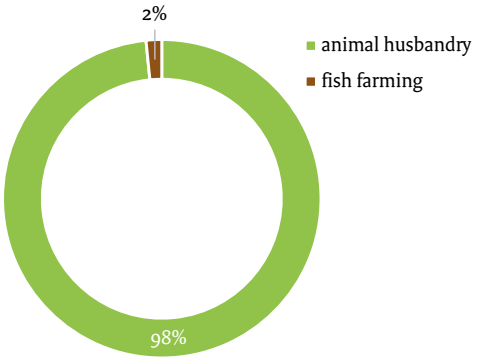


Fig. 5.1 Distribution of animal husbandry and fish farming indicators as represented in the database (N=65).

periods. The vast majority of data regards livestock (98%). The chronological distribution of animal husbandry and fish farming indicators is based on two methods, as explained in chapter 3. The first method uses the starting date of keywords (Fig. 5.2), showing the earliest mention of activities relating to urban farming. The second method uses the (summarized) probability density function for the date range of the keywords (Fig. 5.3). The latter offers a nuanced view of the chronological occurrence of livestock indicators, because it reflects continued use over time.

5.2.1 Animal husbandry

The theme 'animal husbandry' is made up of keywords from archaeological, pictorial, historical and cadastral sources (Fig. 5.4). Of the collected data, 80% is based on archaeological sources. A total of 62 keywords are related to the theme, which have been rated a total of 372 times. Out of this total, 21 keywords have been rated as 'textbook examples' of urban farming (score 20) (Table 5.1).

When the livestock indicators are ordered by starting date, an increase is noted from the late medieval period A (1050-1250) onwards, followed by an explosive growth in the late medieval period B (1250-1500) and rapid decrease in the modern period (Fig. 5.2). This pattern suggests that from the earliest phases of urbanisation, urban farming was practised and remained an important factor of town life. The extent to which animal husbandry was practised though time is illustrated by the probability density plots. This chronology shows three peaks dating to c. 1375, 1750 and 1850 (Fig. 5.3), indicating an increase of livestock keywords attributed to these periods. These historical periods are known for both urban development as well as decline.

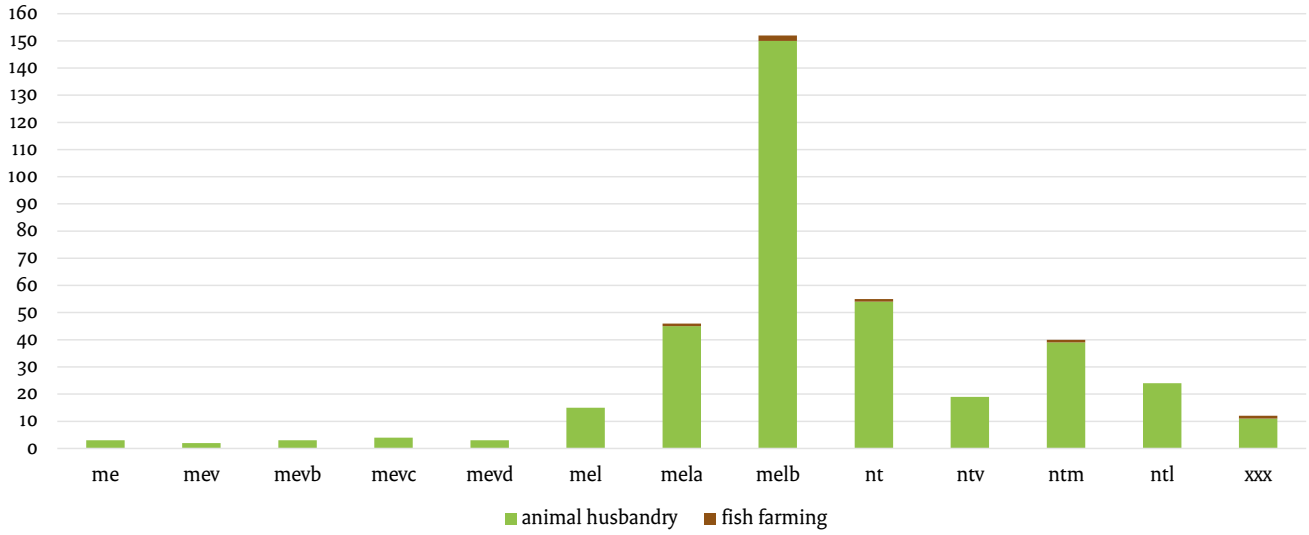


Fig. 5.2 Chronological distribution of animal husbandry (N=372) and fish farming indicators (N=6) based on all sources, according to the starting date (N=378). The late medieval period B (1250-1500) is dominant.

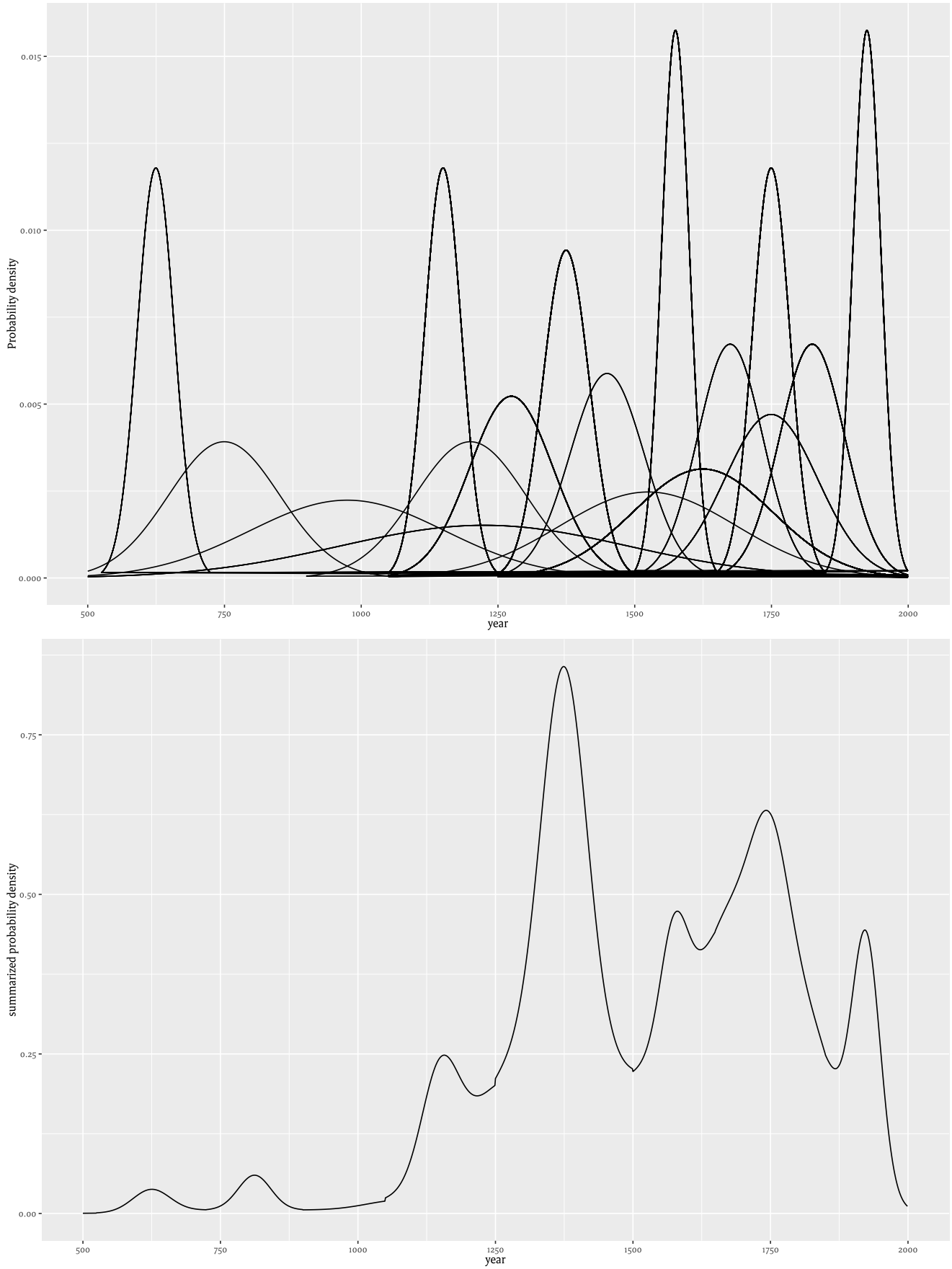


Fig. 5.3 Density plots (top) and summarized density plots (below) of dated urban farming keywords found in this study related to animal husbandry. The probability of the dates is based on the date range of each keyword, assuming normality. Three peaks are noted dating to c. 1350, 1750 and 1850 (N=372).

Table 5.1 Animal husbandry indicators (N=62, frequency 372). All keywords in Dutch and English.

Keywords (Dutch)	Keywords (English)	Score 5	Score 10	Score 20	Total
Agrarisch	agrarian	2	4	1	7
Agrarische	agrarian	-	2	1	3
Begraasd	grazed	2	1	1	4
Begrazing	grazing	3	-	-	3
Bemest	fertilized	1	-	-	1
Bemesten	fertilizing	1	1	-	2
Bijenkorf	beehive	1	-	-	1
Boerderij	farmstead	-	2	-	2
Boerenbedrijf	farm	-	1	-	1
Boerenbedrijven	farms	1	-	-	1
Diergraf	animal grave	-	3	1	4
Diergraven	animal graves	-	2	-	2
Doodgeboren	stillborn	2	5	1	8
Drenkplaats	watering place	1	-	-	1
Drinkbak	drinking trough	3	1	-	4
Foetaal	fetal	-	1	-	1
Foetale	fetal	-	3	-	3
Foetus	fetus	-	2	1	3
Hooi	hay	5	7	1	13
Hooiberg	haystack	6	2	-	8
Hooibergen	haystacks	3	1	-	4
Hooiland	hay field	6	3	-	9
Hooilanden	hay fields	2	-	-	2
Hooivork	pitchfork	-	1	-	1
Kippenhok	chicken coop	1	-	-	1
Koehuis	cowshed	-	-	1	1
Kooien	cages	2	-	-	2
Meent	common	1	1		2
Mest	dung	8	45	2	55
Mestkuil	dung pit	5	34	1	40
Mestkuilen	dung pits	2	5	-	7
Mestschimmel	dung fungus	4	6	-	10
Mestschimmels	dung fungi	3	6	-	9
Mestvaalt	dung heap	2	-	-	2
Neonaat	neonate	1	2	-	3
Ophooglaag	accumulated layer	1	-	-	1
Opslag	storage	1	-	-	1
Paardenstal	stable	3	2	-	5
Roedenbergen	haystacks	-	1	-	1
Rundergraf	cattle grave	-	5	1	6
Rundergraven	cattle graves	-	1	-	1

Table 5.1 Animal husbandry indicators (N=62, frequency 372). All keywords in Dutch and English (continued).

Keywords (Dutch)	Keywords (English)	Score 5	Score 10	Score 20	Total
Stadsboerderij	urban farmstead	-	1	-	1
Stadsweide	common	-	2	-	2
Stal	barn	15	21	3	39
Stalafval	barn/stable waste	1	-	-	1
Stalfunctie	function as barn	-	1	-	1
Stallen	barns	7	4	-	11
Stalling	barn	2	2	-	4
Stalmest	dung	1	1	-	2
Stro	straw	-	6	-	6
Trog	trough	-	2	-	2
Tuinen	gardens	1	-	-	1
Vee	livestock	11	11	1	23
Veehouderij	livestock farming	1	3	1	5
Veekraal	corral	2	-	-	2
Veestalling	barn	-	1	-	1
Veeteelt	animal husbandry	4	5	1	10
Veevoer	fodder	7	3	2	12
Voedergewas	fodder crop	1	1	-	2
Voer	fodder	2	2	-	4
Vogelkooi	birdcage	-	1	1	2
Weidegrond	pasture	2	4	-	6
Total		**130**	**221**	**21**	**372**

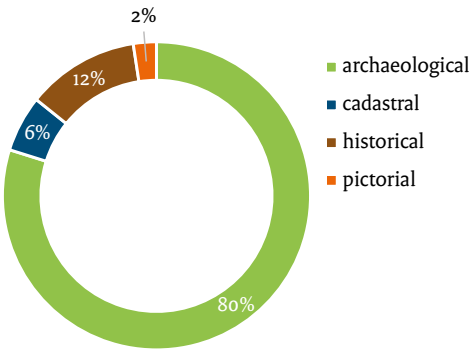


Fig. 5.4 Animal husbandry indicators. Number of keywords per type of source (archaeological, pictorial, historical or cadastral N=372). Archaeology represents 80% of the data.

From the late medieval period B (1250-1500) onwards, the number of keywords from non-archaeological sources increases (Fig. 5.5; Fig. 5.6). This is not surprising in the light of the availability of the written record.

5.2.2 Fish farming

The archaeological evidence for fish farming adds a very small contribution to the spectrum (N=3, frequency 6). Keywords linked to the theme 'fish farming' are exclusively of an archaeological nature. The keywords used for this theme are listed in Table 5.2. Two of the six valued keywords were rated with a score of 20, which means that they should be regarded as 'textbook examples'.

5.3 Context and indicators

During medieval times animal husbandry generally changed from a subsistence economy to

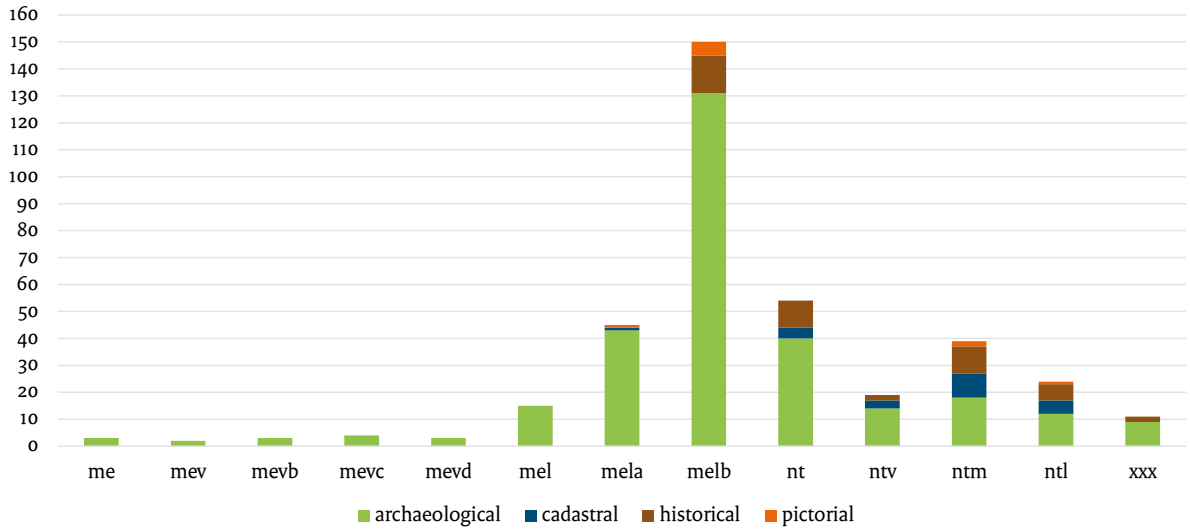


Fig. 5.5 Animal husbandry indicators. Frequency of keywords according to source type over time according to starting date (N=372).

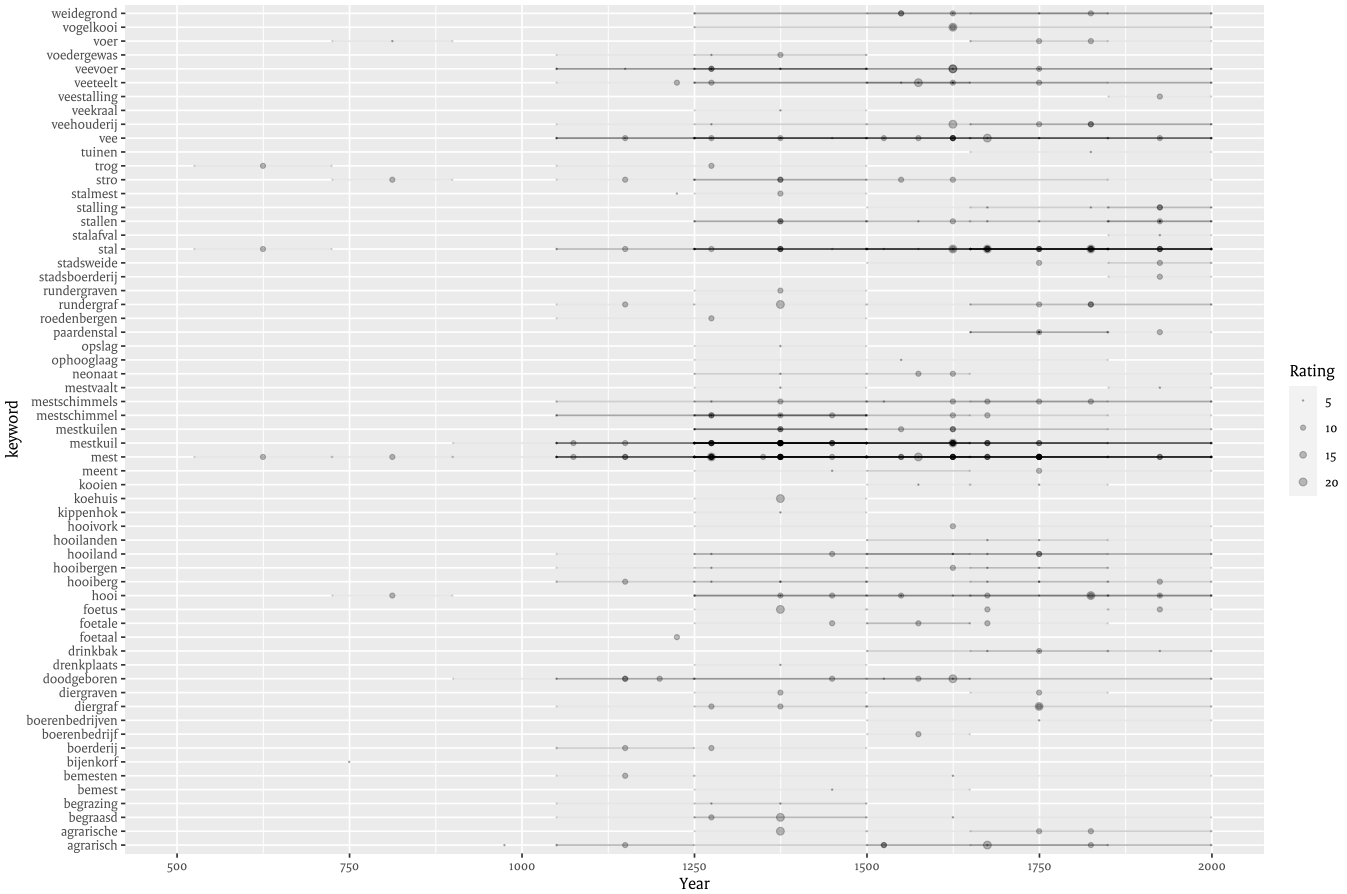


Fig. 5.6 Animal husbandry indicators. Chronological distribution keywords, frequency of use and attributed value (5, 10, 15, 20) (N=62, frequency 372). For translation of keywords, see App. 2.

Table 5.2 Fish farming indicators (N=3, frequency 6). All keywords in Dutch and English.

Keywords (Dutch)	Keywords (English)	Score 5	Score 10	Score 20	Total
Fuiken	fish trap	-	-	1	1
Gekweekt	cultivated	2	1	1	4
Vijver	pond	-	1	-	1
Total		**2**	**2**	**2**	**6**

a more market-oriented economy focusing on surplus production.[150] The exchange of livestock and produce would have been very limited at first but the rise of a monetary society changed this system drastically. The perishable nature of meat and dairy products made it necessary to trade at local or regional markets. Butter and cheese are well known from the toll documentation of the Waal, IJssel and Nederrijn rivers for the local and regional trade from the fourteenth century onwards. The year markets from Deventer, played a central role in the distribution of dairy over a longer distance towards the German hinterland.[151]

Medieval livestock was smaller and lower in productivity compared to modern livestock. Animal breeding to improve this started during the post medieval period. The low productivity was in part due to the lack of specialized breeding, but more importantly down to the poor feeding of animals. The estimated carcass weight of cattle and sheep in the fourteenth century was probably only one third of a carcass in the nineteenth century. Albarella lists the zoological identifiers for innovations in early modern England as size, power (traction), wool and veal. He traces the start of this development back to the sixteenth century.[152] In this period agrarian historians have identified an *agricultural revolution*[153] which was strengthened and redefined as a gradual process over the following centuries. The revolution is seen as the effect of urban population growth on rural food production resulting in new animal breeds, sophisticated machinery, new foodstuff and feeding techniques, enhancement of meat and dairy production, substitution of cattle with horse as the main animal for traction, and increase of cattle size.[154]

Recent zooarchaeological analysis of urban supply and consumption in the Basque country during the medieval and early modern period, however, shows a stable urban diet and produce over time. The authors assume this pattern was caused by town regulations. They make the important point that too much emphasis should not be placed on uncritically accepting of the Anglo-centric model. This is a valuable suggestion given the number of available studies from elsewhere.[155] The relative decline of the goat for instance, reported by Groenman-van Waateringe and Van Wijngaarden-Bakker is, however, certainly paralleled in England.[156] In England, the decline of the goat is explained by the obnoxious habits of goats destroying hedgerows in a period of land reform based on enclosures. Another explanation suggests that there was a change in dairy preference, from goats' milk and cheese, towards cows' milk and cheese.[157] Looking at the Basque example, it may very well be that the 'agricultural revolution' is not recognisable in urban farming development. In the Netherlands, Van Haaster notes an intensification of produce in 's-Hertogenbosch after the fourteenth century, but he does not ascribe this solely to urban farming.[158]

The rearing of livestock and small animals in urban contexts has not only a long – but also a continuous – tradition within Dutch towns, as is illustrated in Chapter 2. Livestock was valued for its meat and secondary products such as milk and wool, but also for traction, slaughter waste and/or dung. All these aspects are also relevant for arable farming (traction and dung), horticulture (dung) and as raw materials for various crafts for instance regarding leather and bones.[159] Animal husbandry in the town raises questions of scale, intensity and the purpose of farming. Firstly, archaeological correlates have to be discussed as various archaeological indications exist to trace livestock farming. These are directly related to the keywords used for analysing the reports (see Chapter 3).

150 Albarella 1997, 27; Crabtree 2001, 1; Blonk-van den Bercken *et al.* 2020, 11-25.
151 Weststrate 2008, 121.
152 Albarella 1997, 19 cf.
153 Beckett 1990; Davis 1997; Davis & Beckett 1999.
154 Grau-Sologestoa & Albarella 2017, 75, citing Langdon, 1986; Albarella 1997, 2004; Davis 1997; Davis & Beckett 1999; Thomas 2005, 2009; Sykes, 2006; Vann & Grimm 2010; Thomas, Holmes & Morris 2013.
155 Grau-Sologestoa & Albarella 2017, 75.
156 Groenman-van Waateringe & Wijngaarden-Bakker 1990.
157 Albarella 1997, 26.
158 Van Haaster 2003, 97.
159 Blonk-van den Bercken *et al.* 2020.

5.3.1 Complete skeletons and neonates

Primary evidence is found through complete skeletons of stillborn, neonate or sick animals.[160] So-called *perinatal mortality* of cattle, sheep, goats and pigs is also referred to in literature as an indication of livestock farming in the town.[161]

5.3.2 Kill-off patterns

Age and associated mortality profiles of animal bones may indicate the primary exploitation of cattle for milk production or meat. It is generally assumed that when keeping cattle in an urban context, the emphasis will be on milk production rather than on meat. In an urban context, a rather large and closed bone assemblage is needed for such an analysis.[162] Therefore, this indicator cannot be used in this study, because it requires work on raw data.

5.3.3 Farm buildings and farming infrastructure

In addition to the animal remains, evidence can be found in stables, barns, canopies and cages to keep animals. Fodder requires storage in outbuildings or haystacks. Feeding troughs and watering places are also regularly found. Then there are structures such as fences, enclosures and other ditches to keep cattle in place.

5.3.4 Dung

The most important and frequent indicator for animal husbandry is dung.[163] It should be noted that dung is also a difficult and complex topic. Dung can be produced by animals kept for animal husbandry, but also by horses. We should not neglect this important indicator because to date there has been insufficient archaeological research to determine which animal urban dung may come from. Dung was also traded and transported, so may only be an indicator of cattle in a wider region or urban hinterland. The use of seabird guano and human excrement as a fertilizer, particularly in the second half of the nineteenth century, is largely beyond the scope of this report, but had a significant impact upon farming in the Netherlands and Belgium.[164] For this study, the focus has been on unambiguous primary data, as has been presented above. Animal bone material alone in an urban context is not proof or urban farming as cattle, pig or goat may have been kept on site elsewhere and walked to be sold live in urban markets by farmers in the area. By focusing on excavated faunal remains we once again shift the focus on consumption rather dan the place and means of production of meat.

In addition to the archaeological evidence for animal husbandry, there are also numerous examples of town accounts or ordinances of towns in which an impression of rural activities can be obtained by means of regulations concerning animal husbandry. When such documents are described in the archaeological reports, these have been incorporated in this study.

5.4 Results

In this section, the archaeological finds relating to animal husbandry (cattle, pigs, sheep/goat, poultry), dung and fish farming are presented.

5.4.1 Cattle

During the Middle Ages, cattle were the most important utility animals because, in addition to meat and milk, they were also used as a beast of burden, and for traction. Carts were pulled by oxen to transport merchandise or building materials, but they were mainly used to pull ploughs and harrows in the fields.

In proportion, the medieval European ox was smaller than modern cattle and much lighter, with short horns. With a height at the withers of 110 to 135 cm, a weight of 150-200 kg and a milk production of three litres per day, the yield was much lower than it is today.[165] A cow of this size produced an average of 16-20 kg of dung per day. In the case of urban farming, this dung will have partly remained within the town walls. It has also been documented as an export product.[166] Dung, then, is a very powerful indicator.

160 Prummel 1987, 1988, 1989.
161 Reichstein 1994, 445-448.
162 See for the discussion Grau-Sologestoa & Albarella 2017, 77.
163 Van Haaster 2003, 97; Van Oosten 2014, 26.
164 Cushman 2013; Burke & Darbu 1979, 132.
165 Von den Driesch & Boessneck 1974; Matolcsi 1970.
166 Architectural historian James Ayres writes in his book 'Building the Georgian City' about the importance of the river Thames as a transport route to London: 'Incoming goods [by river] included coal, stone, brick, lime and timber whereas the single most important outgoing material was dung.' See Ayres 1998, 53.

Fig. 5.7 Calf in anatomical context, dating from the fifteenth century, found at Deventer-Burseplein (Vermeulen, Mittendorff & Bartels 2007, 35.).

Food such as cheese, butter and beef were important basic elements in the daily (post)-medieval diet. The hides were turned into leather for everyday items such as belts, shoes, saddles, rigging, bellows, and other products.[167] Calf skins were also used for the production of parchment. Cattle hair was used for felt, for preparing mortar, and stuffing (padding) material. Bones were transformed into various objects and glue or soap. Tallow was used for making candles, soap and lubricant, intestines were processed into sausages, urinary bladder as a substitute for window glass and tendons as a tension of (cross) arches, fishing rods and for the suspension of flails and bell clappers.

Fig. 5.8 Example from Enkhuizen-Oude Postkantoor. Inside a medieval pit a cow was cut into pieces, dating 1150-1300 (Gerritsen & Schrickx 2014, 47, Fig. 38).

Fig. 5.9 A cattle grave was found in Eindhoven-Vijksteeg, probably dating from the period around 1700 (De Jong, Louvenberg & De Vos 2011, 54 Fig. 45).

[167] Blonk-van den Bercken *et al.* 2020, 141-160; for the Roman period see Çakirlar *et al.* 2019, 9.

Anatomically complete calf and cattle skeletons have been found in several urban contexts (Fig. 5.7). The dates of these finds vary from the early Middle Ages to the modern period. The earliest evidence for complete cattle skeletons comes from Rotterdam-Markthal[168] (900-1050) and Leiden-Aalmarkt[169] (1150-1175). Examples of medieval and earlier contexts in which complete skeletons of cattle or calves were excavated include Enkhuizen-Oude Postkantoor[170] (1150-1300) (Fig. 5.8), Amersfoort-Westsingel Hellestraat[171] (1300-1350) Deventer-Burseplein Stadskantoor[172] (1400-1500), Leiden-Breestraat 46-48[173] (1250-1500), Montfoort-Lievevrouwengracht[174] (1400-1500), Culemborg-waste containers project[175] (1250-1500), Venlo-Maasboulevard[176] (1600-1700), Delft-Scheepmakerij 8-12[177] (1500-1850), Eindhoven-Stratumseind[178] (modern period), Eindhoven-Vijksteeg (1700) (Fig. 5.9), Montfoort-Lieve Vrouwegracht[179] (modern period) and Rotterdam-Mariniershof[180] (modern period).

These finds clearly indicate that cattle were being kept locally. Often these are sick animals or premature or stillborn calves.

5.4.2 Pigs

Pigs were exclusively reared to produce meat. The average weight of a pig in the medieval period was only 60 kg. Pigs were easier to keep in terms of fodder and were therefore not slaughtered before the winter, and by doing this a steady meat supply throughout the year was ensured. This made them very suitable to be kept in towns, where space allowed, being fed on domestic waste. Faunal remains of urban areas during the Viking period (800-1050) in England show that pigs were the dominant domesticated livestock.[181]

As early as the late eighth or ninth century Charlemagne's regulations (742-814) had emphasised the pig's status as a major supplier of meat. Bacon, smoked meat, sausages and salted meat were popular in all sections of the population.[182] In the (late) Middle Ages, pigs were also kept as solitary animals in towns.[183] It is suspected that almost all homeowners in towns kept a pig.[184] These pigs could also be kept

168 Vredenbregt & Van Trierum 2012, 182.
169 Esser, Beerenhout & Kootker 2011, 177.
170 Gerritsen & Schrickx 2014, 47.
171 Hulst & d'Hollosy 2014, 38.
172 Vermeulen, Mittendorff & Bartels 2007, 34.
173 Corver 2016, 68.
174 Van Kampen 2016, 27.
175 Kodde 2017, 50.
176 Van der Velde *et al.* 2009, 840 ff.
177 Craane, Koopmanschap & Sophie 2015, 18.
178 Debruyne 2007, 17.
179 Van Kampen 2016, 27.
180 Jacobs, Guiran & Kempenaar 2005, 6.
181 Crabtree 2001, 3.
182 Brandsch 1990.
183 Falkenberg & Hammer 2006, 292 ev.
184 Contrary to what is sometimes thought, pigs did not roam freely through the towns, but were carefully kept (Jørgensen 2013).

Fig. 5.10 Pit containing the complete skeleton of an adult pig; sow, approximately one year old. Found in Middelburg - Berghuijskazerne, dating 1375-1450 (Dijkstra, Ostkamp & Williams 2006, 182).

centrally outside the town. There was the possibility to keep a pig in the backyard. Pigs were often fattened by bakers, millers, innkeepers and other entrepreneurs. The bakers fattened the so-called 'Bäckersäue' (bakery pigs) with waste and leftovers of cereals, flour, bread and bran.[185] Moreover, by-products from the brewery were used for pig farming. This was done in such a way as to avoid food wastage and to make a good profit, since meat prices for pigs were higher than those for cattle and sheep.[186] Farmers and town dwellers in the domanial system were also obliged to make remittances in the form of pigs to the lord or the church. Young pigs were traditionally delivered on 24th June (St. John's Day).[187] In the Middle Ages and beyond, pigs were allowed to scavenge and roam freely in towns to find their own food in gardens or to eat street waste. At the end of the Middle Ages, this practice was increasingly restricted by town councils for reasons of hygiene.[188]

Complete skeletons of adult pigs or piglets are known from urban excavations (Fig. 5.10). The contexts that emerged in this study indicate that pigs were kept in towns during the entire period from the Middle Ages until recent times. The evidence mainly comprises complete skeletons, or multiple bone elements of neonate piglets. Nevertheless, complete skeletons of adult pigs appear to be less represented than those of cattle.

Examples of anatomically complete pig skeletons have been found in Rotterdam-Markthal[189] (900-1050), Gorinchem-Bluebandhuis[190] (1300-1400/1450), Middelburg-Berghuijskazerne[191] (1375-1450), Gorinchem-Krijtstraat[192] (1300-1400), Arnhem-Oude Oeverstraat (Noord)/Nieuwe Oeverstraat (zuid) Kortestraat[193] (1550-1650), Arnhem-Koningstraat[194] (1500-1600) and during the Culemborg-waste containers project [195] (1250-1500).

5.4.3 Sheep/Goat

Sheep in medieval times were important suppliers of milk, meat and wool.[196] The average weight of sheep during medieval period was only 30 kg and differed considerably from modern varieties. Sheep provide the richest dung to fertilize farmland as their droppings possess higher levels of nitrogen, potassium and phosphorus than cattle dung.[197]

In the Middle Ages, there were strong regional differences in sheep farming. This applied especially to preferences for wool, meat or milk production. In addition to the main use of sheep, the rearing of the animals, the body size and the breed of sheep were all closely connected. Fine woolly breeds of sheep were successfully bred in Great Britain. In the thirteenth century, a sheep's wool represented about half of its total value. The wool from England was exported to Europe and further processed in the Netherlands, Flanders and Italy. In most other regions of Europe sheep were kept that were used for wool, but also for meat and milk. For milk production, the sheep were milked from May to September. The rich sheep's milk was processed into cheese. Sheep for slaughter were often separated from the herd and fattened. Their skins were made into leather and parchment. The belly fat was suitable for making candles. Pasturing sheep did not compete with land for agriculture, because sheep were fed all year round on the most meagre pastures, along verges and fields, in open spaces in the forest or on stubble fields and fallow land. They kept the weeds on the harvested fields short and left valuable dung behind.

Medieval goats were very similar to the wild type, but were small and slender with an average height from 60 to 65 cm. The horn shape was usually bent. However, goats were mostly kept in small-scale herds or even as single animals. They were often kept by poorer people who could not afford to buy a cow. Goats were mainly kept in mountainous regions of Europe (30 to 60% of the domestic animal spectrum) where as they only make up only 10 to 20% of the domestic animal spectrum in other regions of Europe. Coastal areas were mostly unsuited for goats in terms of fodder. They were mostly herded together with sheep with restrictions to where goats were allowed to graze (not in woods). The animals were used for milk, meat, leather.

The remains of complete skeletons of sheep/goats have been recorded in several Dutch towns. On the basis of the skeletal material, neonate sheep and goats cannot be distinguished from each other, so that these finds will be discussed together. In Middelburg-Berghuijskazerne[198] (1375-1450) a pit has been

185 Falkenberg & Hammer 2006, 296.
186 Falkenberg & Hammer 2006, 297.
187 Behre 1995.
188 Falkenberg & Hammer 2006, 298.
189 Vredenbregt & Van Trierum 2012, 370.
190 Hoogendijk 2015, 118.
191 Dijkstra, Ostkamp & Williams 2006, 182.
192 van Genabeek 2005, 21.
193 Loopik 2017, 165.
194 Defilet & Van den Berghe 2011, 104.
195 Kodde 2017, 50.
196 Crabtree 2001, 3.
197 Crabtree 2001, 1.
198 Dijkstra, Ostkamp & Williams 2006, 217.

excavated containing several stillborn lambs. At the site Roermond-Bethlehemstraat Voogdijstraat[199] (1250-1650) foetal remains of a sheep or goat were also identified. Neonatal skeletal parts of sheep/goats have been documented in Groningen-Boterdiep[200] (1200-1400) and Zutphen-Mars Havenstraat[201] (1700-1800).

5.4.4 Poultry

Medieval and early modern books and documents give information about chickens and the keeping of poultry, perhaps more than any other animal.[202] The fact that chickens are mentioned so abundantly, indicates their immense economic and culinary importance. In the preserved medieval cookbooks, various forms of preparation of chicken meat outnumber all other meat dishes.

Young pigeons were generally popular on the menu in the late Middle Ages of richer citizens. In addition, goose and duck were often kept but also hunted or trapped. The common game birds such as partridge, quail, snipe or pheasant, and large wild birds such as cranes, storks, herons and cormorants were also eaten. At the upper end of the social scale peacocks and swans played a special role at the courtly table for particularly lavish display.[203]

In the Middle Ages, chicken farming grew in importance as part of the food industry, and the proportion of chicken bones reported archaeologically is therefore correspondingly higher, approximately fourfold when compared to remains from the early medieval period.[204] Age and gender ratio in the find material point to an increasing differentiation of chicken use in the medieval poultry industry, creating stronger breeds and leading to more abundant egg use.[205] In the thirteenth to the fifteenth centuries there was a clear upswing in breeding efforts: the average height of chickens increased as well as the variety of breeds. The zooarchaeological findings indicate the appearance of the first real domestic chicken breeds at this time.

The 'Capitulare de villis' of Charlemagne (created around 812) regulated the keeping of chickens and geese at mills. The abundance of fodder possibilities with grain are logical. Rules and regulations concerning animal keeping and storage at the royal courts stipulated that at least 100 chickens and 30 geese should be kept. This implies an organized large-scale farming system comparable to the Roman poultry farms. Nevertheless, there was certainly widespread 'small-scale' poultry farming or the keeping of individual animals for egg production or the rearing of individual fattening animals at farms or in urban areas. It is this small-scale household chicken keeping that is usually depicted in medieval art. Chickens were kept in wooden sheds or yards where they were fed with grain.

From an archaeological point of view, there is comparatively little evidence to indicate that chickens or geese were kept in specific localities. In Middelburg-Bachtensteene 14-18, in addition to various neonate mammalian animal

199 Wattenberghe & Van den Bosch 2011, 145.
200 Huis in 't Veld 2015, 162, 626.
201 Fermin & Kastelein 2013, 66.
202 Benecke 1994, 28.
203 Crabtree 2001, 260.
204 Crabtree 2001, 261.
205 Crabtree 2001, 260.

Fig. 5.11 Carpometacarpus of turkey (V319) from sample BE-05, dating seventeenth/eighteenth century (De Rijk 2016, 120, photo by J.M. Grimm).

Fig. 5.12a Bird drinking bowl, 1700-1800, found at castle Heemstede (Open Data Provinciaal Depot voor Archeologie Noord-Holland, no. 4564-05).

Fig. 5.12b Bird drinking bowl (Museum Rotterdam, no. 15524).

Fig. 5.13 Artificial egg made of white pottery, found in Nijmegen-Waterkwartier. Dating 1650-1850 (Harmsen 2015, 72).

carcasses, remains of juveniles of chicken and duck have been excavated (dating from the seventeenth/eighteenth century).[206] The remains of adult specimens of turkey and goose have also been identified, making the interpretation for poultry farming almost certain (Fig. 5.11).

Near the Middelburg-Berghuijskazerne site, almost complete chicken skeletons have been identified in a cesspit context and (dung) pits (1375-1450) in the yard. In addition, three incomplete eighteenth or nineteenth century glass bird drinking bowls with a much later date have also been found.[207] These are cone-shaped bowls that were closed at the top with a disc on which a solid colourless or blue ball has been placed. On one side of the wall there is a long spout with a rectangular opening at the top (Fig. 5.12a and 5.12b).

Among the white pottery in Nijmegen-Waterkwartier there is an artificial egg (1650-1850) (Fig. 5.13).[208] The egg is an indicator that chickens were most likely kept on the spot as this type of egg was used to stimulate hens to lay their eggs in the nest, and also served as a substitute for eggs which were removed.

5.4.5 Dung

As mentioned before, dung is of special interest for this study. Therefore a concise overview is offered here. Dung is the clearest and most represented indication for keeping cattle in the town. Although dung can be transported and/or may derive from traded animals on markets, it may be assumed that the enormous amounts of dung cannot come exclusively from markets or horse stables. Often, dung on the back of houses in pits (often also in connection with other finds) can be interpreted as an indication of small-scale but local keeping of (small) livestock. Dung is the most important link in the cycle of a garden. Well matured dung makes external input unnecessary because the nutrients are fully utilised and remain available.

Dung research often provides additional information on the species of animals kept. There are several options to investigate dung. First there is research on parasites, both at

206 De Rijk 2016, 120.
207 Dijkstra, Ostkamp & Williams 2006, 98-99.
208 Den Braven 2015, 72.

macroscopic level (insects/mites/fleas) as well as microscopic (often through pollen research). Macroscopic examination of a soil sample at the Gouda-Bolwerk excavation (1500-1600) has shown that a specific type of lice (*Bovicola caprae*) only occurs in goats.[209] Furthermore, there are often hair remnants from the coat in dung and microscopic research can show from which animal the hair originates. Dung often consists of a mixture of different materials such as straw or other vegetable litter, animal faeces and remains of fodder. Straw is often used as litter in barns or cages. It is waste from grain processing and sometimes it is still possible to find out which crops were cultivated in the area by means of archaeological research. In this respect, dung on the one hand links the themes of animal husbandry and arable farming, but it can also be linked to horticulture, where it can be used as fertilizer. With the help of archaeobotanical research, it is sometimes possible to determine which parts of plants were used to feed animals with (hay) or what the land/landscape looked like where the cattle grazed, by looking at remains of more or less digested plant remains and seeds.[210] It is often possible to draw conclusions about the animal by means of archaeobotanical research into the way in which the vegetable material has been chewed. Furthermore, this type of research can also yield data on dung fungi and intestinal parasites, which may in turn give indications that there has been livestock farming or fertilization.

In pits, dung ripens through fermentation, making the material suitable for later fertilization in gardens and fields. In addition, heat is generated during fermentation, so that the dung pits can also be used as hotbeds (see also Chapter 6). This allows earlier sowing of crops in spring and an extension of the growing season. At the same time, trough fermentation the minerals from the dung become available and this improves the fertility of the area concerned.

Throughout all periods and almost all medieval towns there are indications of dung, dung pits, dung layers, dung bars or dung gutters. Dung layers and pits are most commonly found, and these structures can often only be dated when other find material, such as pottery is present. The finds of dung are too numerous to be discussed here. Some representative examples are presented per period. The oldest traces date from the tenth century from towns like Alkmaar-de Laat 208-212[211] and in eleventh century Alkmaar-Doelenstraat St. Jorisstraat[212], Leiden-Aalmarkt 8-9[213], Vlaardingen-Gat in de Markt.[214] Dung pits from the full and late Middle Ages have been excavated in Tiel-Prins Willem Alexanderschool[215] (1125-1375), Hoorn-Grote Noord 4 and 6[216] (1310-1350), Rotterdam-Markthal[217] (1250-1500), Venlo-Maasboulevard[218] (1250-1500), Dordrecht-Grote Markt[219] (1320-1400) and Groningen-Vismarkt 26[220] (1200-1400).

Numerous finds of dung and dung pits have been made in urban contexts dating from the late medieval period to the early modern period onwards. Finds have been made at: Utrecht-Sint Jacobsstraat[221] (1250-1849), Zwolle-Achter de Broeren[222] (1475-1525), Medemblik-Gedempt Achterom 45[223] (1500-1850) and Gouda-Bolwerk (1400-1500).[224]

Layers of compact plant material are described as dung in several of the excavation reports which were examined, but archaeobotanical research sometimes proves otherwise. It may be that the plant material has been used for some other purpose, such as thatched roofing.[225] We would therefore recommend that much more targeted research is undertaken on dung as it has enormous potential for information on urban farming.

There is a lot of documentary evidence about dung from medieval and early modern Europe which can assist with archaeological interpretations. The fifteenth and sixteenth century inspection books (*keurboeken*) from Doetinchem contain various provisions and regulations concerning livestock farming in the town. It was, for example, stipulated that dung was not allowed to be left in the streets for more than eight days.[226]

5.4.6 Fish

As stated before, fish farming is an underexposed theme in this study because of the scarce representation in the database. Whether there were fishponds in towns, for example, or people fished in canals or rivers along the towns, was very seldomly reported (Fig. 5.14). The few present references relate to lead seals for herring nets, fish traps and finds.

209 Hakbijl 2010, 289.
210 Schepers & Van Haaster 2014, 66-81.
211 Bitter 2013, 54.
212 Loopik 2013, 23.
213 Dijkstra & Endeman 2011, 36.
214 Van Loon & De Ridder 2006, 8, 9, 12.
215 Verhelst & Van Renswoude 2015, 150.
216 Schrickx & Van de Walle-van der Woude 2006, 27.
217 Vredenbregt & Van Trierum 2012, 127.
218 Van der Velde *et al.* 2009, 423.
219 Hos & Paalman 2008a, 155.
220 Bergsma 2014, 12.
221 Van Wieren 2017, 13.
222 Klomp 2007, 25.
223 Schrickx 2013, 92.
224 Dijkstra, Houkes & Ostkamp 2010, 289.
225 Salomons 2015, 33.
226 Van der Linden 2007, 58.

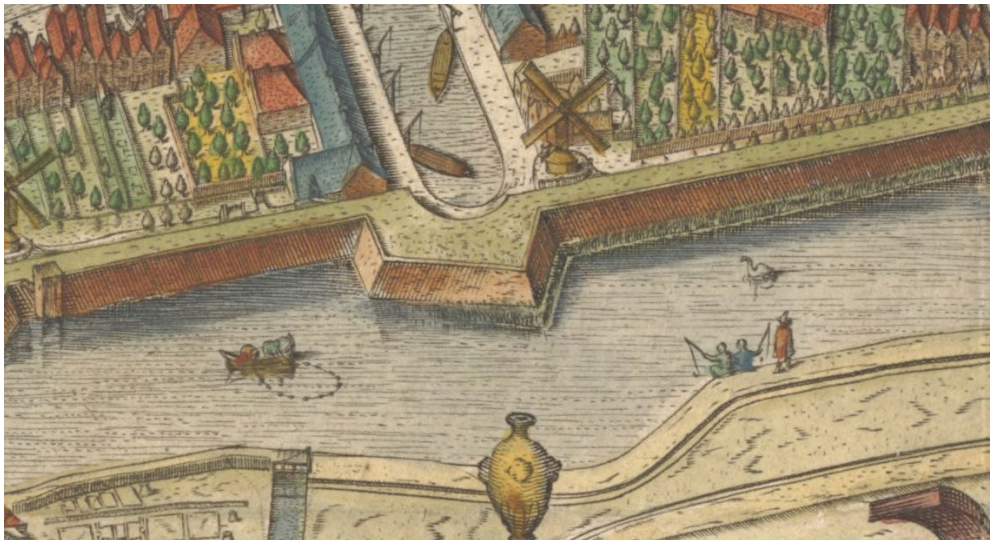


Fig. 5.14 Details of fishing directly surrounding the town of Alkmaar, on the map of Cornelis Drebbel from 1597. Within the city, agricultural activities were not uncommon, such as fishing with nets in the town canal/moat (Hakvoort *et al.* 2015, 162, collection Regionaal Archief Alkmaar / PR1005691).

Fig. 5.15 Example of a lead seal for a herring net from Schiedam, found in Enkhuizen-Westerstraat 188 (Duijn & Schrickx 2016, 109).

Just as there were lead quality standards attached to linen products, there were also seals for herring nets. From the sixteenth century onwards, these were used by urban authorities to monitor the quality of fishing nets (Fig. 5.15). The production of hemp fibre fishing nets was concentrated in the provinces of Zuid-Holland and Utrecht. A first overview of this class of small finds has been undertaken at Enkhuizen-Westerstraat 188.[227]

During the excavation of Tiel-Dominicuskwartier[228] several traps from moat contexts were recovered (Fig. 5.16 for the best preserved one). This trap construction

[227] Duijn & Schrickx 2016, 112.
[228] Van Renswoude & Habermehl 2014, 395.

Fig. 5.16 Fish trap (1600-1750) found in Tiel-Dominicuskwartier (Van Renswoude & Habermehl 2014, 91).

comprised a tiled pit with a trap on top of it. The semi-circular trap was made from a willow wickerwork framework, twisted around oak poles. This construction was then placed in the moat. Two similar traps which may have been used to catch eel were found in the moat, but they are less well-preserved. The traps date from between 1600 and 1750.

5.5 How were animals kept?

The agricultural intensification from the Middle Ages onwards, meant the increase of cultivated acreage. The meadows for the town's cattle as well as fields or horticultural land extended towards the urban fringe. The close vicinity was needed to ensure propper grazing grounds for the livestock kept within the town. In contrast, pigs and poultry could roam around freely or were often kept in barns and fed throughout the year.

Various traditional strategies for livestock feeding are historically known. The most common way was to let cattle graze on areas just outside the town, often communal land. In addition, during the summer months, hay was often stored in attics, barns or haystacks (see for examples Chapter 2). If there were not enough meadows available in the area, the cattle were driven in herds to summer pastures further away from the town during the spring to autumn. Furthermore, the feeding of cattle with foliage from deciduous trees such as ash (*Fraxinus excelsior*), lime (*Tilia cordata*), elm (*Ulmus glabra*), maple (*Acer sp.*) and oak (*Quercus sp.*) is also known. Occasionally cattle was fed with collected weeds.[229] Hay, and gathered leaves are of vital importance to provide fodder when livestock is kept inside, for instance during winter months. Winter grazing is only an option if it is not too wet and the land is not covered with snow. Providing winter fodder was easier in areas of rich arable land, where it has been imbedded within the greater farming system and the production of cereals.[230] The by-products of harvest processing were also fed to livestock. To minimize the labour-intensive gathering and storage of winter fodder, a lot of grazing animals were slaughtered before the winter, mostly in November. One of the most important limiting factors in the low productivity concerning animal husbandry was the poor feeding strategies especially during the winter months.[231]

In addition to the archaeological data, land registry information has been found in reports that describe transactions and sales of plots of land, often including barns as outbuildings. For example, there are various cadastral records of barns, such as those at Alkmaar-Laat/ Bloemstraat (Houtmarkt).[232] The tax lists show that during the Spanish siege of Alkmaar in 1573, a large number of cow owners from the surrounding countryside settled within the walls of the town. However, it remains unclear how they continued their business within an urban context. The influx of rural farmers into the town is also apparent from the deed of sale of a plot of land in which the house was converted into a cowshed and horse stables, including a hayloft. Historical information is available for land at Venlo-Keizerstraat 11-13 (1300-1500) which shows that the land was used more intensively during this period, and that stables or barns were built.[233] Furthermore, the land register illustrates that in later urban contexts plots of land contained horse stables. Examples have been at a site in Tiel-Plein 21-27 (1778).[234] Historic map information from 1832 offers additional information on an excavation site in Alkmaar-Gedempte Nieuwesloot 46 Doelenveld, stating there must have been a barn, with the addition 'for agriculture'.[235] The same cadastral overview shows that the adjacent parcels consist of meadows, owned by the town of Alkmaar.

From cadastral data concerning the location Doetinchem-Hamburgerstraat 46 it is known that the houses were extended in 1888 with a cattle shed (barn) being built on the Boliestraat.[236]

5.5.1 Meadows

In addition to a large number of historical sources the regulations regarding the use of commons around towns, there are archaeological indications about pasture areas where cattle have been grazing. Fresh grass or hay often contains dead flowers and their seeds. Through grazing or hay harvesting, these macrobotanical remains end up in dung. As previously noted, archaeobotanical analysis of dung can often give indications about the parts

229 Lindemans 1952, 345.
230 Crabtree 2001, 1.
231 Crabtree 2001, 1.
232 Bitter & Van den Berg 2014, 11.
233 Van Horssen 2013, 73.
234 Spitzers & Van Genabeek 2009, 12.
235 Griffioen *et al.* 2015, 11.
236 Spitzers & Heijting 2014, 8.

Fig. 5.17 The Mars anno 1573 from the Caertboeck by Thomas Wittenroos, outlying area as a town meadow (common) (Fermin & Kastelein 2013, 13, Fig. 7).

of the landscape in which the cattle grazed through the archaeobotanical analysis of macrobotanical remains. In addition, the species of animals grazing also influenced the composition of the vegetation. Fast-growing plants often found in grasslands are favoured by grazing and the presence of their seeds in dung indicates intensively grazed pastures. Archaeological samples can therefore provide information about the origin of hay and the way in which a meadow has been exploited.[237]

Meadows can sometimes be recognized as field systems formed by ditches, such as seen in Zwolle-Pannekoekendijk Mussenhage[238], where the area was most probably used as a pasture land between the tenth and thirteenth centuries.

Numerous historical sources are available regarding cattle grazing on pastures and commons around towns. These provide insight into such activities, mainly by means of urban ordinances. In many towns, it was common for homeowners to pay pasture fees to the town for the use of the pastures. In 1391 it was decreed that only farmers who lived within the walls of Kampen were allowed to let cows graze on the meadows west of the town (Fig. 5.17).[239] In the winter these meadows were flooded by the high water levels of the IJssel river and the cows had to stay in the barns safely within the town walls. The town of Zutphen owned the meadows, such as the largest parts of the Mars. The town's people bought shares to graze their cattle there.

Zwolle-Blekerswegje[240] is partly situated in the former outskirts of the town, where from 1384 the town law applied. These laws stipulated that farmers in this area were allowed to let their cattle graze on the commons. The sources show that much later there was still talk of agricultural activities in the area. In 1805, the district ruled that a maximum of twelve bulls could be grazed.[241]

From the town hall administration of Doetinchem[242] (1530) it is clear that grazing fees generated a major source of income for the town. The accounts paint a nuanced picture of Doetinchem pointing towards a strong agricultural character. This is not only illustrated by the grazing fees owed to the town by the owners of houses to which the grazing rights are attached, but also by the many provisions noted in the Doetinchem Inspection Book (Keurboek) that related to agricultural businesses within the town walls.

237 Schepers & Van Haaster 2014, 78.
238 Clevis & Klomp 2014, 69.
239 Klomp 2017, 79.
240 Klomp 2002, 2.
241 Klomp 2011, 9.
242 Van der Linden 2007, 58.

Historical maps show the area around Breda-Haagdijk Leuvenaarstraat[243] as open spaces in the period between the seventeenth to the nineteenth century. Two levels of dumping, with find material from the late Middle Ages probably indicate its use as arable or horticultural land.[244] In 1651, the town council of Gennep established the grazing fees (in Dutch *koegeld*) which the citizens had to pay for the use of common land.[245]

5.5.2 Fodder

Information from dung

Hay can sometimes be determined from macro-botanical residues in dung. The harvested hay may contain remnants of (poisonous) plants that cows would not normally eat in the meadow, for example.[246] The analysis of dung can be used to determine whether and how animals were fed (and thus kept in the barn) or walked around freely. In the case of complete animal burials, where an animal is still anatomically complete, soil samples can also be taken to examine stomach content.

Examples of archaeological research has shown that cattle were fed with hay, come from excavations in Gorinchem-Bluebandhuis[247] (1250-1500), Oldenzaal-Ganzenmarkt[248] (1400-1500) or Leeuwarden-Harmoniekwartier (1500-1600).[249] During excavations in the urban fringe of Alkmaar at Oudorp-Lauwershof (1275-1600) a very large number of seeds of grassland plants were recovered from a sample, indicating extensive grassland vegetation.[250] The excavators suggested that the seeds had ended up within the settlement through grazing, or hay harvesting. Tools, such as pitchforks, also give an indication of agricultural activities, such as those recovered from Gennep-Houtstraat[251] (1050-1500).

Evidence for mixed animal diets can be found by combining the evidence from dung with information from the stomach contents of complete animal burials. The interpretation of dung samples can be challenging, because not all components in the dung have to be remnants of the feed, but may also come from mixed waste or the bedding of a stable floor. In some cases, it is clear, however, that cattle have also been fed with cereal threshing residues, or oil mill residues (e.g. press cakes from rape and flax seeds).

A dung sample which was archaeobotanically analysed from excavations in Tiel-Prins Willem-Alexanderschool (1125-1200), that grain straw had been fed to cattle.[252] The cereal straw examined contained characteristic cuts which had been bitten and chewed by animals. It was also established that the straw had probably been mixed with other threshing waste, such as chaff waste from emmer wheat. Moreover, the plant remains which were identified were all indicative of meadow grazing. This makes it likely that the animal had both grazed, and partly been fed, perhaps during a period in a stall. The Leiden-Aalmarkt 8-9 excavation (1225-1275) delivered evidence of oat threshing waste being used as fodder.[253] In addition, the cattle probably also ate weeds, and especially tall weeds, while they were standing in the yard, or grazing along road verges, or in stubble fields.

In later periods (1300 -1700) there are indications that cattle have been fed in various ways, as shown by dung samples taken during the Culemborg-waste containers project (1300-1500).[254] Here straw from grain, possibly waste from flax processing and broad beans were fed, with the beans as well as the pods themselves. The stomach contents of a cow (from c. 1700; Eindhoven-Vijksteeg[255]) showed that the animal had eaten rapeseed press cake (remains of oil presses; *Brassica rapa*), hay, and threshing waste from cereals.

Storage

Historical documents and old maps sometimes contain information about hay and meadows. The oldest map of Doetinchem (c. 1560, by Jacob van Deventer) shows small sheds or buildings on the later cattle and animal market.[256] These are probably granaries for grain storage (*horrea*), but may also include spickers (in Dutch *spiekers*) or haystacks. A register of 1427 from Doesburg-Kloosterstraat indicates that in the early fifteenth century there were buildings in which cattle feed was stored in the former monastery grounds.[257] In later accounts of the Commandery of Doesburg (1491/1492) it seems that the building not only stored hay and grain, but possibly also had a function as a barn and storage facility for harvesting equipment.

Haystacks can be reconstructed in different ways. Sometimes, so-called mouse pots – a type of mouse trap – buried in postholes, ditches or pits are the only evidence. A six-post structure documented during the excavation of

243 Corver, De Moor & Bos 2010, 23.
244 see also Devos *et al.* 2011 regarding dark earth.
245 Van Dinter 1992, 58.
246 Schepers & Van Haaster 2014, 61-88.
247 Hoogendijk 2015, 121.
248 Van Benthem & Vandevelde 2011, 34.
249 Moolhuizen 2015, 102.
250 Van Haaster 2015, 60.
251 Mooren 2008, 43.
252 Kubiak-Martens 2015, 138.
253 Van der Meer, Vermeeren & den Ouden 2011, 268.
254 Kodde 2017, 50.
255 De Jong, Louvenberg & De Vos 2011, 22.
256 Pronk 2011, 33.
257 Inv. 4213: Reg. 430, 441 and 444, Inv. 4216: Reg. 510 and Inv. 4224: Reg. 739; Fermin, Brouwer & Kastelein 2016, 31.

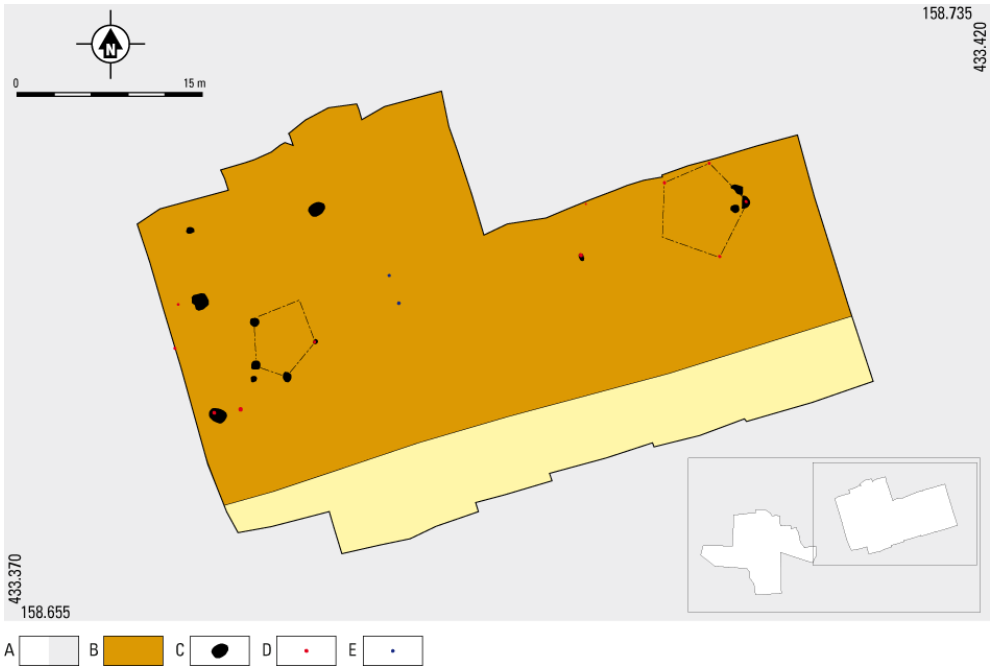


Fig. 5.18 Tiel-Fabriekslaantje, fourteenth century. The fourteenth century features projected on the reconstructed location of the extended dike phase 3. Legend: A (un)excavated area; B the extended dike phase 3; C archaeological trail; D buried pot from the present investigation; E buried pot from the preliminary investigation; F possible haystack (Scale 1:500, Van den Brink & Van Renswoude 2017, 33, Fig. 6.7).

Alkmaar-Gedempte Nieuwesloot 46 Doelenveld was interpreted as a haystack (900-1300).[258] Part of a fifteenth century drainage ditch which may have surrounded a haystack was identified during investigation at Zwolle-Pannekoekendijk Mussenhage.[259]

A further indication that buried pots may have been used as mouse traps[260] around a haystack has been identified by pots that were buried in a circle, as excavated, at the Tiel-Prins Willem Alexanderschool[261] and (1250-1300) Tiel-Fabriekslaantje (1300-1400) (Fig. 5.18).[262]

5.5.3 Barns

Former urban barns have rarely been identified by archaeological evidence. More than half of the data on barns mentioned in reports comes from documentary evidence or historic maps. Most of the time, archaeological traces of outbuildings in yards cannot be interpreted exclusively as such, as sheds may have had a different, or indeed multiple functions. Moreover, stables and barn constructions are lighter founded than houses, making them less visible in the archaeological record. The backyards of town houses are frequently disturbed and it can be difficult to reconstruct smaller and insubstantial structures, such as animal shelters and small stables during excavation. An example of a possible barn from the thirteenth century was found during the investigations of a site in 's-Hertogenbosch at Hinthamerstraat 163 and Mgr. Prinsenstraat 1A-C (Fig. 5.19). The structure was founded on posts with a ditch in the middle, possibly for the drainage of animal urine and excrement.

In the Middle Ages, farmsteads with integrated indoor barns were quite common. Reconstructions of barns are known, such as in Groningen-Boterdiep, Gorinchem-Bluebandhuis or Alkmaar-Laat/Bloemstraat (Houtmarkt). In Groningen-Boterdiep a farm of the Gasselte A type with a barn section and dung gutter dated from the twelfth-fourteenth centuries are found (Fig. 5.20).[263] In Gorinchem-Bluebandhuis, a house contained a barn section in which a dung pit has been documented (Fig. 5.21).[264]

Two urban farmsteads from the fifteenth century have been investigated in Alkmaar-Laat/Bloemstraat (Houtmarkt) (Fig. 5.22a and 5.22b).[265] These houses contained a barn on the

258 Griffioen *et al.* 2016, 7.
259 Clevis & Klomp 2014, 53.
260 Doesburg 2013, 117-130
261 Verhelst & Van Renswoude 2015, 57.
262 Habermehl & Boreel 2015, 31.
263 Huis in 't Veld 2015, 24.
264 Hoogendijk 2015, 133.
265 Bitter & Van den Berg 2014, 198.

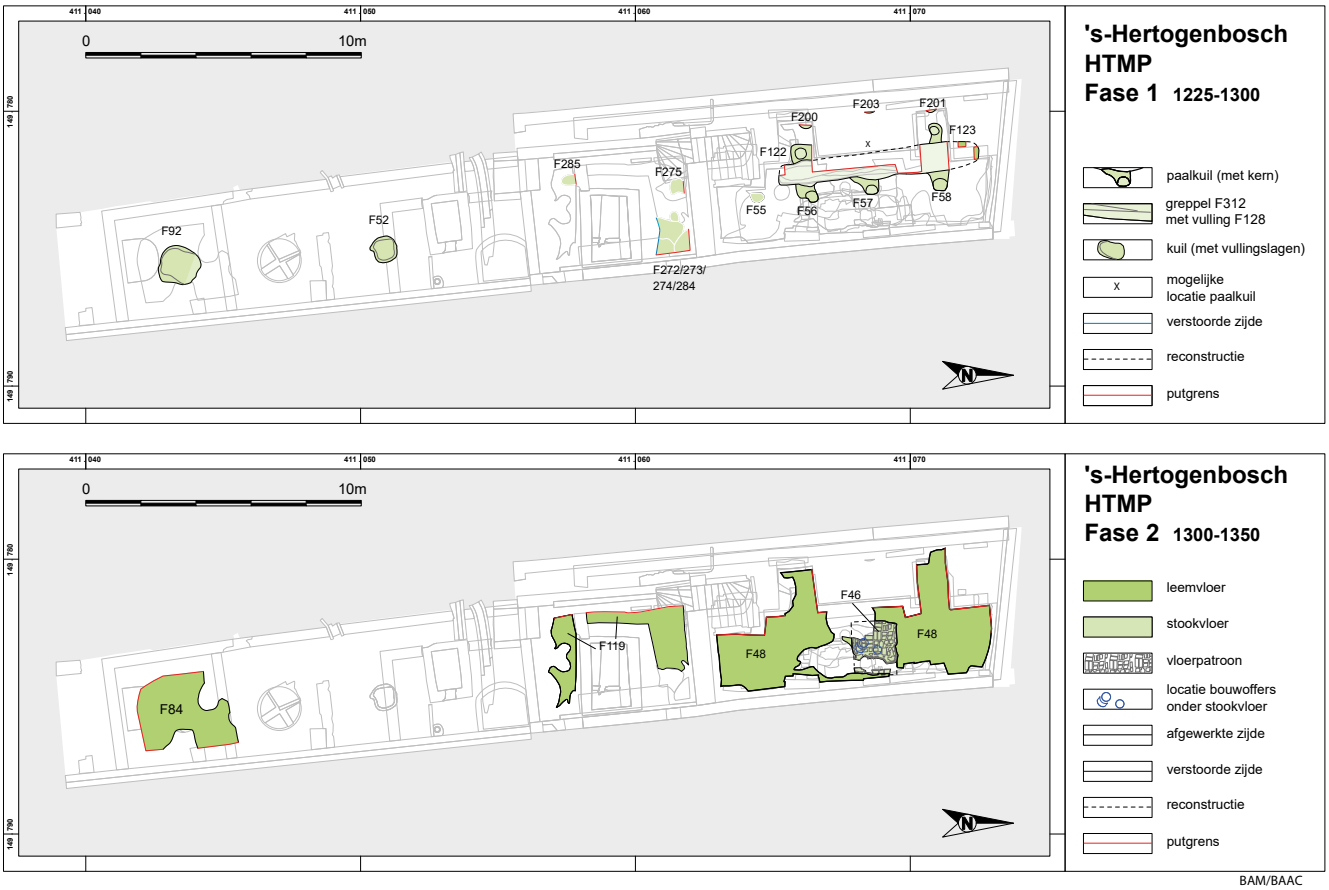


Fig. 5.19 Close-up of field plan with possible stable with ditch; 's-Hertogenbosch-Hinthamerstraat 163 and Mgr. Prinsenstraat 1A-C (Cleijne & Van Genabeek 2007, 122).

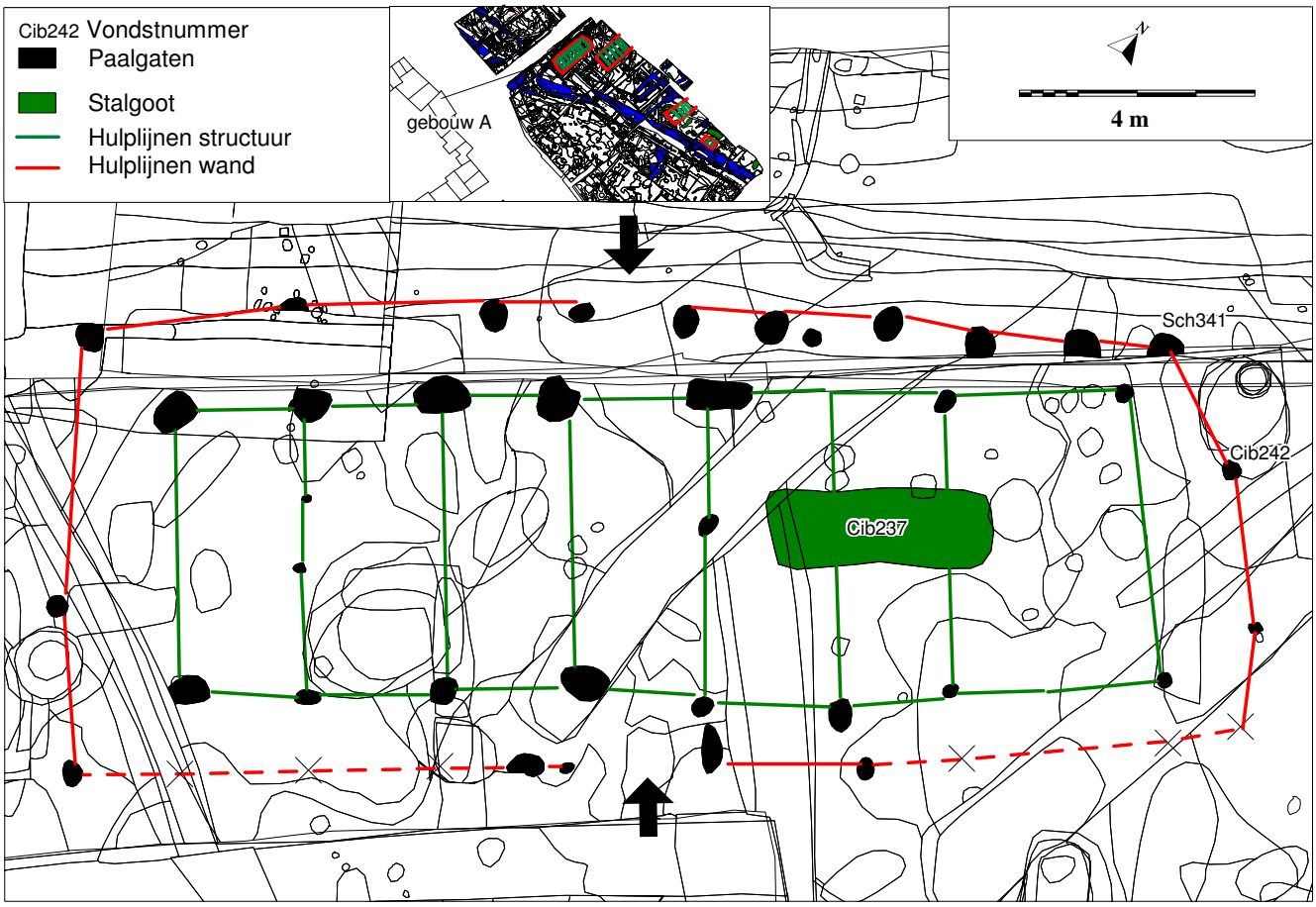


Fig. 5.20 Groningen-Boterdiep building A with barn inside and dung gutter (Huis in 't Veld 2014, 26). Legend: in black: posthole; in green: dung gutter; green line: reconstruction of structure; red line: reconstruction of wall.

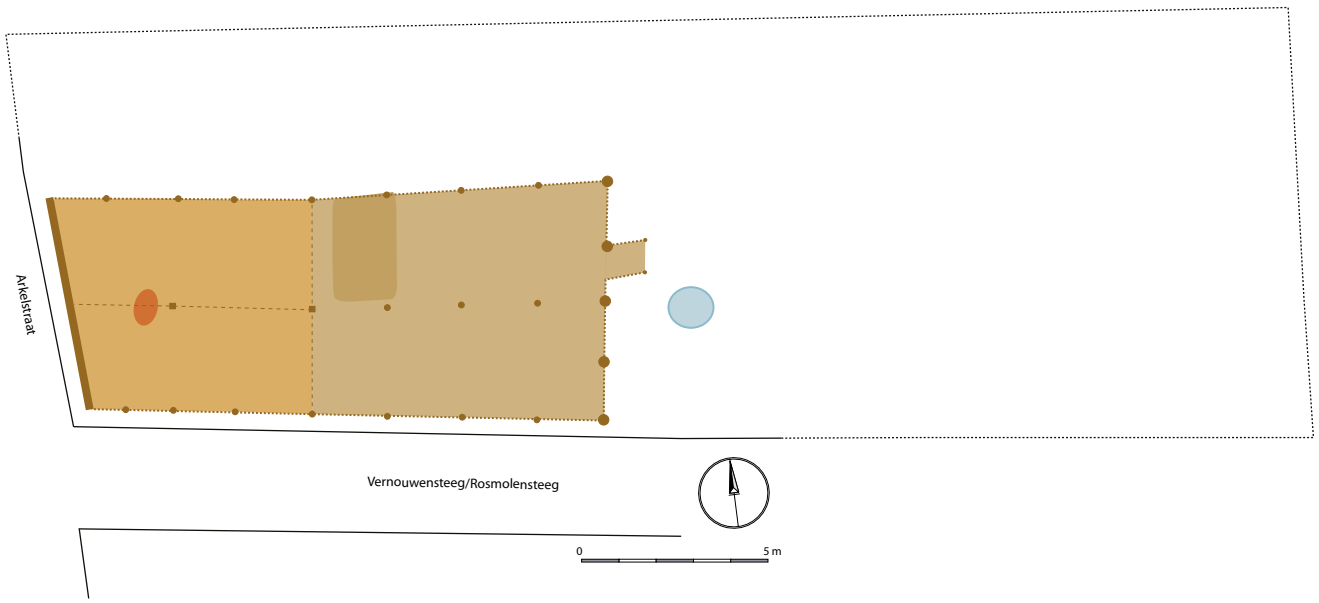


Fig. 5.21 Gorinchem-Bluebandhuis, farmstead with barn inside, dating fourteenth/fifteenth century (Hoogendijk 2015, 133).

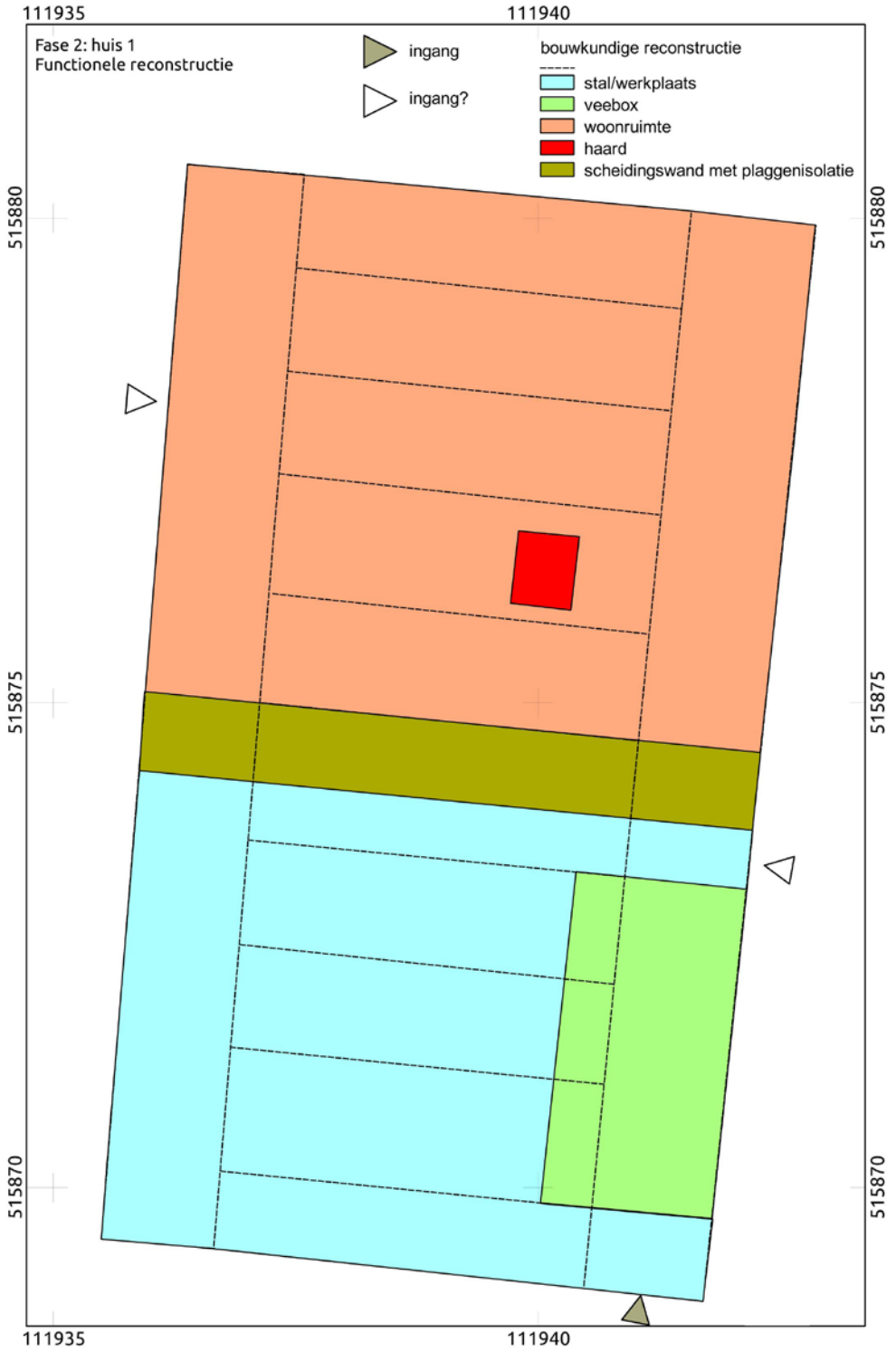


Fig. 5.22a functional layout of house 1 Alkmaar-Laat/Bloemstraat (Houtmarkt) (Bitter & Van den Berg 2014, 42).

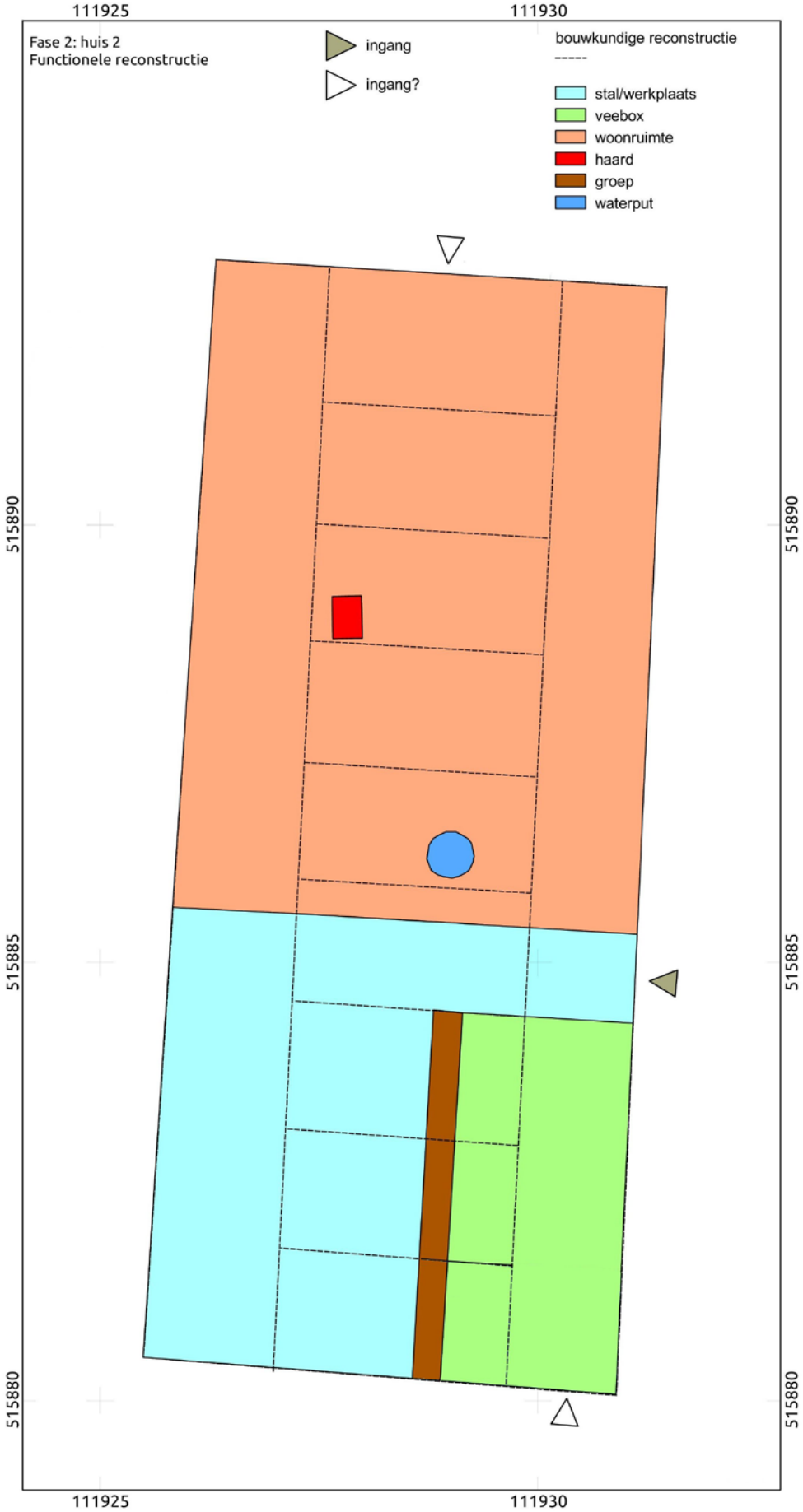


Fig. 5.22b functional layout of house 2 Alkmaar-Laat/Bloemstraat (Houtmarkt) (Bitter & Van den Berg 2014, 42).

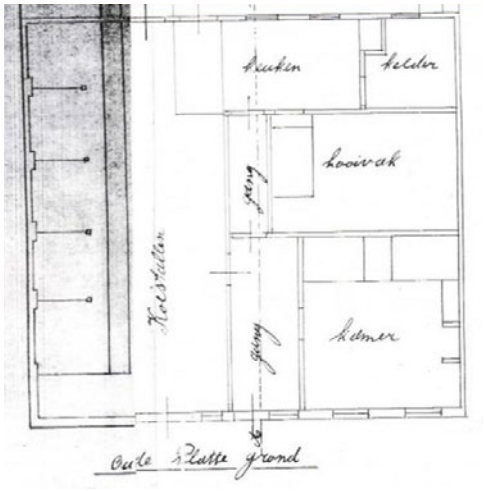


Fig. 5.23 Plan of a farmstead dating from 1797 (Wieringa 2018, 8).

south side with a ditch or gutter in the middle for the removal of dung. In addition to these farmsteads, a barn or shelter for smaller animals of measuring 2 x 2 m was also identified by the excavators. The smaller structure was identified from pile pits and a system of dung gutters that were connected to a larger dung pit.

The presence of a barn has been reconstructed at Zutphen-Het Kruittorenplein (1250-1500).[266] Here, traces of postholes showed a subdivision into different stalled areas. At Dordrecht-Elfhuizen (1300-1400) several traces pointed toward barns for smaller animals (and vegetable patches).[267] On a site in Gennep-Houtstraat a house had been converted into a cowshed around 1900, possibly as part of a ruralisation process.[268] Archaeological research in Hoorn-Achterstraat 19-21 revealed a possible barn, dating between c. 1500-1650.[269]

Barns could still be part of a house in more recent periods, as is shown by a map of urban farmstead in Groningen-Kijk in 't Jatstraat, dating from 1797 (Fig. 5.23, Fig. 5.24).[270]

A barn from the early modern period (1650-1900) has been excavated in Enkhuizen at Zuider Boerenvaart 43.[271] This barn (probably for cattle) had a gully in the middle for dung and was subdivided into different pens. Two archaeological excavations in Arnhem have revealed traces of barns. At Arnhem-Koningstraat (dating 1650-1850) a house was transformed into a barn or stable and storage area.[272] An excavation at Arnhem-Op de Beek revealed a barn or stable dating between 1870 and 1895.[273] The interpretation as a barn was based on the location of the structure in relation to other buildings and the inner subdivisions.

Fig. 5.24 Double gutter against the east facade of the barn (Wieringa 2018, 10).

266 Fermin & Groothedde 2009, 16.
267 Hos & Paalman 2008b, 39.
268 Mooren 2008, 59.
269 Schrickx 2009, 39.
270 Wieringa 2018, 8.
271 Griffioen 2012, 44.
272 Defilet & Van den Berghe 2011, 78.
273 Van der Mark, Wemerman & Van de Venne 2009, 92.

Fig. 5.25 Hoorn-Grote Noord 4-6; Wickerwork of possible henhouses feature numbers 221 and S217 (from the south), (Schrickx & Van de Walle-van der Woude 2006, 23.).

5.5.4 Chicken coops and birdcages

Very few remains of chicken coops or birdcages have been found in the Netherlands. At the excavations in Hoorn-Grote Noord 4-6 remains of wickerwork were excavated (dating 1280-1310) that may be remnants of chicken coops, or even a pigsty (Fig. 5.25).[274] The fragile nature of the thin wickerwork makes the interpretation of chicken coops more plausible.

During the excavation of Middelburg-Berghuijskazerne, two narrow strips of beech wood were retrieved, with regular holes of about 4 mm along their entire length. These were interpreted as possibly being fragments from birdcages (dating from the sixteenth century).[275] Comparable birdcages are known from Haarlem (Fig. 5.26).

Fig. 5.26 Birdcage for songbirds from Haarlem-Riviervismarkt 1400-1600 (Van Zalinge 2019, no. 0.88RIV).

5.5.5 Fish ponds

Relatively little archaeological research has been undertaken on fish ponds in the Netherlands. Two ponds from the Groningen-Boterdiep excavation are an exception.[276] The first pond was traced as a pit with a size of approximately 4.5 x 14.5 m and a depth of 1.3 m -NAP (below sea level). The pit has been interpreted as a possible pond for fish farming based on cadastral information. It probably dates from the sixteenth and seventeenth century. A second pond, that was part of an ornamental garden, laid out at the beginning of

274 Schrickx & Van de Walle-van der Woude 2006, 23.
275 Dijkstra, Ostkamp & Williams 2006, 166.
276 Huis in 't Veld 2015, 55

Fig. 5.27 Fish pond found at Groningen-Boterdiep (Huis in 't Veld 2015, 57).

the eighteenth century. This pond measures 35 x 5.5 m and had a depth of 1.3 m -NAP (below sea level). The pond had been covered with wooden planks and peat sods. A wooden construction was recorded in the middle of this pond, of which the function is unknown. At the bottom of the pond there was a rectangular wooden box which had been constructed from planks and poles (Fig. 5.27). The inside of this box was divided into compartments, and on top there were seven wooden beams that formed a kind of grid. The construction was therefore interpreted in the report as a probable sieve construction, with a shallow container.[277] Map information is available for this research location from 1830 and shows additional rectangular ponds.[278]

Archaeozoological research on fish remains often allows statements to be made about the origin of the fish that have been eaten. The introduction of farmed fish as carp by the Romans is generally accepted.[279] From the ninth century onwards, fishponds were a feature of monastery complexes where fish were farmed before Lent.[280] Van Neer and Ervynck suspect that open water carp escaped from monastery ponds connected to open water during floods and became feral in the Rhine and Meuse.[281]

The oldest finds of carp in an urban context dates from between 950-1100 and has been documented in a trench context at Tiel-Dominicuskwartier.[282] In Alkmaar-Paardenmarkt a skeleton of a carp was found in a well (1125-1200).[283] This may relate to the medieval habit, which was still practised in some areas of central Europe until the late-nineteenth century, of keeping a carp in the house well. Folk beliefs held that the fish would devour extraneous food waste and purify the water.

The skeletal remains of carp have also been recovered from a debris layer in Hoorn-Grote Noord 4 and 6 dating to between 1280 and 1310.[284] Based on archaeozoological research, it seems that the keeping of carp increased in the Netherlands in the Middle Ages, in line with the wider western European trend.[285]

The analysis of fish remains from a cesspit (1600-1700) in the Montfoort-Lieve Vrouwegracht excavations shows that the inhabitants ate a relatively large proportion of freshwater fish and were very likely self-sufficient in their fish needs.[286] These fish, including many eels, were probably caught in the Hollandse IJssel, which flows past Montfoort.

277 Huis in 't Veld 2015, 57.
278 Huis in 't Veld 2015, 55.
279 Beerenhout 2015, 143.
280 Beerenhout 2015, 143.
281 Van Neer & Ervynck 1993, 42.
282 Van Renswoude & Habermehl 2014, 368.
283 Beerenhout 2015, 143.
284 Beerenhout 2006, 41.
285 Van Neer & Ervynck 1993, 42.
286 Van Kampen 2016, 124.

5.6 Concluding remarks

Urban husbandry is archaeologically traceable when using combined evidence through keywords (especially neonates, N=62), instead of excavated bone material alone. Due to the abundance of animal dung in towns in the past, archaeology offers a range of insights into animal husbandry, although such information is admittedly limited. By clustering these observations (N=372), some fine examples of common urban practice can, nevertheless be seen. Livestock rearing in Dutch towns occurred from their early beginnings until the modern period and included the rearing of cattle, pigs, sheep/goat and poultry. There is evidence for urban farmsteads, barns, chicken coops and fish cultivation in purpose-built buildings.

Most indications for livestock farming are local, small-scale and incidental. This is probably due to the nature of archaeological research in modern towns and cities. In Chapter 7 an overview of the spatial distribution of activities related to animal husbandry is presented. Following from above, the assumption is made that livestock farming of cattle with outdoor grazing, was located on the edge of urban areas or in open or densely populated areas where the farmsteads were built.

6 Horticulture and arable farming in towns

A.D. Fischer

6.1 Introduction

Towns often had a more or less dominant agricultural aspect, be that horticulture or arable farming. Local horticulture, fruit production and arable farming can all be traced by archaeological and bio-archaeological research. Archaeological studies like the PhD thesis of van Haaster[287] who studied the plant diet and food provision of a whole town, however, are still unique. Horticulture and arable farming in and around urban centres are touched upon in the studies of Sangers[288] and Bieleman.[289] A few studies have concentrated on the crop production of a single town such as Groningen[290], Leeuwarden[291], or Kampen[292] but a synthesis is lacking.

6.2 Quantitative information

This chapter explores the three themes of horticulture, orchards, and arable farming (Fig. 6.1). Most of the data relates to horticulture. It is striking that when data relating to arable farming decreases, the data related to horticulture increases (Fig. 6.2). Orchards have been present in Dutch towns since the late Middle Ages.

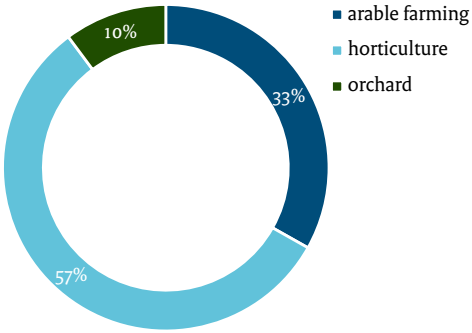


Fig. 6.1 Distribution of arable farming, horticulture and orchards relating keywords as represented in the database.

6.2.1 Horticulture

The data connected to horticulture is mainly derived from archaeological research. Information

287 Van Haaster 2003.
288 Sangers 1952.
289 Bieleman 2008.
290 Hofman 1986, 51-68.
291 Van Berkum 2015.
292 Hendriks 1953.

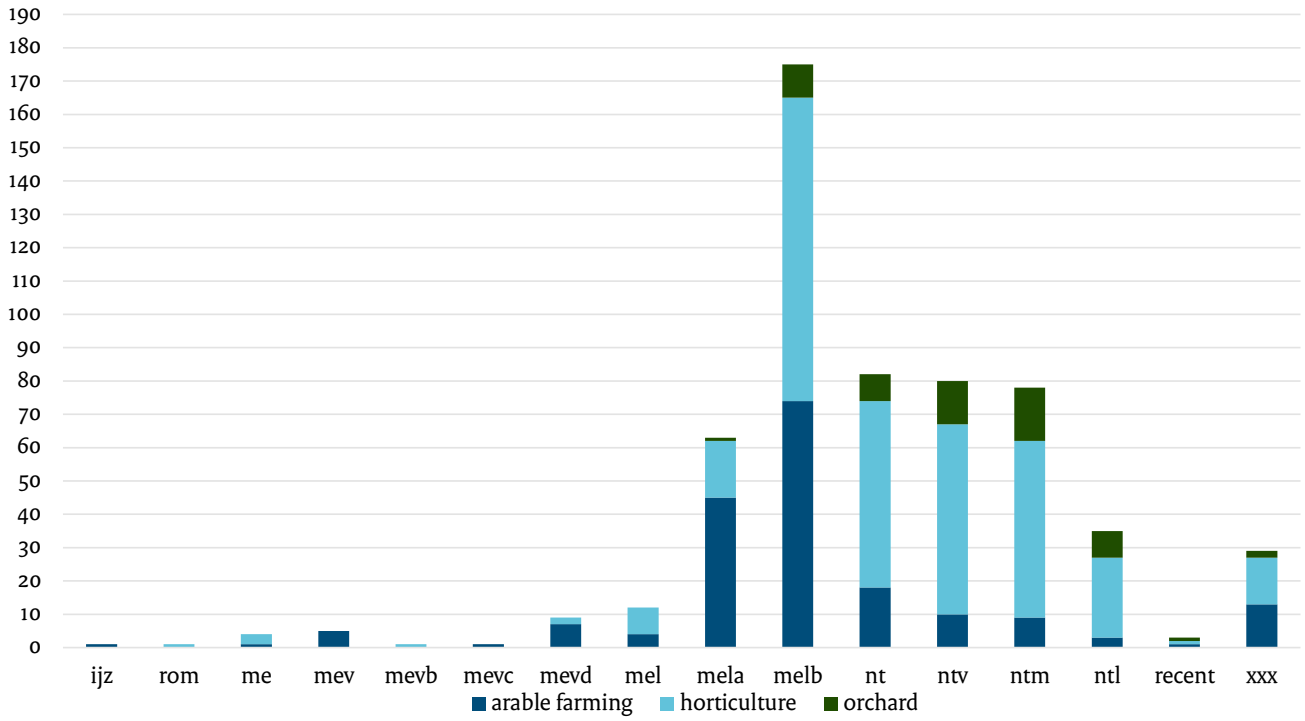


Fig. 6.2 Chronological distribution of keywords related to arable farming, horticulture and orchards according to starting date. The late medieval period B (1250-1500) is dominant.

derived from maps and other historical sources is less numerous (Fig. 6.3). In addition, horticulture occurs throughout all periods, although there is again a strong increase in data from 1250 to 1500 (Fig. 6.4, Fig. 6.5). Based on the (summarized) density of the date ranges of the keywords, there is an increase after 1500 (Fig. 6.6). The theme 'horticulture' consists of 51 keywords, which have been scored 328 times in total (Table 6.1).

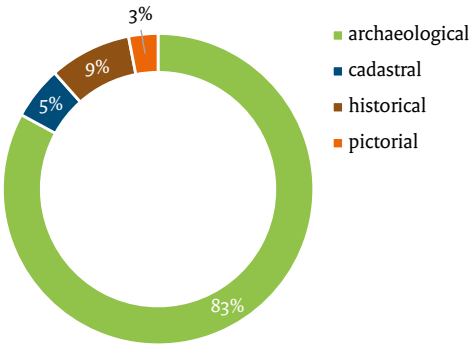


Fig. 6.3 The distribution of keywords related to horticulture per type of source (archaeological, pictorial, historical or cadastral). The majority of data (83%) are based on archaeological finds.

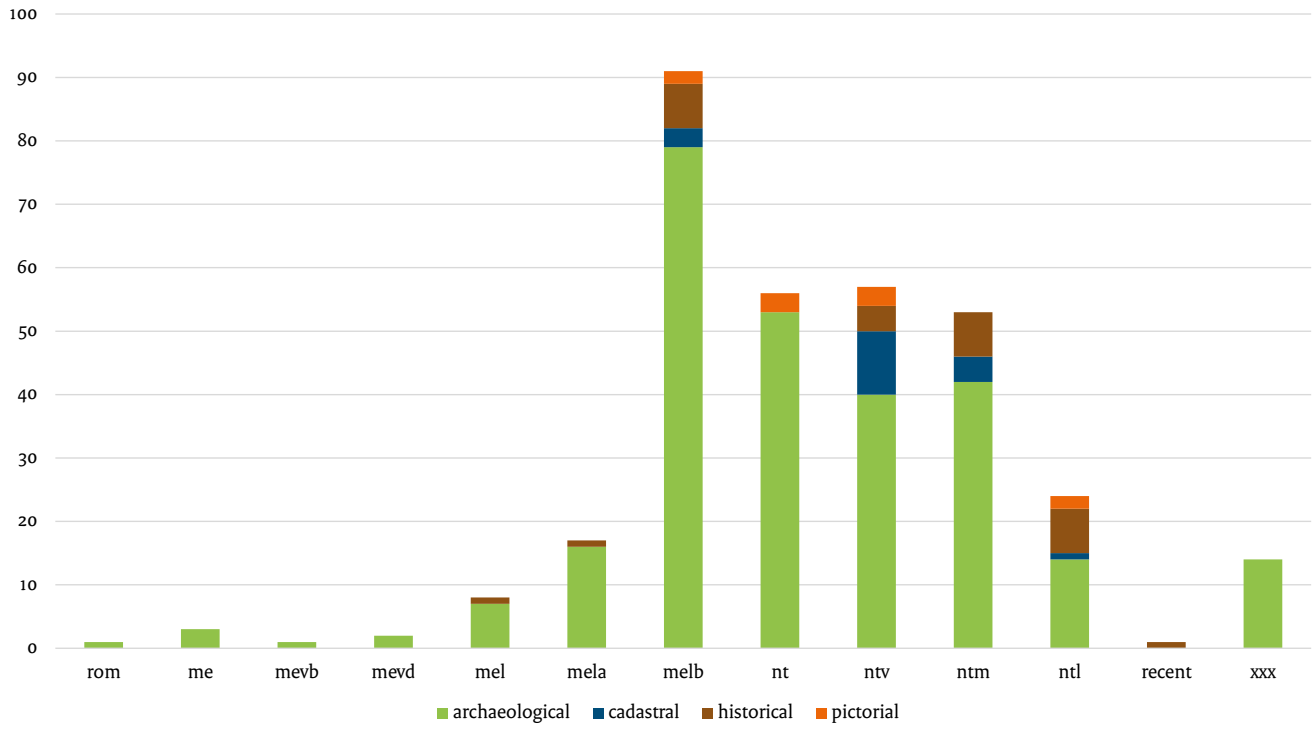


Fig. 6.4 The chronological distribution of keywords related to horticulture (N=51) based on all sources, according to starting date (N=328).

Table 6.1 Keywords relating to horticulture in Dutch and English (N=51, frequency = 328).

Keywords (Dutch)	Keywords (English)	Score 5	Score 10	Score 20	Total
Achtertuin	backyard	-	1	-	1
Agrarisch	agrarian	1	1	1	3
Agrarische	agrarian	-	1	1	2
Akkerbouw	arable farming	-	1	-	1
Akkerlaag	layer of arable soil	-	1	-	1
Bemest	fertilized	5	1	-	6

Table 6.1 Keywords relating to horticulture in Dutch and English (N=51, frequency = 328). (continued)

Keywords (Dutch)	Keywords (English)	Score 5	Score 10	Score 20	Total
Bemesting	fertilization	2	2	1	5
Binnentuin	garden	1	-	-	1
Bloempot	flowerpot	17	57	1	75
Bloempotten	flowerpots	1	10	-	11
Boerderij	farmstead	1	-	-	1
Broeibed	hotbed	1	-	-	1
Fruitteelt	fruit cultivation	-	1	-	1
Gaffel	pitchfork	-	1	-	1
Gekweekt	cultivated	6	4	-	10
Gieter	watering can	-	1	-	1
Groente	vegetable	10	12	-	22
Groenten	vegetables	4	10	1	15
Groenteteelt	vegetable cultivation	-	1	-	1
Hark	rake	-	1	-	1
Hop	hop	1	1	-	2
Kruidentuin	herb garden	2	5	-	7
Mest	dung	3	1	-	4
Mestkuil	dung pit	4	1	1	6
Mestkuilen	dung pits	-	1	-	1
Mestschimmel	dung fungus	-	1	-	1
Moesbed	vegetable patch	-	1	1	2
Moestuin	vegetable garden	20	12	3	35
Moestuinbedden	vegetable patches	-	1	-	1
Moestuinen	vegetable gardens	9	12	1	22
Ophogingslaag	accumulated layer	-	1	-	1
Opslag	storage	-	1	-	1
Oranjerie	orangery	1	-	-	1
Schep	shovel	1	-	-	1
Siertuin	ornamental garden	-	1	-	1
Spitspoor	spade mark	-	1	-	1
Spitsporen	spade marks	-	2	-	2
Stadstuinen	city gardens	2	-	-	2
Teelt	cultivation	1	1	-	2
Tuin	garden	13	12	4	29
Tuinaanleg	garden landscaping	-	1	-	1
Tuinaarde	garden soil	1	1	-	2
Tuinafval	garden waste	2	-	-	2
Tuinbouw	horticulture	2	4	2	8
Tuinbouwproducten	horticultural products	2	1	-	3
Tuinen	gardens	7	5	-	12
Tuinman	gardener	1	-	-	1
Tuinmuur	garden wall	6	7	-	13
Tuinpot	garden pot	1	-	-	1
Tuinslak	garden snail	2	-	-	2
Wijngaard	vineyard	-	1	-	1
Total		**130**	**181**	**17**	**328**

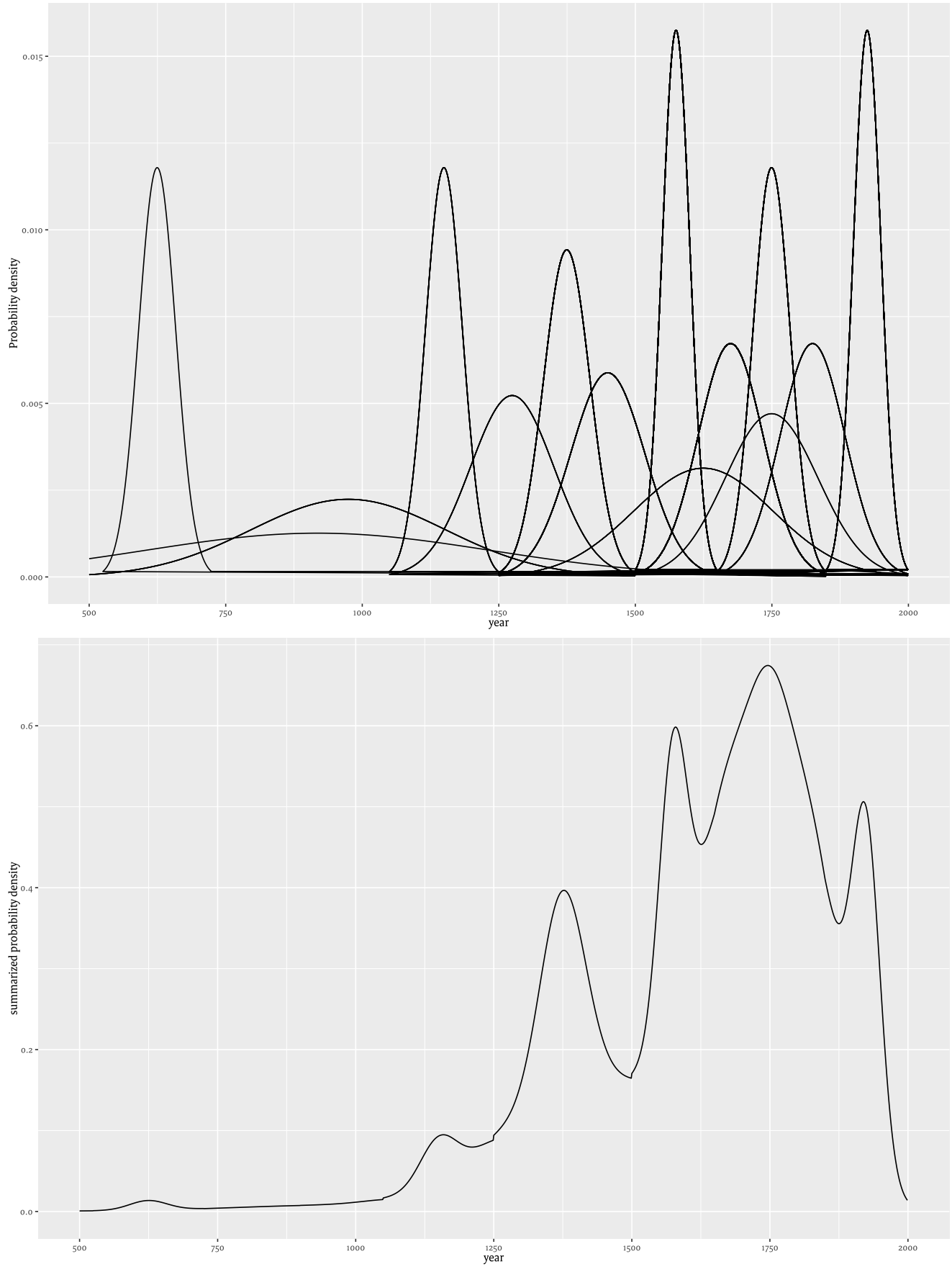


Fig. 6.5 Density plots (top) and summarized density plots (below) of dated urban farming keywords found in this study related to horticulture. The probability of the dates is based on the date range of each keyword, assuming normality. Peaks are noted dating to c. 1300 and 1750.

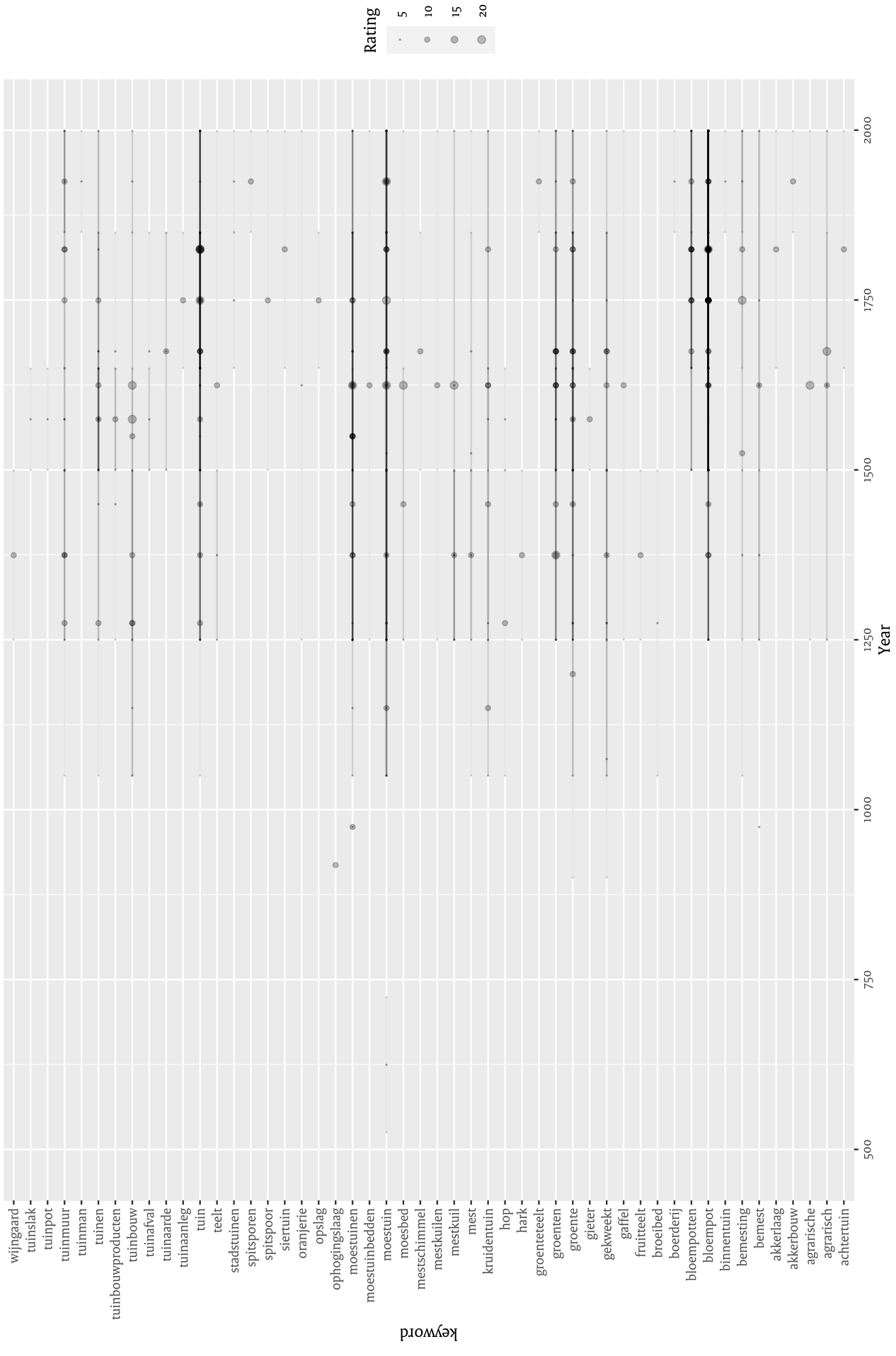


Fig. 6.6 The chronological distribution of keywords related to horticulture and attributed value (score 5, 10 or 20) (N=51/frequency=328). For translation of keywords, see App. 2.

6.2.2 Orchards

Of all the evaluated data, orchards show the most diverse picture. Figure 6.7, for example, shows that keywords relating to this theme are provided by all types of sources, although most information is provided by archaeological investigations. Orchards occur in Dutch towns from the period 1250 onwards to 1500, and a slight increase can be seen from in the period 1650-1850 (Fig. 6.8). Based on the (summarized) density of the date ranges of the keywords, this trend seems to date slightly later (Fig. 6.9, Fig. 6.10). The data is connected to eight keywords that have been rated 59 times in total (Table 6.2).

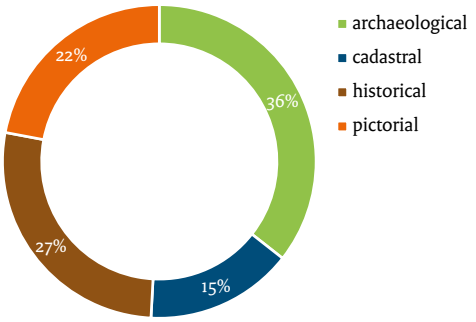


Fig. 6.7 The distribution of keywords related to orchards per type of source (archaeological, pictorial, historical or cadastral). The data is more or less equally based on all types of sources but archaeological finds are still the most important.

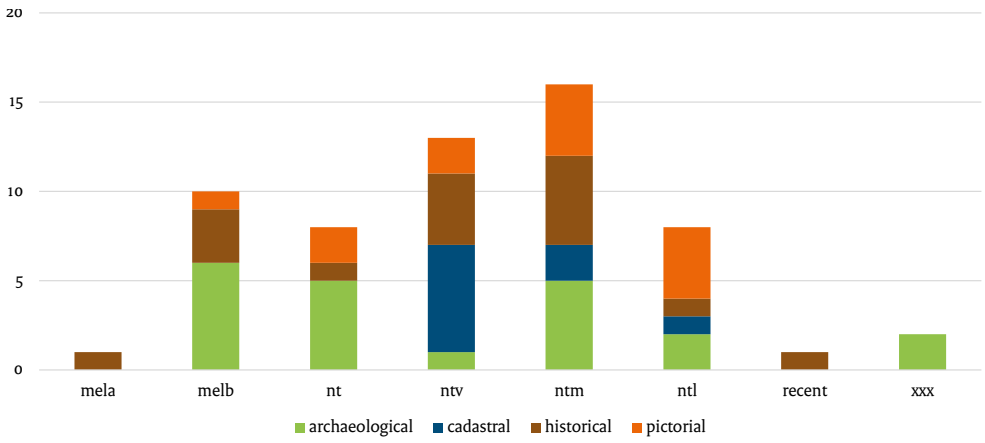


Fig. 6.8 The distribution of orchards (N=8) based on all sources, according to starting date (N=59).

Table 6.2 Keywords relating to orchards in Dutch and English (N=8, frequency = 59).

Keywords (Dutch)	Keywords (English)	Score 5	Score 10	Score 20	Total
Boomgaard	orchard	11	22	2	35
Boomgaarden	orchards	4	5	3	12
Fruitbomen	fruit trees	3	1	1	5
Gaard	orchard	-	2	-	2
Juglans (regia)	juglans	-	1	-	1
Park	park	-	2	-	2
Tuin	garden	1	-	-	1
Walnootbomen	walnut trees	-	1	-	1
Total		**19**	**34**	**6**	**59**

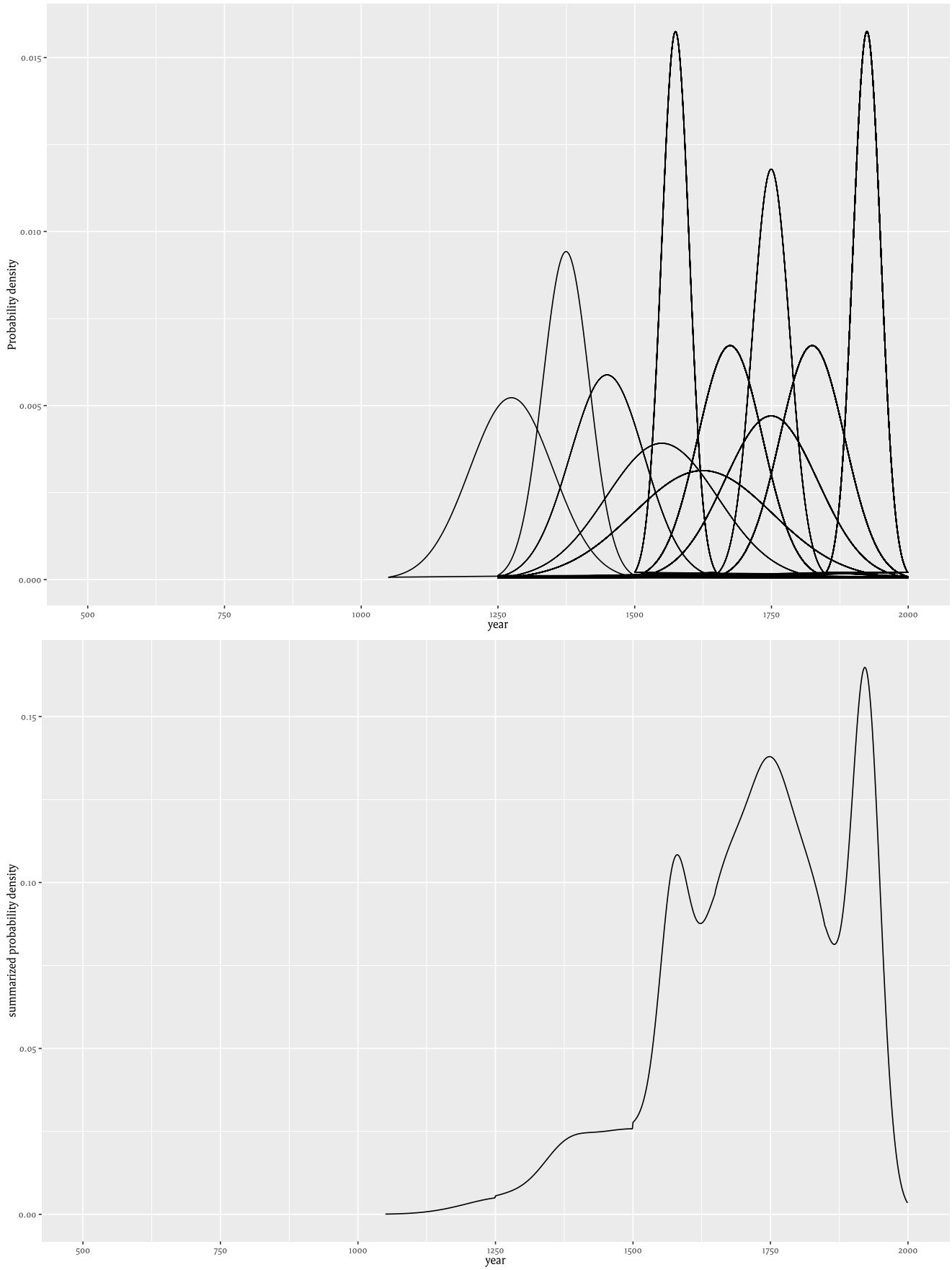


Fig. 6.9 Density plots (top) and summarized density plots (below) of dated urban farming keywords found in this study related to orchards. The probability of the dates is based on the date range of each keyword, assuming normality. Orchards exist throughout all periods but occur more frequently from 1500 onward with a climax around 1650 and 1850.

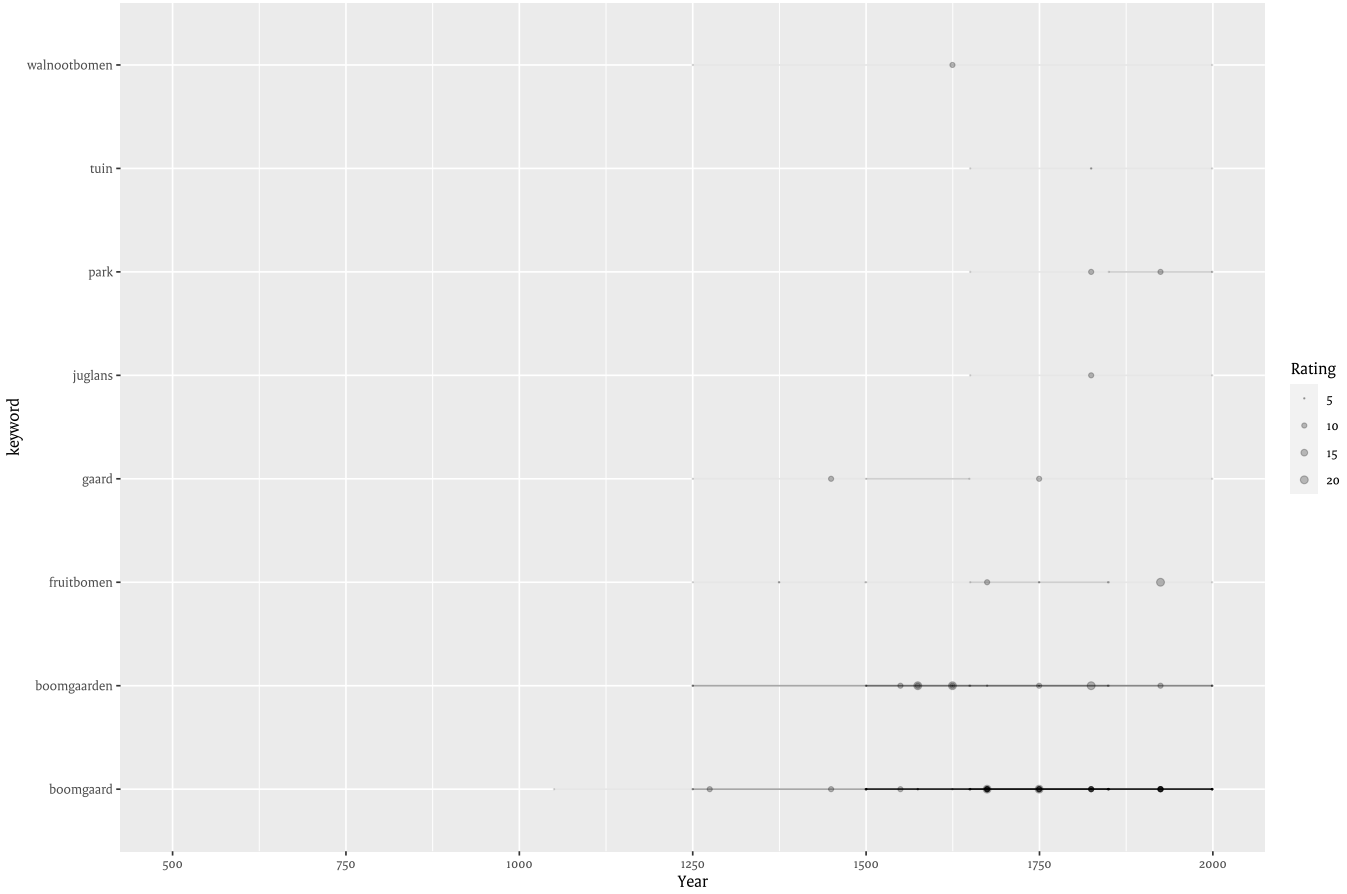


Fig. 6.10 The chronological distribution of keywords related to orchards and attributed value (score 5, 10 or 20) (N=8/frequency=59). For translation of keywords, see App. 2.

6.2.3 Arable farming

The keywords connected to arable farming mainly derive from archaeological sources (Fig. 6.11). Arable farming in Dutch towns occurs from the period 1050-1250 onwards, increasing in the late medieval period (1259-1500). In the early modern period, the data decreases drastically (Fig. 6.12). Based on the (summarized) density of the date ranges of the keywords, this trend seems to date slightly later (Fig. 6.13, Fig. 6.14).

The list of keywords associated with arable farming consists of 38 keywords. These have been scored a total of 192 times (Table 6.3).

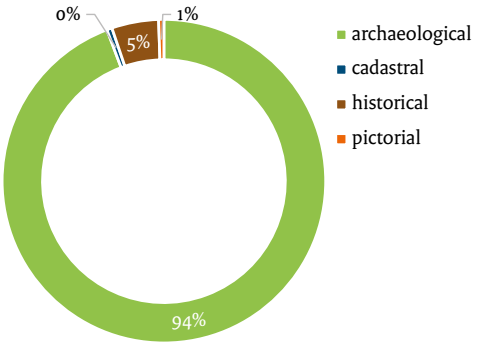


Fig. 6.11 The distribution of keywords related to arable farming per type of source (archaeological, pictorial, historical or cadastral). The majority of data (94%) are based on archaeological finds.

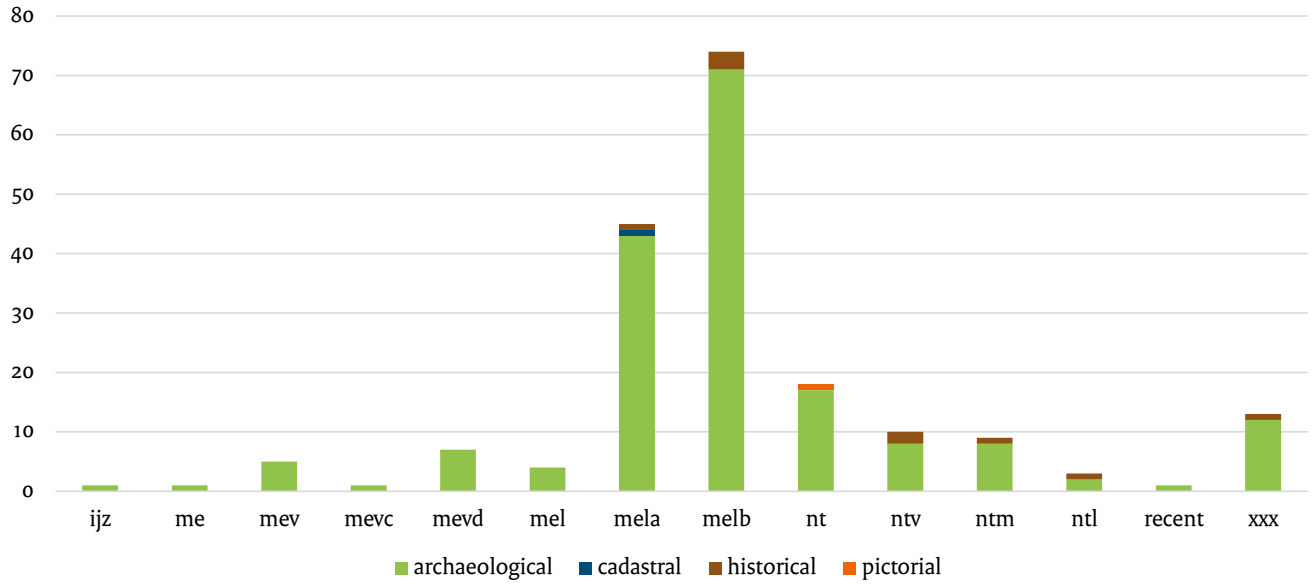


Fig. 6.12 The occurrence of number of keywords in the theme 'arable farming' related to period.

Table 6.3 Keywords relating to arable farming in Dutch and English (N=38, frequency = 192).

Keywords (Dutch)	Keywords (English)	Score 5	Score 10	Score 20	Total
Agrarisch	agrarian	5	9	1	15
Agrarische	agrarian	1	6	-	7
Akkerbouw	arable farming	7	19	5	31
Akkerlaag	layer of arable soil	8	29	-	37
Akkerlagen	layers of arable soil	1	-	-	1
Bemest	fertilized	5	1	1	7
Bemesting	fertilization	7	5	1	13
Boerderij	farmstead	1	4	-	5
Boerderijen	farmstead	1	-	-	1
Bonenhof	bean garden plot	1	-	-	1
Dorsvlegel	flail	1	1	-	2
Esdek	plaggen soil	1	4	-	5
Fruitteelt	fruit cultivation	1	-	-	1
Gaffel	pitchfork	-	1	-	1
Gekweekt	cultivated	2	1	-	3
Graanopslag	grain storage	-	1	-	1
Hooi	hay	1	-	-	1
Hooibergen	haystacks	-	2	-	2
Hooilanden	hay fields	-	1	-	1
Hooivork	pitchfork	2	2	-	4
Landbouw	arable farming	5	6	-	11
Landbouwgrond	arable land	-	5	-	5
Landelijk	rural	1	-	-	1
Mest	dung	1	3	-	4

Table 6.3 Keywords relating to arable farming in Dutch and English (N=38, frequency = 192). (continued)

Keywords (Dutch)	Keywords (English)	Score 5	Score 10	Score 20	Total
Mestschimmel	dung fungus	1	-	-	1
Oogstafval	harvest waste	1	-	-	1
Ophogingslaag	accumulated layer	1	-	-	1
Opslag	storage	-	1	1	2
Ploeg	plough	1	2	-	3
Ploegspoor	plough mark	1	1	-	2
Ploegsporen	plough marks	1	4	-	5
Roedenbergen	haystacks	-	1	1	2
Spitsporen	spade marks	1	2	-	3
Stadsakker	urban arable field	-	1	-	1
Stro	straw	-	7	-	7
Teelt	cultivation	-	2	-	2
Tuin	garden	-	1	-	1
Veevoer	fodder	1	-	-	1
Total		**60**	**122**	**10**	**192**

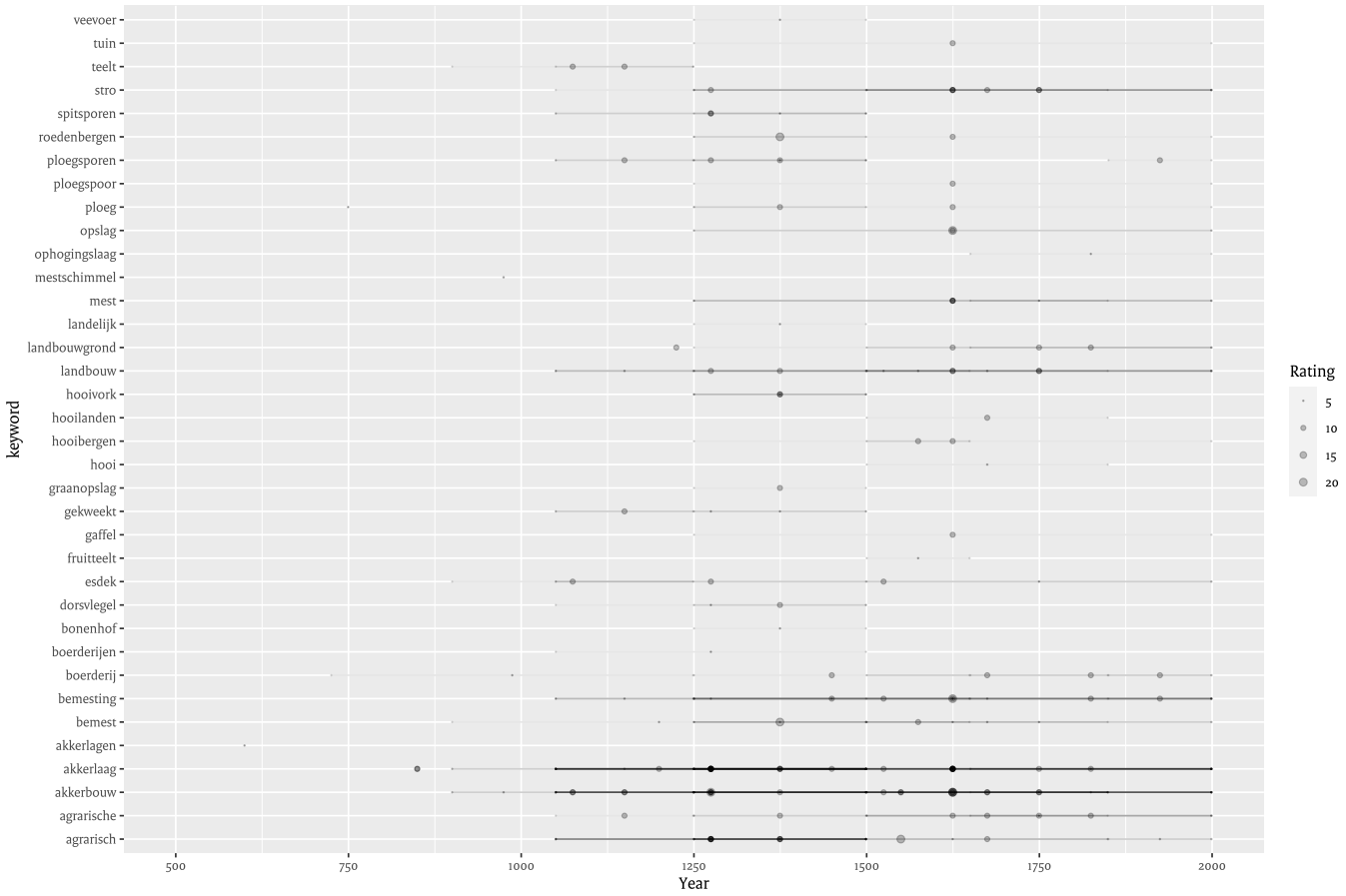


Fig. 6.14 chronological occurrence of keywords related to arable farming and attributed value (score 5, 10 or 20) (N=38, frequency=192). For translation of keywords, see App. 2.

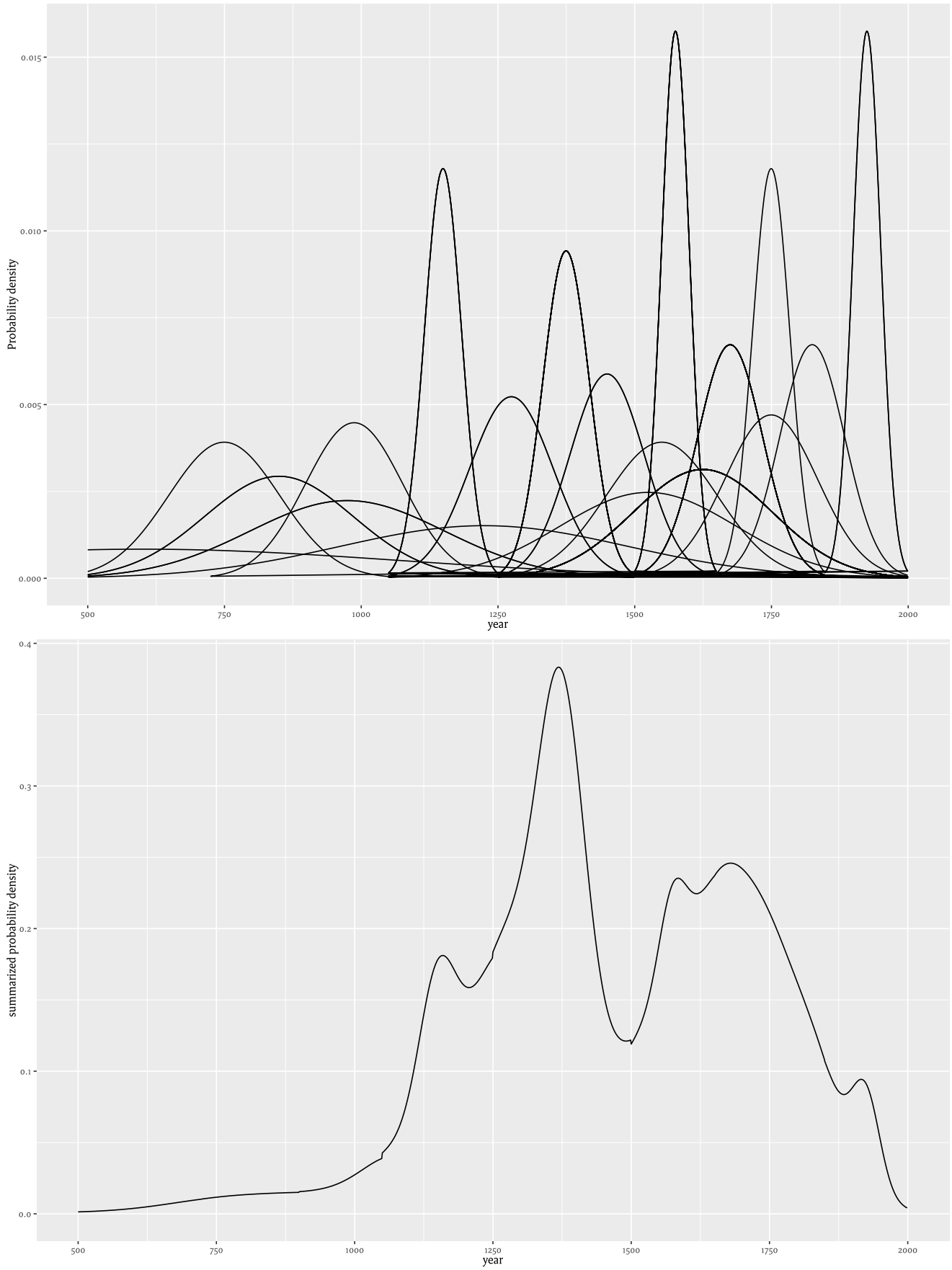


Fig. 6.13 Density plots (top) and summarized density plots (below) of dated urban farming keywords found in this study related to arable farming. The probability of the dates is based on the date range of each keywords, assuming normality. Arable farming exists throughout all periods but peaks around 1300 and rises again around 1600/1650.

6.3 Context and indicators

The *Ruralia commoda*, written by Pietro de Crescenzi, is one of the oldest late medieval treatises on agriculture and horticulture dates from the beginning of the fourteenth century.[293] The instructions of the treatise *Le Ménagier de Paris* (The Parisian Household Book) from 1393 also show how to maintain an urban garden in Paris.[294] Various types of gardens are known from medieval sources. Often the gardens of monasteries or castles are described, but also gardens in urban contexts as well as orchards and vegetable gardens are included. Gardens can serve very diverse functions. In addition to ornamental gardens, gardens can be used to fulfil the basic needs of households and to grow vegetables, fruit, nuts, and medicinal or kitchen herbs. In more recent centuries, towns also had common gardens or allotments. The general assumption that gardening and arable farming play an important role, especially in the pre-urban phase of towns, seems self-evident. The line of reasoning follows the argument that in the denser built-up areas of towns no room was left for arable farming or horticulture. Consequently, agriculture and horticulture will have hardly played a role in the daily lives of the town dwellers, and large-scale production will have moved to the countryside. This chapter aims to investigate this assumption and to refine this concept of urban arable fields and horticulture.

Although the assumption mentioned above is probably more adequate for farming on arable fields where efficient production requires large areas of arable land, it is not necessarily the case for horticulture. The increase in the urban population may lead to less available arable land for staple crops such as cereals, but horticulture can contribute to the self-sufficiency of citizens by cultivating plants in garden plots in backyards or on allotments.

Historical maps from the sixteenth and seventeenth centuries often show green and undeveloped areas in towns. It is often impossible to determine how such vacant plots were used simply on the basis of the maps. Furthermore, the assumption that even in densely built urban contexts no rural activities such as horticulture took place can lead to a circular reasoning, in the sense that there is insufficient research interest into whether or not there are plots of land used for arable farming or horticulture, which in turn results in a lack of archaeological investigation and insufficient data being gathered to investigate the subject.

6.3.1 Scale

The cultivation of vegetables, fruit and nuts can take place very small-scale in the backyard and in private gardens. In addition, larger plots of land for these agricultural functions may also be available, either inside or just outside the town. Most of the archaeological information is fragmented and usually relates to small-scale activities in backyards. We know from historical studies that urban horticulture of small vegetable gardens around houses and on plots inside and outside the town is the cradle of professional horticulture in later periods.[295] The tradition of urban vegetable gardens remained in existence until the seventeenth century.[296] The rise of horticulture after 1250 is economically visible in the vegetable trade, especially the trade in cabbage and onions, but also in the availability of vegetable seeds for sale on markets.[297] During the sixteenth and seventeenth century the range of cultivated vegetables and fruits became more diverse.[298] Dutch urban prosperity led to the trend of eating more new foods, with more variety, creating status through food. Delicate vegetables[299] were often expensive due to their perishable nature and their relatively time-consuming cultivation process. This trend to eat more diversely could form a stimulus to grow vegetables in local gardens by people who could not afford to buy such products, or by those who hoped to sell their own produce at the local markets.

6.3.2 Gardens and fields

From an archaeological point of view, the presence of arable land and gardens where cereals, vegetables, fruit, herbs or nuts were grown is often ambiguous. The evidence that a particular plot of land might have been used for such purposes, is often only evident through

293 Vollmann 2007.
294 Greco & Rose 2009, 209-215.
295 Sangers 1952, 58; Bieleman 2008,91.
296 Sangers 1952, 97.
297 Sangers 1952, 31.
298 Sangers 1952, 56-156.
299 Like leafy vegetables or other perishable crops.

plough marks, or evidence for manuring with town waste, or just by the presence of rich organic layers, such as dark earth or garden soil. It is often difficult to reconstruct the specific use for which a particular plot may have been used and whether or not specific plants were grown. Usually, it is only possible to achieve such insights through a combination of research techniques including soil morphology, phosphate analysis, and archaeobotanical analysis. Unfortunately, such laboratory-based techniques are not often used in commercial archaeological investigations.

Shallow traces of cultivation can quickly disappear in urban contexts, such as backyards where activities and therefore also features often overlap. Urban gardening and soil improvement activities often result in a disturbance of layers, mixing finds from different periods, which leads to the problem of dating different forms of activities safely.

Another problem in reconstructing gardens, especially vegetable gardens, arises from the fact that crops are harvested before they set seed.[300] These are for example crops that are grown for leafy vegetables, tubers or other vegetative parts and may not disperse many seeds. As a result, archaeobotanical visibility is poor and pollen and/or seeds from plants grown in vegetable gardens are likely to be only partially detectable. The preservation of the pollen or macrobotanical remains in the soil is another factor that may make this research more difficult.

In addition to the broad spectrum of cultivated plants that are grown in gardens, there is often also a characteristic accompanying group of weeds.[301] Because of their intensive use, pieces of hand cultivated urban land were usually fertilized. This can explain the presence of annual plants which thrive in nitrogen rich environments. Such weeds occur on intensively cultivated nutrient rich soils such as urban gardens. These plants are often annual and have a preference for (very) nitrogen rich soil, such as field mustard (*Sinapis arvensis*), common orache (*Atriplex patula*), chickweed (*Stellaria media*), common sow-thistle (*Sonchus oleraceus*), fig-leaved goosefoot (*Chenopodium ficifolium*), black nightshade (*Solanum nigrum*), fat-hen (*Chenopodium album*) and redshank (*Persicaria maculosa*). Due to the intensive use of land and tillage, perennial weeds are rare in vegetable gardens. These plants must be able to grow undisturbed for at least a year, as they will only be able to produce seeds in their second year. The finds of (or a combination of) such species are therefore often associated with the presence of gardens. Unfortunately, the presence of these species alone can never be a conclusive argument for horticulture as they may grow in other nitrogen rich contexts. Furthermore, a good gardener may have kept his plot in good condition without weeds. In a garden we have to think of a piece of land where herbs, vegetables and other labour-intensive crops were grown. There may be traces of vegetable gardens, parcellation, fertilization, manual soil improvement, greenhouse farming, humus rich fillings and accumulated layers.

In addition to this, finds like ploughs, flails, rakes, pitchforks or flowerpots may give additional clues to urban gardening.

The accidental preservation of seeds in such contexts is due to the fact that plants sometimes overshoot and still produce seeds. Furthermore, the germination rate of sowed seeds must have been lower than of modern crops.[302] These sowed, but ungerminated seeds are an important reason for macrobotanical discoveries of cultivated plants.

6.3.3 Vegetable gardens

Vegetable gardens existed throughout all periods in Dutch urban contexts. These vegetable gardens can be traced archaeologically in various ways. The traces of former vegetable garden beds or plots can usually be recognized by their shape, depth and filling. Sometimes there are also traces of cultivation for soil improvement, such as spade marks etc., which are also archaeologically visible. Traditionally vegetable beds were long and narrow (not more than 1.5 m wide). They were often oriented north-south, so that working along the garden patches could be done without getting blinded by the sun, or to catch sun on the gardener's backside.[303]

Evidence of fertilization, in the form of dung or household waste, is also often found in this type of context (Fig. 6.15). The presence of dung also plays a special role. Dung can be used on the one hand to improve soil quality and fertility, but it can also be an indicator for use as a hotbed.

300 Van Haaster 2003, 68.
301 Van Haaster 2003, 17.
302 Groenen *et al.* 2013, 18.
303 Willemsen 2019, 31.

Fig. 6.15 Dung pit at excavation of Schelpenkade in Leiden (although not in database), dating from the fifteenth century (Photo Erfgoed Leiden and omstreken).

6.3.4 Hotbeds

Pits that contain animal dung could have been used as hotbeds in the past.[304] The dung needed for such a hotbed must ripen and the fermentation process has to have started. The depth of theses hotbeds can vary between 30-60 cm. A pit was filled with alternating layers of dung and soil. The fermentation process of the dung created heat, so that the growing season of vegetables could be extended and a better yield achieved. Sometimes wooden containers or other structures were placed over the hotbed to protect the sown plants from the cold. The method is described in various sources such as the *Ruralia commoda* and *Le Ménagier De Paris* from as early as the fourteenth century.[305]

The recent research of van Oosten[306] and Hos[307] have established several indicators for the presence of hotbeds:

- layers with concentrations of organic material such as straw or bark (but only under good conservation conditions);
- seeds of cultivated garden plants from these layers;
- potentially, the remains of insects which are active on dung heaps and in compost.

Often the dung was removed from a hotbed after the growing season when its nutrients were depleted. That can result in a pit with only little, or no remains of dung. This can complicate research into this topic. Careful archaeobotanical research of dung rich layers is therefore required to determine whether the filling contains dung and/or the remains of cultivated plants, and to determine whether a pit has been used as a hotbed. Organic material that is often described as dung during excavations does not always turn out to be dung. Other concentrations of organic material, such as thatch from roofs or the stems of flax can also look like dung when degraded. In such circumstances a collapsed out building roof might be mistaken by an excavator for a thick layer of fertilized garden soil.

6.3.5 Orchards

The archaeological visibility of orchards is often poor. Apart from bush or tree planting holes at regular intervals there can be few archaeological traces. Fruits such as apples, pears, plums and cherries belong to the rose family whose pollen is indistinguishable from wild species from the same family. Furthermore, these fruit trees are insect pollinators and therefore produce few pollen. For these reasons,

304 Van Oosten 2014, 296.
305 Greco & Rose 2009, 209-215; Vollmann 2007.
306 Van Oosten 2014.
307 Hos 2015.

fruit trees are often not represented in the pollen spectrum of the settlement. Wood and charcoal from fruit trees are therefore the only reliable indications for local fruit cultivation.

6.3.6 Arable fields

In relation to fields features functioning as boundaries like embankments, (drainage) ditches and other structures like fences might be traced. Also, distinct layers that indicate fertilization and soil improvement, like plough marks, are often visible.

6.4 Results

In this section, the archaeological finds relating to horticulture, orchards and arable farming are presented.

6.4.1 Horticulture

Vegetable gardens

Only one hotbed has been found mentioned in a report by this study. During the excavation Tiel-Westluidensepoort[308], a structure which could be interpreted as a hotbed was identified. This seemed to date from the Carolingian period (up to 900).

This study showed the value of combining archaeological and specialist research of pits resulting in a reconstruction of early medieval vegetable garden plots. Various indicators of vegetable gardening have been documented at a site in Leiden-Aalmarkt[309] (1050-1250). In the weed spectrum, species were identified that indicated intensively fertilised vegetable gardens or fields. In addition, the discovery of broad bean stalks (*Vicia faba*) and remains of beet seeds (*Beta vulgaris*) was further evidence of local vegetable gardens. Celery, plums and grapes may also have been grown locally, but could not be linked directly to the site.

Various weeds were identified that could indicate vegetable gardens in the earliest phases of Rotterdam-Van Rotta tot Rotterdam (1050-1250).[310] At an Utrecht location-Ganzenmarkt 24-26 (1100-1200)[311], seeds of different garden vegetables were identified in a pit. Macrobotanical remains of beet (*Beta vulgaris*), celery (*Apium graveolens*) but also dyer's rocket (*Reseda luteola*), common soapwort (*Saponaria officinalis*) and henbane (*Hyoscyamus niger*) suggest that they have been growing in a garden nearby. During the excavation of Tiel-Westluidensepoort (885-1050), vegetable gardens may have been located in the backyard where plants such as beetroot (*Beta vulgaris*), celery (*Apium graveolens*), dill (*Anethum graveolens*), parsley (*Petroselinum crispum*), coriander (*Coriandrum sativum*) and savory (*Satureja hortensis*) were cultivated.[312] A number of pits have been documented with wood or decayed wickerwork in the peripheral zone. Possibly this was a framework for hotbeds.[313]

The block of houses recognized during the excavation of 's-Hertogenbosch-Kerkstraat (1200-1325) concerns buildings that in this period were still just outside the town wall.[314] The backyards were open spaces and the botanical research has shown that a vegetable garden in which various vegetables and herbs were grown was present. Finds of beetroot (*Beta vulgaris*), celery (*Apium graveolens*), hyssop (*Hyssopus officinalis*), dill (*Anethum graveolens*), catnip (*Nepeta cataria*) and savory (*Satureja hortensis*) are described. In addition, there are indications that rye was threshed on the site, which may also have been cultivated near the site. At the Eindhoven-Hoogstraat location (1300-1800) several vegetable garden beds were observed that were more or less placed in rows.[315] The shape of the vegetable garden beds varied between rounded or rectangular beds with a width of approximately 0.4-0.8 m. The length of these trenches could not be determined by means of this method, but were at least a few meters long. Unfortunately, these structures were not archaeobotanically investigated.

Garden beds were also identified during the excavation of Bergen op Zoom-Station Fietshelling[316] (1250-1500) (Fig. 6.16). The dimensions of these beds were 4.10 x 1.20 m. The soil within the beds was heterogeneous and with a higher percentage of humus than the surrounding soil. Only the lower 20 cm of the plots had been preserved. The soil had probably been improved by fertilizing with compost, dung, or maybe sods.

308 Leijnse 2017, 84.
309 Dijkstra 2011, 331.
310 Brinkkemper 2004, 92.
311 Van der Mark 2015, 177.
312 Van Haaster 2017, 183.
313 Leijnse 2017, 84.
314 Cleijne 2013, 109.
315 Benerink 2013, 30.
316 Depuydt 2014, 37.

Fig. 6.16 Vegetable garden plots at excavation Bergen op Zoom-Station Fietshelling (Depuydt 2014, 37).

In many cases, traces of soil improvement indicate use for agricultural purposes. In a research project in Dordrecht-Elfhuizen[317] (1300-1400) a thick accumulated layer of clay and peat dating from the fourteenth century made it clear that the area had possibly been used earlier on as a garden. In addition to the layer of garden soil, there are archaeobotanical indications for its use as a vegetable garden. The characteristic composition of macrobotanical remains of garden waste and weeds, but also possible threshing remains of field mustard (*Sinapis arvensis*) in a pit point suggesting horticulture. Mustard was produced from the seeds of the plant in the fourteenth century.[318] Also in the case of Doesburg-Korte Koepoortstraat (1200-1300) fertilization with household waste containing pottery was noticed in very humic layers.[319] This added to the fact that this part was undeveloped, and that horticulture could be reconstructed during the research.

Archaeobotanical research on samples from an excavation in Groningen-Boterdiep[320] (1500-1650), revealed characteristic weeds from vegetable gardens in a dung pit. In addition, historical information (dating between 1586 and 1629) about the leased plots of land recorded that there had been a cabbage garden of approximately 1,000 m² (60 *roede*) in the area.[321]

Ditches to improve water management and parcellation can also provide an indication of agricultural land use. The map of Haubois shows a garden and orchard complex divided into ditches in this part of the town. One of these ditches was found during the excavation (see also Fig. 6.17).

The Rotterdam-Markthal excavation (1425-1450) showed that ditches in extensive backyards had been filled up and that the land had then been used more intensively.[322] The keeping of cattle and growing of vegetables nevertheless continued in this area during this period. Archaeobotanical research on the samples from this phase showed that beet (*Beta vulgaris*) had been cultivated.[323]

Herbal gardens

Various plants were grown in herbal gardens. In addition to kitchen herbs, plants for artisanal production or medicinal purposes could also be cultivated. Although there were often separate herb gardens, especially in monastery complexes, herbs at a household level were usually planted in garden beds, or in flowerpots. The oldest indication of a herb garden that has

317 Hos & Paalman 2008b, 123.
318 Van Haaster 2008, 87.
319 Fermin & Groothedde 2008, 71.
320 Vrede & Dopmeijer 2015, 340.
321 An overview of archeobotonical seeds of seventeenth century in Groningen is published in Veenman & Vrede 2016.
322 Ploegaert 2013, 268.
323 Brinkkemper 2013, 296.

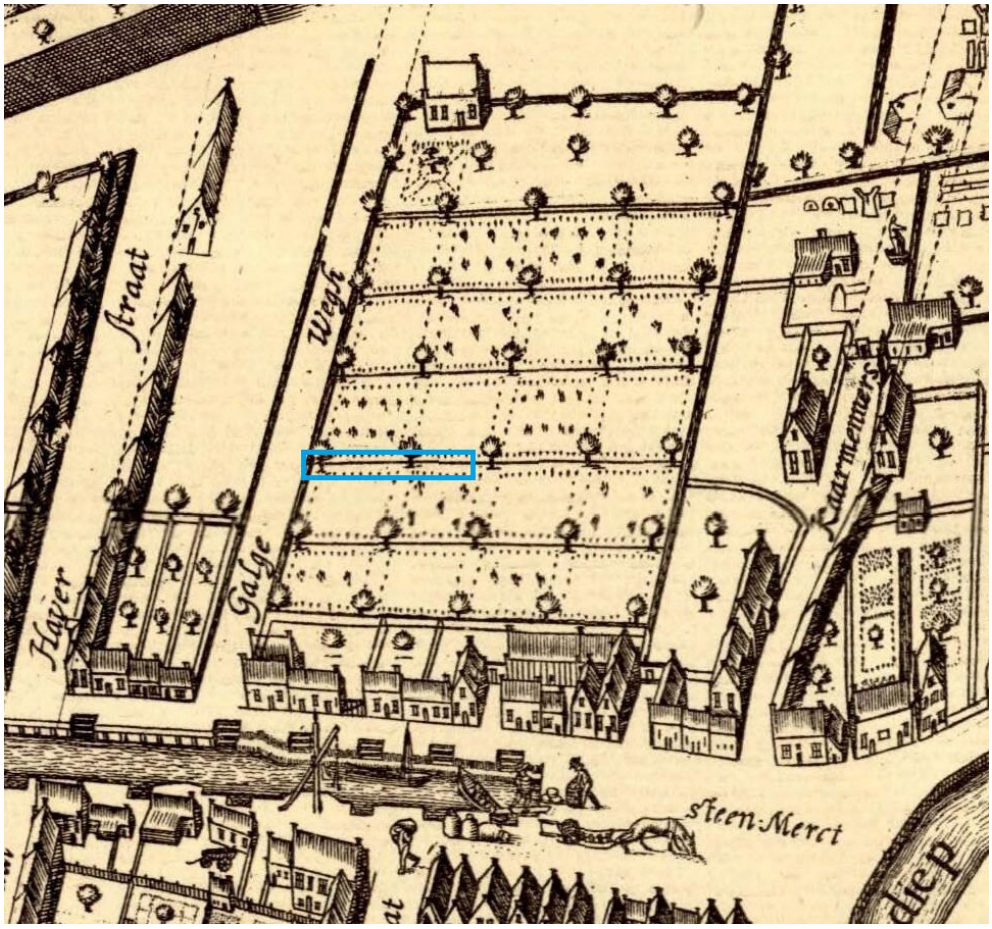


Fig. 6.17 Detail of the map of Haubois, showing in light blue the ditch within the orchard was found during the excavation (S53/S222, after Huis in 't Veld 2017, 31).

been found by this study was in Eindhoven-Hoogstraat (1000-1050).[324] Here numerous species of medicinal plants were found in a well, including hemp (*Cannabis sativa*), white nettle (*Lamium album*), flixweed (*Descurainia sophia*), henbane (*Hyoscyamus niger*), poison hemlock (*Conium maculatum*), hedge mustard (*Sisymbrium officinale*) and common vervain (*Verbena officinalis*).

Archaeobotanical remains of medicinal plants were also found, by an excavation in Utrecht-Ganzenmarkt (1125-1200).[325] In addition to traces of a vegetable garden, herbs such as henbane (*Hyoscyamus niger*), common soapwort (*Saponaria officinalis*) and dyer's rocket (*Reseda luteola*) were also identified. Henbane and soapwort can be used for medicinal purposes. But soapwort and dyer's rocket can also point to crafts. Soapweed is used to make soap and dyer's rocket is used to dye textile fabric yellow.

During the excavation of Oldenzaal-Ganzenmarkt (1400-1500) seeds of common vervain (*Verbena officinalis*), hyssopus (*Hyssopus officinalis*), poppy (*Papaver somniferum*), hemp (*Cannabis sativa*) and rue (*Ruta graveolens*) were identified in a sample from a cesspit, these had probably been cultivated in the herb garden of the Chapter of St. Plechelmus.[326]

One of the oldest discoveries of rosemary leaves (*Rosmarinus officinalis*) in the Netherlands comes from the Donkere Begijnhof within the Haarlem-waste containers project (1430-1480).[327] The remains of rosemary branches were found, these probably belong to a head wreath which had been placed in the grave of a nun. It seems likely that the rosemary had been grown locally.

Archaeobotanical research on a cesspit at the Oldenzaal-Agnietenklooster (1400-1500) has yielded the remains of several medicinal plants that must have been cultivated locally.[328] Remains of wormwood (*Artemisia absinthium*)

324 Verbruggen 2013a, 67.
325 Van der Mark 2015, 56.
326 Van der Mark 2006, 81.
327 Groen-Houchin 2014, 200.
328 Brinkkemper & De Man 1999, 54.

and common vervain (*Verbena officinalis*) have been identified. During the excavation of the complex Beda-Begijnhof Tuin (1575-1625) several medicinal plants were identified within an archaeobotanical sample from a pit.[329] Here valerian (*Valeriana officinalis*), savory (*Satureja hortensis*), hop (*Humulus lupulus*) and fennel (*Foeniculum vulgare*) were all present and had probably been cultivated in a local herb garden. The remains of medicinal plants have been found in Maastricht-Sphinx (1500-1700) within the structures of the Andriesconvent.[330] In this case a soil sample retrieved from a cesspool produced the remains of medicinal plants including rue (*Ruta graveolens*), poppy (*Papaver somniferum*), borage (*Borago officinalis*) and yellow sweet clover (*Melilotus officinalis*).

For later periods, there is evidence for a herb garden in Tiel-Fabriekslaantje (1700-1750).[331] In this case historical information about an ornamental garden, is backed up by archaeobotanical evidence, with pollen from various plants confirming the local cultivation of comfrey (*Symphytum officinale*), red/white bryony (*Bryonia dioica*) and possibly red-flowered bladder senna (*Colutea orientalis*) in a herb garden.

Ornamental gardens and parks

Comparatively little data is available on urban gardens and garden culture in medieval times from the reports that have been studied. As already noted, historical sources are available in this period, but these are mostly limited to monasteries, castle gardens, or ornamental gardens.[332] Ornamental gardens were most often associated with estates in the countryside, outside the scope of this study. A combination of useful and ornamental plants was generally planted in ornamental gardens. Gardens from ordinary farms or urban centres are mostly neglected by historical sources and any information on them is almost exclusively derived from archaeological research.[333] Van Haaster emphasizes that the remains of certain ornamental and symbolic plants like milk thistle (*Silybum marianum*) and boxwood (*Buxus sempervirens*) are clear indicators of a garden culture.

Ornamental and symbolic plants, including, for example, the milk thistle (*Silybum marianum*) and boxwood (*Buxus sempervirens*), can be seen as indicators for the presence of gardens.[334] In the later periods, especially in the seventeenth and eighteenth centuries, the first large urban private gardens were created by wealthy citizens. Parks were also created, which later became public.[335]

The only archaeological features for ornamental gardens that have been noted in this study were recognized in the castle grounds of Asperen-Kasteel Waddestein[336] (1500-1650). Here, a combination of archaeobotanical and cartographic research made it possible to reconstruct a garden with various ornamental plants such as roses. Other examples of ornamental gardens have been reconstructed by solely using historical information, as at Delft-Spoorzone Delft III[337] (1650-1850) and Groningen-Boterdiep[338] (1800-1900).

Archaeological information on urban parks is limited to two locations, and dates from the eighteenth and nineteenth centuries. Again, these are specific finds and not coherent or complex structures. In the inner town of Gouda-Binnenstad remnants of a bridgehead has been reconstructed which probably belonged to a construction in the park in the nineteenth century.[339] In addition, a special garden vase was excavated at a site in Leiden-Boshuizerkade, where a complete garden vase made of natural stone was found, illustrating the classic layout of the garden and park of the Boshuizen estate.[340]

Most of the information on the development and location of parks is historical or cadastral in nature. An example of a relatively early estate Presikhaaf that was mentioned in 1338 is the estate of the Earl of Gelre. This estate was later converted into a public park.

Flowerpots

In the theme horticulture, the highest scoring and therefore most common find related to horticulture is the flowerpot. Fragments of earthenware flowerpots sporadically from the late fifteenth century are found, but are regularly present in the more recent periods investigated by excavations in urban contexts.[341] However, even though flowerpots occur regularly in post-medieval assemblages they have been mostly neglected and studies in relation to their form, fabric and find context, although recent work is starting to address that problem.[342]

The flowerpots are mostly simple, unglazed pots with a conical shape with one or more holes at the bottom. They are sometimes hand-formed,

329 Van Beurden 2013, 153.
330 Van der Meer 2009, 78.
331 Van der Meer 2017, 138.
332 Oldenburger-Ebbers 1992, 92.
333 Van Haaster 1992, 103-113.
334 Van Haaster 2003, 68.
335 Den Dulk 2013, 25.
336 Van der Feest & Hagens 2017, 167.
337 Penning 2017, 9.
338 Huis in 't Veld 2017, 15.
339 Engelse, Wagner & Van Dasselaar 2018, 80.
340 Dijkstra & Ter Steege 2017, 34.
341 Bartels 1999, 119.
342 Currie 1993, 227.

and sometimes wheel-thrown and pressed in modern times. They are very similar to the terracotta pots that we still know today. This study shows that the finds (of fragments) of flowerpots are often mentioned by the specialists in the pottery research, but they are rarely described in detail. Also, an interpretation of the function in relation to the context or site is often lacking. In addition, no samples are taken for archaeobotanical research. Our Belgian colleague Piessens describes the untapped potential of this material category.[343] She mentions that the first flowerpots which probably date from the fourteenth century, have an abundance of different forms and different types relating to both private and professional uses. The form and size of pots was also related to the plant that was grown in it. The size of the pots for sowing and cultivating certain plants also varied but has yet to be studied in detail. In the report of on excavations in Alkmaar-Langestraat[344] (1550-1780) the finds of flowerpots are interpreted as pots intended to grow kitchen herbs for daily use rather than ornamental flowers.

Watering can

An iron watering can whose date is unknown has been excavated at a site in Tiel-Dominicuskwartier.[345] At Bergen op Zoom-Huijbergsestraat Schoolstraat (1500-1525) a watering can made of red earthenware was found (see also Fig. 6.18).[346]

6.4.2 Orchards

Orchards in urban contexts can be reconstructed mainly on the basis of historical, cartographic and cadastral data.

At an excavation in Den Haag-Bierstraat, planting holes for trees or shrubs were recorded in the courtyard of a building block, which probably dated from the seventeenth and eighteenth centuries.[347] It is striking that this is the only mention of planting holes in this study. In many cases, archaeological research confirms the historical data in a certain part of the town. For example, during the Maastricht-Sphinx

343 Piessens 2019, 23.
344 Bitter & Roedema 2010, 79.
345 Van Renswoude & Habermehl 2014, 201.
346 Vermunt & Van der Kallen 2013, 32.
347 Van Veen 2012, 52.

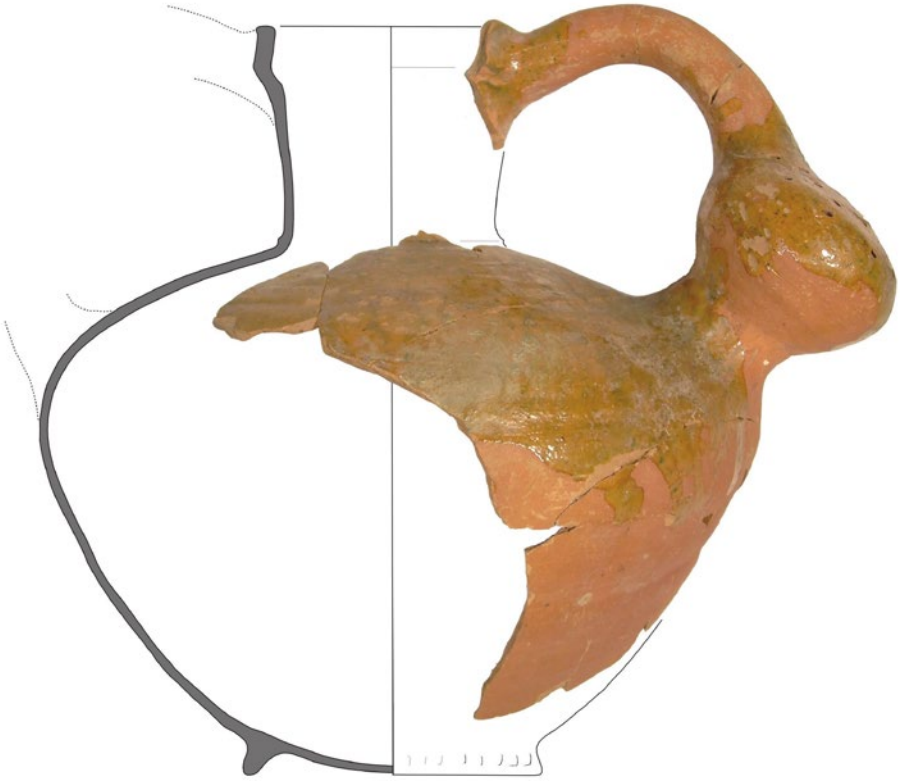


Fig. 6.18 A watering can made of pottery (dating 1500-1525) found at Bergen op Zoom-Huijbergsestraat / Schoolstraat (Vermunt & Van der Kallen 2013, 32).

excavation, an inner town terrain was investigated that confirmed the use as orchard and vegetable garden from the fourteenth to the nineteenth century.[348] The Enkhuizen-Molenweg excavation is a textbook example of ruralisation.[349] In the eighteenth and nineteenth centuries, after vacancy and decay, houses in the area were demolished and orchards were laid out. During the excavation, a thick layer of garden soil containing debris was documented. In addition to this, possible drainage ditches were present connected to the use as orchard.

Evidence of orchards has also been established in Tiel-Fabriekslaantje[350] (1650-1850) and Tiel-Hogendijkstraat[351] (1600-1850). In these locations the presence of historic orchards was first identified based on the town maps of Jacob van Deventer, and later confirmed by archaeological research which recovered traces of embankments and ditches.

There is archaeobotanical evidence for orchards in Dutch towns, usually in the form of wood, charcoal or pollen from fruit or nut trees. During an excavation in Leiden-Aalmarkt (1250-1454) wood from at least two different fruit trees was identified.[352] Evidence for fruit trees has also been excavated in Groningen-Lutkenieuwstraat-Tehuis (1050-1500) where walnut wood has been recorded pointing to locally growing trees.[353] From historical sources it is known that from the fourteenth century onwards young walnut trees were traded.[354] In Hagestein-Biezenweg (1400-1500) charcoal from fruit trees (probably cherries) was found which also indicates the presence of locally grown fruit trees.[355] In Groningen-Lutkenieuwstraat Tehuis (1050-1850) charcoal from apple or pear trees was found.[356] In addition to archaeological indications of fruit trees, there are also contexts in which pollen from walnuts and/or sweet chestnuts has been found. This is the case with the site at Oldenzaal-Wilhelminastraat (1650-1700) where the local cultivation of chestnuts (*Castanea sativa*), walnuts (*Juglans regia*) and hazelnut (*Corylus avellana*) could be traced through the remains recovered from a moat.[357]

6.4.3 Arable farming

Arable fields plots in and around towns have been established throughout all periods of this research. The cultivated land is usually just outside the town, but these areas are often later urbanized and built on as the town grows. In many inner city locations, therefore, old layers of arable land lie beneath the buildings. But fields are not only present in pre-urban phases of towns. In many examples, fields remain close to the urban centres and in some cases shrink again, houses are demolished and an area becomes arable land again in times of ruralisation.

At various locations around the old core of Nijmegen, traces of agrarian fields from various periods have been found, such as Nijmegen-Hertoghof[358] (1250-1700), Nijmegen Waterkwartier/Nijmegen West[359] (1200-1900), Nijmegen-Oscar Carrestraat[360] (1500-1900).

In Deventer, too, there are parcels just outside the town that remained in use as a field from the tenth to the nineteenth century, such as at the location Deventer-Molenbelt.[361] Also at the location Tiel-Hogendijkstraat (1300-1625) located very close to the town a layer of an arable field has been recorded.[362] The area was then built on in the later periods. At the location Eindhoven-Vijksteeg a humus rich and accumulated layer containing urban waste and traces of tillage were visible and it was concluded that the site was used as an urban arable field from the thirteenth to the fifteenth century.[363]

The storage of arable and horticultural products also requires storage facilities. At the Arnhem-Op de Beek site (1275-1300) a hexagonal granary with a diameter of 9 m has been documented in which arable products or hay are probably stored.[364] During the excavation Utrecht-Ganzenmarkt (950-1225) storage pits are probably related to the storage or processing of arable crops.[365] The botanical analysis of the filling revealed the presence of charred residues of wheat and broad beans. Maps of Jacob van Deventer show large horreas outside the town walls of Deventer and cadastral information points to the same situation in Amersfoort.[366]

Fertilization

The evidence of fertilization in urban contexts is often circumstantial. Fertilization is usually derived from finds of household or street waste mixed into field- or garden soil. In a few cases there is evidence for fertilization with sods, such as at the sites Arnhem-Oude Oeverstraat[367]

348 Van der Mark 2007, 84.
349 Duijn 2011, 119.
350 Habermehl & Boreel 2015, 7, 62.
351 Van den Brink, Hebinck & Schurmans 2015, 20.
352 Van der Meer, Vermeeren & den Ouden 2011, 264.
353 Vrede 2008, 72.
354 Van Haaster 1997, 89.
355 Leijnse 2012, 86.
356 Vrede 2008, 72.
357 Maurer 2018, 40.
358 Habraken 2013, 17.
359 Enckevort 2015, 107.
360 Van Hemert 2015, 6.
361 Hermsen 2005, 16.
362 Van den Brink, Hebinck & Schurmans 2015, 1.
363 De Jong, Louvenberg & De Vos 2011, 63.
364 Wemerman 2009, 34.
365 Van der Mark 2015, 55.
366 Groenewoudt 2011, 192.
367 Asch, Moolhuizen & Klerkx 2017, 194.

(1400-1500) and Amersfoort-Koestraat 14-16[368] (1200-1300), where archaeological research has shown that this kind of fertilization was plausible.

Dung pits have been identified by excavations in Rotterdam-Markthal[369] (1300-1500) and Zwolle-Blekerswegje (1400-1500).[370] The dung in these pits had probably been stored for later use as compost or fertilizer. There are numerous other examples from all periods in which archaeobotanical research has identified fertilization by the composition of the weed identified at the site such as Dordrecht -Elfhuizen[371] (1300-1400), Utrecht-Vredenburg[372] (1300-1500), Alkmaar-Doelenstraat / St. Jorisstraat[373] (1525-1600), Haarlem-Kruisweg[374] (1600-1700). At the site in Leiden-Kaarsenmakersstraat (1400-1600) excavation revealed that the area had been used for agricultural purposes including vegetable growing.[375] In this case the excavated garden soil was tested for acidity and nitrogen. Based on the relatively high nitrogen content, it was concluded that the garden had been fertilised in the past.

Parcellation

Plots of arable field can often be reconstructed on the basis of subdivision, where they have been divided by structures such as trenches, drainage ditches or walls. A good example of this has been documented at a location in Bergen op Zoom-Parade, where an earthen embankment around a field was later levelled out for the construction of houses in the late thirteenth or fourteenth century.[376]

Straw

The archaeological residues of threshing cereal crops have been recovered in various urban contexts. In addition to a direct association with arable farming and harvest processing on site or in the vicinity of the site, straw can also be present in association with livestock farming. Straw residues have often been observed in dung and waste pits because the straw has often been used as bedding in barns but also as animal fodder.

Traces of arable farming existed in the vicinity of the Utrecht-Ganzenmarkt site (1100-1200).[377] On the basis of pollen research, the cultivation and/or processing of grains such as wheat and barley was proven by the excavators. Rye and flax also seem to have been cultivated at a later date. A dung pit was also found to contain straw and the remains from threshing bread wheat, oats and field mustard which had been locally grown and processed in the vicinity of Gorinchem-Krijtstraat (1300-1400).[378] This also applies to Gorinchem-Bluebandhuis (1300-1400), where cereals were grown and processed.[379] Here, archaeobotanical research on the fill of a dung pit showed that wheat and/or barley had been grown.

Threshing waste and rye straw were identified in the layers of a well, Alkmaar-Doelenstraat/St. Jorisstraat (1375-1425) once again signalling the local cultivation of the crop.[380] At 's-Hertogenbosch-Kerkstraat (1200-1325) evidence of the local farming of rye and flax was found in the form of processing waste, possibly indicating that flax had been pressed for oil, or used in textile production.[381]

Agricultural tools

Discoveries of agricultural tools in urban contexts give an indication of their importance and use. In Enkhuizen, during the excavation of Enkhuizen-Winkelcentrum Streekhof, a ploughshare was found in a filled-up ditch/ accumulated layer, which dated from the fourteenth/fifteenth century.[382] There was further archaeological evidence for arable farming, in the form of pathological traces on the cattle bones recovered, indicating that the animals had been used as pack animals, or for ploughing. An example retrieved during an excavation at Tiel-Fabriekslaantje (1250-1500).[383] Here the femur of a cow with osteoarthritis was found, which also indicated that the animal had endured heavy labour, such as ploughing.

Archaeological traces of plough marks have often been found in open spaces in Dutch towns as well as in the plots of land just outside. Examples have been found by excavations in Groningen-Lutkenieuwstraat[384] and Groningen-Lutkenieuwstraat-Tehuis[385] where plough marks from the eleventh/twelfth century and the later Middle Ages have been recorded, indicating that the location remained in arable use for a long period of time. In Amersfoort-Westsingel Hellestraat (1200-1300) plough marks were found in a layer dating to the thirteenth century.[386] At a site in Zwolle-Meeuwenlaan (1300-1400) plough marks were identified in a

368 d'Hollosy & Verhamme 2011, 18.
369 Ploegaert 2013, 175.
370 Klomp 2002, 5.
371 Van Haaster 2008, 88.
372 Hänninen 2009, 70.
373 Moolhuizen 2013, 81.
374 Moolhuizen 2012, 31.
375 Meijer 2018, 72.
376 Vermunt *et al.* 2009, 79.
377 Van der Mark 2015, 195.
378 Haaster, Kubiak & Van Waijjen 2005, 81.
379 Hoogendijk 2015, 121.
380 Moolhuizen 2013, 82.
381 Cleijne 2013, 110.
382 Gerritsen 2013, 32.
383 Van Haasteren 2015, 54.
384 Jelsma 2016, 35.
385 Huis in 't Veld 2008, 25.
386 Hulst & d'Hollosy 2014, 25.

Fig. 6.19 The archaeological traces of vegetable patches at Amerfoort-Smallepad dating 1200 to 1400. (Snieder 2006, 29, Fig. 40).

buried horizon that had later been assimilated to the town and build over.[387] The project Gouda-Rioleringen (1250-1500) revealed an arable field with plough marks at the Sophiastraat-site which existed up to time of the area's development in the sixteenth century.[388]

Traces of soil improvement: digging

Traces of soil improvement can be identified where fields and especially (vegetable) gardens have been cultivated by hand. The soil has often been improved by mixing fertilizer into the soil. Examples of this have been found at Amersfoort- Smallepad (1200-1400).[389] Often such traces are related to hotbeds (Fig. 6.19). Based on these features, the excavators suggested that hotbeds measuring 0.4 m wide and 10 m long had been used.

Traces of digging and ploughing have also been excavated that, at a site in Amersfoort-Koestraat 14-16 where excavation is combined with archaeobotanical research, has demonstrated that the area was a field just outside the town.[390] The terrain was first used as a field (1200-1400). Later on, granaries, haystacks and possibly stables for livestock were build there.

Spades, shovels and pitchforks

Finds of shovels and spades can indicate agricultural activities. Examples of shovels have been found in Leiden-Breestraat 46-48[391] (1500-1600), Tiel-Dominicuskwartier[392] (1500-1600). At Montfoort-Lieve Vrouwegracht (1250-1500) a shovel and a pitchfork were excavated in the same context.[393] Pitchforks have also been recovered from sites in Tiel-Dominicuskwartier[394] (900- 1250), Arnhem-Op de Beek[395] (1050-1250), and Tiel-Prins Willem-Alexanderschool[396] (1250-1650).

Hoe

Hoes are an important tool for horticulture and are used to weed around slow growing cultivated plants like beet, carrot, turnip and onion. Only one find of a hoe has been recorded in this study, in an excavation report from Leiden-Aalmarkt.[397] Unfortunately, the hoe is only included in a list of finds, with no date, and no further description.

Rake

During the excavation in Hoorn-Grote Noord 4 and 6 an iron rake was excavated in a layer that dated from 1300-1350.[398]

387 Groenhuijzen 2009, 10.
388 De Rijk, Wagner & Van Dasselaar 2013, 32.
389 Wijker 2006, 29.
390 d'Hollosy & Verhamme 2011, 18-20.
391 Corver 2016, 76.
392 Van Renswoude 2014, 232.
393 Van Kampen 2016, 80.
394 Van Renswoude 2014, 214.
395 Wemerman 2009, 33.
396 Verhelst & Van Renswoude 2015, 56.
397 Dijkstra & Brandenburgh 2011.
398 Schrickx & Van de Walle-van der Woude *et al.* 2006, 252

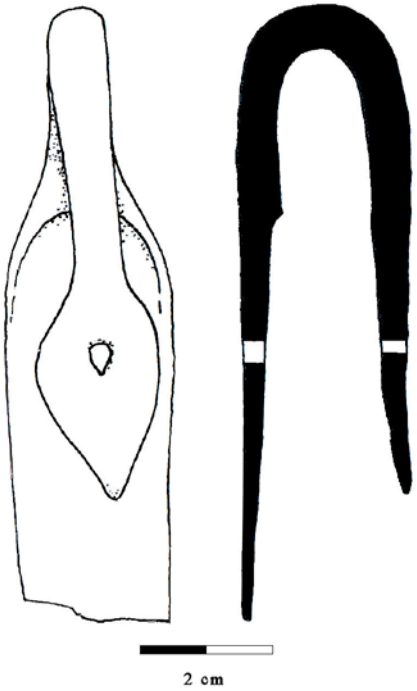


Fig. 6.20a The hinge of flail from site Zutphen-Het Kruittorenplein (Fermin & Groothedde 2009, 24).

Fig. 6.20b The hinge of flail in use, dated 1250 (after Crowfoot, Pritchard & Staniland 2001, 187 in Fermin & Groothedde 2009, 24).

Flail

During the excavation of Zutphen-Het Kruittorenplein a metal hinge was recovered which probably belongs to a flail.[399] The find was retrieved from a thirteenth century well (Fig. 6.20a and 6.20b).

Scythe

A fragment of a scythe, which indicates an agricultural aspect of town life was found in an excavation in Tiel-Dominicuskwartier (1350-1400).[400]

6.5 Concluding remarks

Historically, urban farming took place on different scales. Small-scale urban farming in backyards and gardens allowed households to maintain a certain level of self-sufficiency. Although small-scale, and often ephemeral, this level of household production can leave archaeological traces. However, in the Netherlands research into backyards in urban centres has rarely focused on the topic of urban farming, or the traces thereof. Farming activities are accounted for in most research dating to the pre-urban phase of the settlement. In later periods when town maps are available, these have been used by archaeologists in their preliminary desk-based assessment of potential development sites. It is usual for archaeological interventions to confirm what has been suggested by documentary and cadastral sources, i.e., a trench may be excavated to confirm the presence of vegetable patches or orchards.

Horticulture and arable farming can occur at any location in an urban centre, and even small-scale cultivation in backyard plots can provide a stable provision of fruit, vegetables, nuts and (medicinal) herbs adding to staple foods based on cereals. From the fifteenth century we see a professionalization and upscaling of horticulture. This often led to a move from locations inside urban centres to fields just outside the town.[401] This professionalisation of horticulture to provide for urban centres is first seen on a very large scale around Leiden, but can also be seen around Delft and Arnhem.[402]

The answer to the question who – or which people were urban farmers- cannot be answered

399 Fermin & Groothedde 2009, 23.
400 Van Renswoude 2014, 232.
401 Sangers 1952, 45.
402 Sangers 1952, 45.

by archaeology alone. The range of activities from medieval times to the pre-modern period is very diverse. The variation in scale from household level vegetable gardens to professional horticulture just outside the urban centre also underline the complexity of this subject. Historic sources can add significant information, but this also has limitations. While historic sources tell us about the professions of urban dwellers, trades, taxes and the rental or ownership of arable land, orchards or vegetable plots in or around the town these sources are often only available from the late medieval to early-modern periods. Documentary sources can also neglect the non-professional or public activities undertaken by individual households. Descriptions of the growing of vegetables, fruits or herbs to sustain or add to the daily food are similarly underrepresented in the earlier historical sources.

From the fifteenth century onwards there are accounts of individuals growing vegetables professionally in town registers.[403] They are sometimes already specialized and grow particular vegetables, such as only cabbages. A great variation in the supply of vegetable and fruit may also be linked to the social welfare of urban centres.[404] Put simply: the richer the town the more diverse it's food. The rise of wealthy middle-class citizens in the sixteenth and seventeenth centuries created greater demand for a wider variety of food.[405] Vegetables were often expensive, and with the trend to eat more diversely there could also be a stimulus to grow vegetables in local gardens for people who could not afford to buy these at the local markets.

Maintaining a certain level of self-sufficiency and independence protected urban households from food-shortage, rising food-prices. Individual food preferences and the better quality/freshness of home-grown produce may also have encouraged households to engage in urban farming. In the pre-modern world delicate produce like lettuce, fresh kitchen herbs and comparable products could not be transported and traded over large distances without the luxury of modern cooling and storage facilities.

403 Sangers 1952, 45.
404 Van Berkum 2015, 9.
405 Den Hartog 2003, 48.

7 Urban farmsteads and farming practices

A.D. Fischer

7.1 Introduction

Traditionally it has been argued that most Dutch towns in the Middle Ages had farmland outside their town walls and little spaces associated with agrarian activities within their walls.[406] Food was cultivated in a radius of 5-10 km outside the town. Staple foods like cereals for bread were often imported in bulk through long distance trading routes. Some citizens had backyards with a kitchen garden. There might also have been communal fruit, vegetable and herb gardens in towns for residents as some intra-mural areas were deliberately left undeveloped.[407] However, as towns became more densely populated and more buildings were needed, these agricultural spaces were developed and built over.

This traditional pattern and sequence might be appropriate for a general outline, but a more nuanced and less deterministic model needs to be established to interpret the data from this research.

Although it is often argued that urban agriculture is a relatively inefficient way of production, there are also advantages:

1. The efficient way of land use to produce food locally.
2. The use of resources – raw materials – from the immediate surroundings, the town itself. This aspect of urban agriculture – a closed economic and organic cycle – is not always made explicitly included in descriptions of urban agriculture projects, but is relevant in the context of sustainability.

7.2 The conceptualization of towns

The modern view of what constitutes a town does often not include agrarian activities. Using modern skyscraper rooftops or community gardens to grow local produce has become more and more popular during the last decades, propagating a more sustainable approach of consumption in town areas. Although urban farming has a long tradition, this new trend seems like a brand-new concept. This is mostly due to an underlying dichotomous idea that farming is constricted to the countryside and neat urban areas are strictly centres of artisanal production, trade and services. Therefore, it is vital to consciously unravel and understand the history of how our notion of 'a town' has been shaped.

The definition of a town can be based on different concepts. Town concepts are mostly based on economic, political-administrative or social criteria. The dominating concept is based on a model first created by Adam Smith[408] and later modified by Karl Büchner.[409] In this model a town thrives upon the surplus production of food and raw materials of its hinterland in exchange for urban craft products. A town, as was explained in Chapter 2, is usually seen as a settlement that is first and foremost a centre of crafts, trade and commerce. The rural character of a large number of towns surrounded by arable land where cultivation of cereals, vegetables and fruit took place and keeping a substantial livestock in urban areas does not fit into this concept. In this model there is no room for urban farmers. The position of merchants and traders also remains difficult to explain as producers sell their produce themselves. In this model a closed circuit of product exchange (*'geschlossene Stadtwirtschaft'*[410]) takes place directly, within a town between producers and consumers. In recent years research has shown that a town's economy cannot be simplified and reduced to this concept.[411] Towns not only produced artisanal goods for the surrounding rural areas, but might also have specialized in products fit for trans-regional or international trade. And vice versa not all of the surplus food grown in rural areas was meant for the surrounding towns. The very strong spatial segregation of functions that is seen within towns as we know them today is a recent phenomenon.[412] In the past, urban houses often combined residential, commercial and craft functions. In medieval England, where fewer towns had a town wall, the transition between town and countryside was also much more gradual.[413] The international literature on the phenomenon of urban farming, places the focus mainly on the outer area surrounding the town, the rural-urban fringe. Regarding the area as market gardens or *les hortillonages* aiming to produce vegetables and fruit for the town market is one interpretation. Communal allotment gardens also emerged in many

406 Claringbould 2017, 9.
407 Renes 2005a, 33.
408 Smith 1776, Book III, Chapter I.
409 Büchner 1917, 108.
410 Büchner 1917, 116.
411 Isenmann 2014, 43.
412 Renes 2005, 41.
413 Renes 2005, 43.

European towns after industrialization, allowing workers to grow their own produce. The building of town walls limited the spatial growth of towns, and demographic growth within those bounds often led to denser built-up areas, which subsequently preserved existing structures in the urban area.[414] When a demographic decline occurred the demolition of unused or abandoned houses made room for a shift in activities or to development of new functions.

7.3 Historic sources

Many European towns had an agricultural component for a long time and this is reflected in historical sources.[415] Numerous town charters therefore contained statutes concerning land regulations, forest use and regulations regarding the keeping of livestock. The regulations of the German town of Ulm offer an excellent example.[416] In Ulm, the town regulations ordered that animals should be kept inside barns during the night, and prohibited the driving of animals through the town at night. There were punishments for damage caused to fields or gardens by animals. Furthermore, the town council tried to limit the number of live animals kept within the town by taxation. Residents who owned more than three cows and one sheep had to pay a weekly tax. The value that was attributed to pasture land around towns is also interesting. Arable fields appear to be more important than gardens or orchards (at least in this example). The Ulm town regulations stipulated that no pasture land could be converted into arable fields without permission of the town council. Converting existing arable land into vegetable gardens or orchards without permission was also prohibited.

Research has shown that in the town council regulations in medieval Frankfurt as much as 50% of the regulations concerning farming, with the other 50% dealing with crafts and trade.[417] In 1440, some 18% of the working population of Frankfurt's citizens were engaged in farming activities.

The town regulations of Haarlem, Delft and Alkmaar stated that town dwellers were allowed to leave the town during the summer for a period of forty days at the harvest time. In autumn they were allowed to sow for forty days. The length of these periods of absence and the percentage of the urban population that were involved stresses the importance that agricultural activities had for urban inhabitants at that time.

Quantitative information is given below for urban farmsteads and agricultural land use patterns. A qualitative framework is then presented to contextualize used keywords, archaeological features and finds behind these numbers. The collected archaeological remains relate to farmsteads, fences, accumulated layers, land division and pastures.

7.4 Quantitative information

The subject of general urban farming mainly concerns keywords that are not suitable to be assigned to one of the other themes. The keywords originate from all four types of sources: archaeologically, historical, cadastral and pictorial. The majority of data originates from archaeological research and historical research (Fig. 7.1). Data from cadastral and pictorial sources are less frequent. The distribution of the keywords over the different periods is shown in Figure 7.2.

The theme 'general urban farming' is made up of 55 different keywords that have been rated a total of 254 times (Table 7.1). In addition, six keywords have been qualified as very valuable data with a rating score of 20.

The phenomenon of town farming is present in towns in all periods of this research. Based on the (summarized) density of the date ranges of the keywords, two peaks are shown around 1300 and 1750 (see Fig. 7.3 and 7.4). A notable low is visible in 1500.

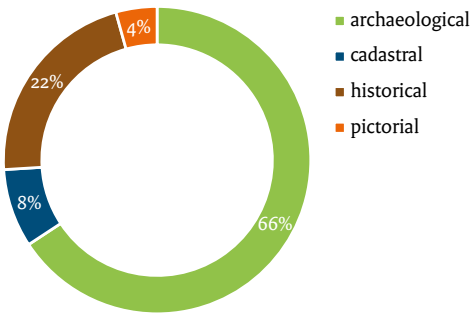


Fig. 7.1 number of keywords per type of source (archaeological, image, historical or cadastral) in the theme 'general urban farming'.

414 Renes 2005, 43.
415 Renes 2005, 44.
416 Isenmann 2014, 43.
417 Isenmann 2014, 44.

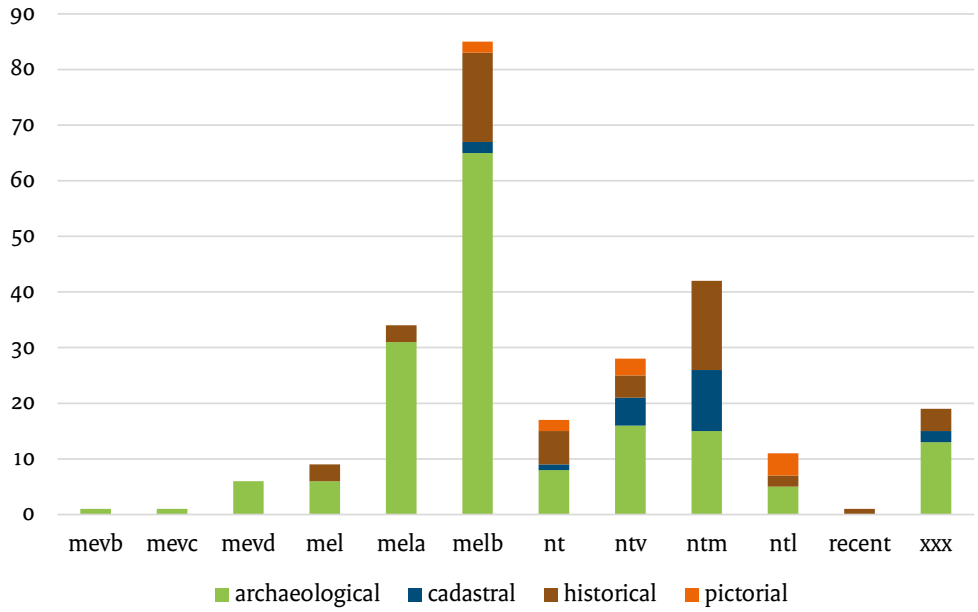


Fig. 7.2 number of keywords in the theme 'general urban farming', distributed over all periods sorted by the initial period.

7.5 Context and indicators

Urban farming occurs in many different forms. In addition to being widespread and diverse, it is often opportunistic in nature. It arises where space is available and therefore urban farming can have a great variety of different types of farming practices, which makes it difficult to develop clear classifications.[418]

In general, former agricultural practices can be traced archaeologically by means of :

- soil treatments such as ploughing, fertilizing, drainage;
- land division;
- specialist analysis of soil for micromorphology or archaeobotanical or zooarchaeological remains;
- buildings associated with agrarian activities like storage;
- dung;
- the presence of (neonate) animal remains.

7.5.1 Urban Farmers

In the first phase of urban development it can be argued that part of the agricultural activities that were present related to the process of urbanization, whereby a pre-urban settlement was transformed into a town. In other words, during this transition period some agricultural activities still took place. Although this is a valid argument, it does not explain the continuous agricultural activities that took place in most towns in later periods. The extent of such urban farming practices varied over time and differ from town to town. The idea that agricultural activities do not belong in towns is rather a modern idea (see also heading 7.2), and as has been shown in this research, the separation between urban and rural activities in the past was much less strict.[419]

Another reason why a settled peasant population may be present in an urban area could come down to the urban foundation process. This is especially true for the period between 1300 and 1450, when many small towns and what were to become failed towns were founded.[420] New founded towns that were under development needed a secure source of supplies. In order to secure the provision of food, farmers who wanted to become town dwellers were offered free land to build on, along with cheap fields and other privileges.[421] The town farmers of the new towns enjoyed prosperity and influence, because of their land ownership and the privileges granted to them they were superior to later settlers. Urban farmers formed, especially in the rural towns, a

418 De Graaf 2011, 19.
419 Renes 2005, 43.
420 Isenmann 2014, 54.
421 Kulischer 1988, 137.

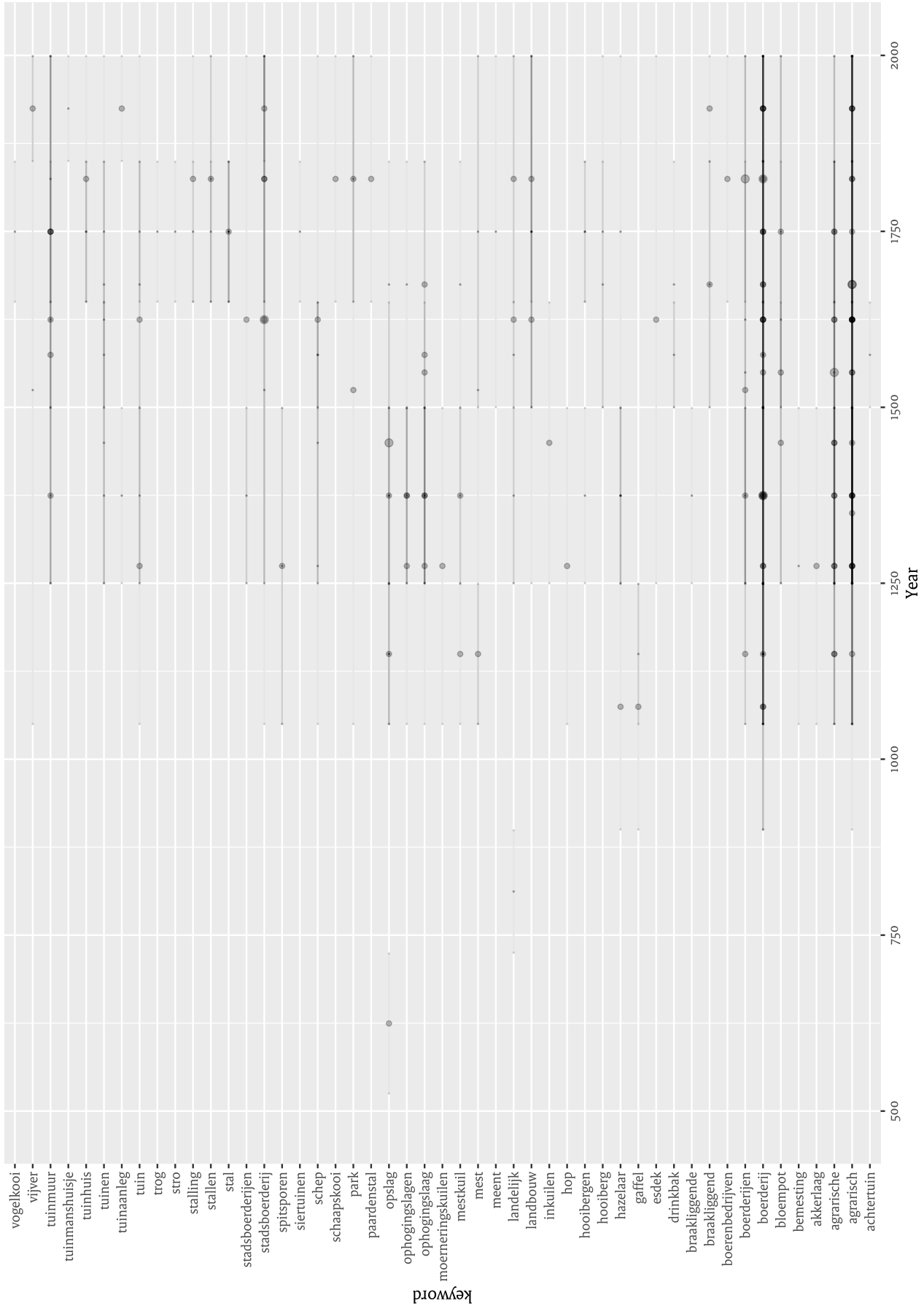


Fig. 7.4 The chronological occurrence of general keywords related to urban farming and attributed value (score 5, 10 or 20) (N=55/frequency=254). For translation of keywords, see App. 2.

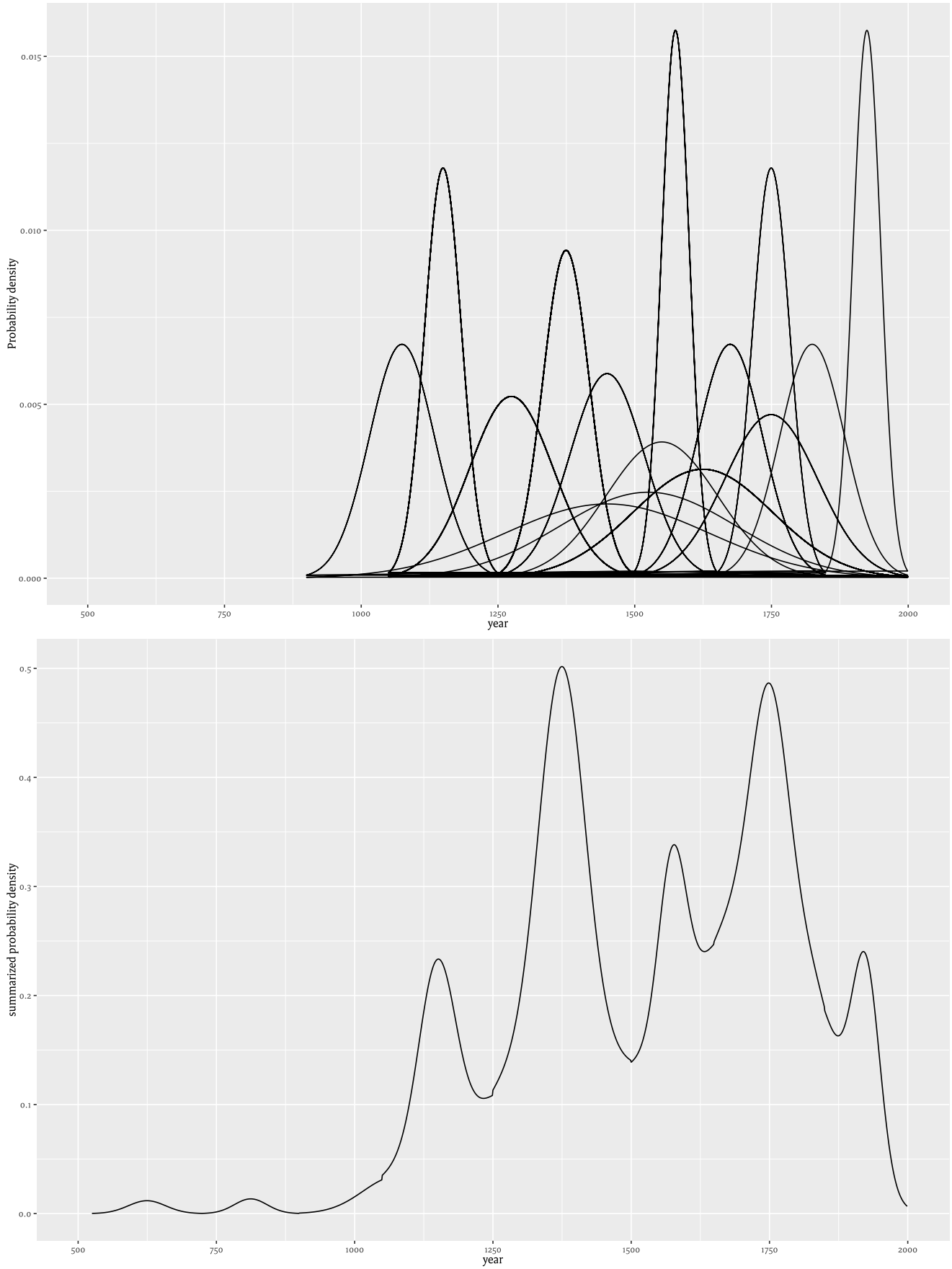


Fig. 7.3 Density plots (top) and summarized density plots (below) of dated urban farming keywords found in this study related to general themes. The probability of the dates is based on the date range of each keyword, assuming normality. Peaks are noted dating to c. 1300 and 1750.

Table 7.1 General keywords relating to urban farming in Dutch and English (N = 55, frequency = 254).

Keywords (Dutch)	Keywords (English)	Score 5	Score 10	Score 20	Total
Achtertuin	backyard	1	-	-	1
Agrarisch	agrarian	8	29	2	39
Agrarische	agrarian	3	12	1	16
Akkerlaag	field layer	-	1	-	1
Bemesting	fertilzation	1	-	-	1
Bloempot	flowerpot	2	3	-	5
Boerderij	farmstead	14	26	3	43
Boerderijen	farmsteads	3	3	1	7
Boerenbedrijven	farms	-	1	-	1
Braakliggend	fallow/undeveloped	2	2	-	4
Braakliggende	fallow/undeveloped	1	-	-	1
Drinkbak	drinking trough	2	-	-	2
Esdek	plaggen soil	1	1	-	2
Gaffel	pitchfork	1	1	-	2
Gieter	watering can	-	1	-	1
Hazelaar	hazel	4	1	-	5
Hooiberg	haystack	2	-	-	2
Hooibergen	haystacks	4	-	-	4
Hooivork	pitchfork	1	1	-	2
Hop	hop	-	1	-	1
Inkuilen	silage	-	1	-	1
Landbouw	arable farming	3	2	-	5
Landbouwgrond	arable land	1	-	-	1
Landelijk	rural	3	2	-	5
Meent	common	1	-	-	1
Mest	dung	2	1	-	3
Mestkuil	dung pit	3	2	-	5
Moerneringskuilen	peat pits for salt extraction	-	1	-	1
Ophogingslaag	accumulated layer	2	6	-	8
Ophogingslagen	accumulated layers	2	3	-	5
Opslag	storage	5	3	1	9
Paardenstal	stable	-	1	-	1
Park	park	1	2	-	3
Plantgaten	planting holes	1	-	-	1
Schaapskooi	sheepfold	-	1	-	1
Schep	shovel	5	1	-	6
Siertuin	ornamental garden	-	1	-	1
Siertuinen	ornamental gardens	1	-	-	1
Spitsporen	spade marks	1	1	-	2
Stadsboerderij	urban farmsteads	1	4	1	6

Table 7.1 General keywords relating to urban farming in Dutch and English (N = 55, frequency = 254) (continued).

Keywords (Dutch)	Keywords (English)	Score 5	Score 10	Score 20	Total
Stadsboerderijen	urban farmsteads	1	1	-	2
Stal	barn	4	1	-	5
Stallen	barns	3	1	-	4
Stalling	barn	1	1	-	2
Stro	straw	1	-	-	1
Trog	trough	1	-	-	1
Tuin	garden	3	2	-	5
Tuinaanleg	garden landscaping	1	1	-	2
Tuinafval	garden waste	1	-	-	1
Tuinen	gardens	6	-	-	6
Tuinhuis	garden shed	3	1	-	4
Tuinmanshuisje	gardener's house	1	-	-	1
Tuinmuur	garden wall	4	6	-	10
Vijver	pond	2	1	-	3
Vogelkooi	birdcage	1	-	-	1
Total		**115**	**130**	**9**	**254**

large part of the medieval inhabitants, often originating from the surrounding region.[422] The estates of the full-time or part-time urban farmers included sheds, grain and hay stores, cattle barns, enclosures and dung heaps, which all led to problems of pollution in the inner-town.

To summarize, there were several reasons why farmers might choose to settle within and just outside a walled town or town. Some farming families had never given up farming and continued to farm after new towns had been founded (especially in older towns which were in existence before c. 1250). In later periods newly founded towns needed secure food production and a constant supply from their immediate vicinity. The founders of new towns had a great interest in attracting farmers to become citizens. As a result, from the thirteenth century in the German Empire and France, and from the fourteenth century in Flanders and Brabant, farmers who lived just outside the town walls were recruited and became urban citizens[423] A so called '*buitenpoorter*' (external citizen, 'outburgher' or Ausbürger) enjoyed the civil rights of a town, but lived outside the area of this town. The conditions for being a buitenpoorter could vary somewhat from town to town. A number of towns including Haarlem, Delft, Leiden, Amsterdam, Rotterdam, Schiedam and Alkmaar promised that they would require their buitenpoorter citizens to live within the town walls.[424] In order to obtain this legal status, buitenpoorters had to pay money to their respective town. However, on the other hand, buitenpoorters were exempt from paying tax to the local feudal lord, and were protected by the legal constitution of the town. The exemption from tax meant the right to become a buitenpoorter was a sought-after status. It was only in 1796, as a result of the French Revolution, that the regulation of citizenship was reformed.

Another phenomenon is the so-called Ackerbürgerstädte (see Section 2.1.1), where agricultural settlements grew into small towns. In addition to crafts and trade they remained largely rural in character, sometimes even producing surplus food for other towns. The citizens can also be part-time farmers but generally also practice a craft. Ackerbürgerstädte are not to be confused with failed towns. Failed towns were often founded by aristocrats and had the potential to become a town but ultimately failed as they did not fulfill their potential. Ackerbürgerstädte have often grown naturally from hamlets into larger centres.

422 Boerefijn 2010, 392.
423 Bos-Rops 1993, 26.
424 Bos-Rops 1993, 27.

In times of war (such as the Eighty Years' War) or political tensions there was a tendency for rich farmers to settle inside a town for security and to continue farming outside the town. This could be traced in Alkmaar-Laat Houtmarkt, where historical and cadastral information is available for cow farmers who moved to Alkmaar during the siege in 1573.[425] They came from villages in the surrounding countryside like Ursem, Krommenie, Hoogwoud, Oterleek and Boekel.

7.6 Results

7.6.1 Farmsteads

There are numerous examples of farms in towns during the investigated period. The oldest farms often date from the transition phase between pre-urban settlement and urban development. Examples of such pre-urban farmsteads where documented at Arnhem-Op de Beek[426] (1000-1250) and Zutphen-Het Kruittorenplein[427] (1300) where farmsteads existed within urban areas. In other places integrated farms were common for centuries within the town territory. Amersfoort, Alkmaar and Groningen are all towns where at numerous excavations within the town traces of agrarian activities have been found.

Generally speaking, it is often impossible to reconstruct precisely the agricultural activities on individual farms, i.e., whether a farmer was specialized on livestock farming, or arable agriculture, or a mix of both. At a site in Montfoort-Lieve Vrouwegracht[428] archaeobotanical research has shown that beer was brewed at the farm.

In Amersfoort the remains of a farmstead just 175 m outside of the town gate were excavated at Amersfoort-Kreupelstraat/ Achter de Kamp (1200-1300).[429] Further evidence of agricultural activities dating from the thirteenth to the fifteenth centuries are known from archaeological, historical and cartographic sources for Amersfoort-Koestraat 14-16.[430]

After the fifteenth century the area became part of the growing town and the buildings changed. The Koestraat and the perpendicular Koesteeg probably owe their name to a former gate (the Koepoort), through which cattle were led from the town farms to the grazing grounds outside the town. Close to these sites another possible farm with associated features of agrarian activities (1300-1400) has been investigated at Amersfoort-Westsingel Hellestraat.[431]

Urban farms and traces of agricultural activities have been identified at several locations in the town of Groningen. A reconstruction based on excavated evidence from Groningen-Vismarkt 26 (1000-1400), shows farms and stone houses.[432] At

425 Bitter & Van den Berg 2014, 15.
426 Van der Mark, Wemerman & Van de Venne 2009, 154.
427 Fermin & Groothedde 2009, 15.
428 Van der Meer 2016, 108.
429 Van Dijk & d'Hollosy 2007, 19.
430 d'Hollosy & Verhamme 2011, 7, 19.
431 Hulst & d'Hollosy 2014, 73.
432 Bergsma 2014, 6.

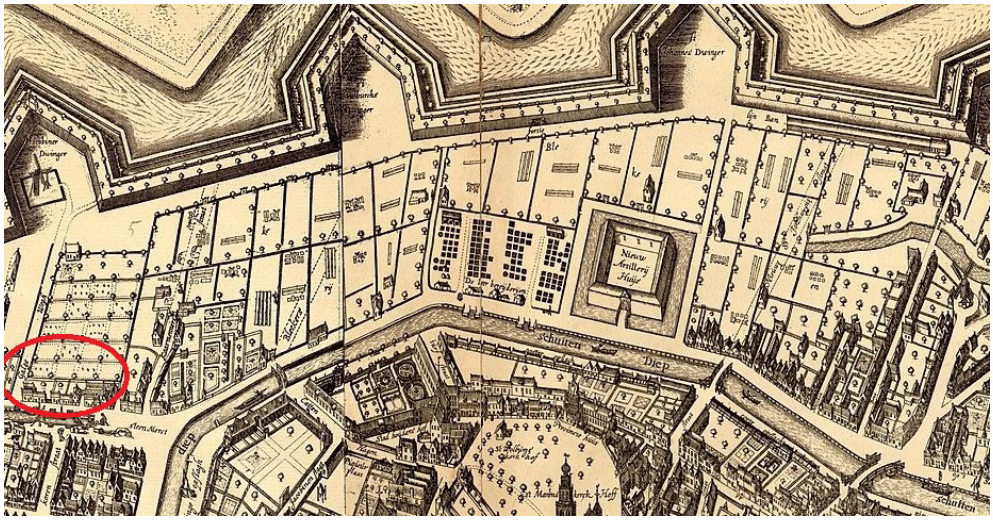


Fig. 7.5 Detail of the map of Haubois from the seventeenth century with the excavation site Groningen-Boterdiep on the left. The area is depicted as a garden. During the excavation remains of the garden were found indicating that mainly fruit trees were planted in the garden (after Huis in 't Veld 2015, 368).

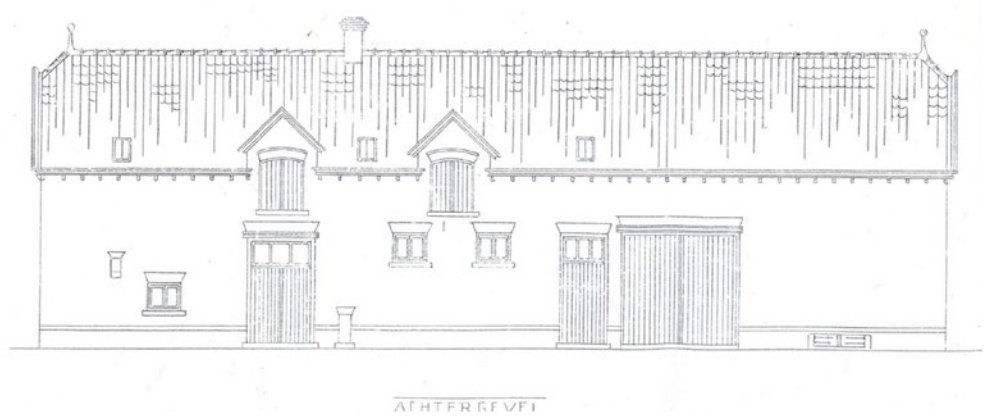


Fig. 7.6 Back facade of a twentieth century urban farmstead at Roermond-Bethlehemstraat / Voogdijstraat (Wattenberghe & Van den Bosch 2011, 111).

Fig. 7.7 Cross section of twentieth century urban farmstead at Roermond-Bethlehemstraat / Voogdijstraat, (Wattenberghe & Van den Bosch 2011, 111).

Groningen-Lutkenieuwstraat-Tehuis the land division and other features suggest agrarian use between the eleventh and the sixteenth century.[433] An excavation at Groningen-Boterdiep provided evidence of farmsteads, drainage and soil improvement for farming (see also Fig. 7.5).[434] The last recorded farmstead located at Groningen-Kijk in 't Jatstraat 103 existed from 1775 to 1964, and mainly kept cattle for dairy products.[435] Numerous examples of farms and agricultural activities in and or directly outside of other Dutch towns emphasize the continuous growth of this tradition.

We know from historical sources that a total of six farmsteads and 13 haystacks existed in Montfoort in the seventeenth century.[436] At a site in Montfoort-Lieve Vrouwegracht an earlier dating farm from the late thirteenth and fourteenth centuries has also been excavated.[437] Traces of the main building, several (dung) pits, a number of ditches and a stable section within the main building were found.

Further evidence of urban farmsteads and/or barns, animal graves, and dung pits have been identified at Doesburg-Gasthuisstraat 23[438] (1200-1300), Breda-Gasthuiscomplex[439] (1300-1400), Tiel-Dominicuskwartier[440] (1400-1500) and Deventer-Burseplein Stadskantoor[441] (1450-1500).

In the period between 1600 and 1920 farmsteads in towns existed at Vlaardingen-Ex Libris[442] (1600-1900), Roermond-Bethlehemstraat Voogdijstraat (1850-1920)[443] (see also Fig. 7.6 and 7.7), Breda-Achter de Lange Stallen[444] (1700-1950), Zaltbommel-Wielewaal-Terrein[445] (1955), although the date falls out of the research framework, are good examples.

Farms with field plots which later developed into a linear settlement, existed just outside of

433 Huis in 't Veld 2008, 86.
434 Huis in 't Veld 2015, 24.
435 Wieringa 2018, 11.
436 Van Kampen 2016, 123.
437 Van Kampen 2016, 11.
438 Kastelein & Fermin 2017, 27.
439 Hendriks, De Kievith & Peters 2013, 82.
440 Van Renswoude & Habermehl 2014, 425.
441 Vermeulen, Mittendorff & Bartels 2007, 34.
442 Van der Mark, Franzen & Van Genabeek 2008, 30.
443 Wattenberghe & Van den Bosch 2011, 111.
444 Alma & Van Engeldorp Gastelaars 2012, 6.
445 Floore & Spanjer 2002, 20.

the town of Alkmaar at Oudorp-Lauwershof[446] (1300-1600). Groningen-Violenstraat 4[447] provides another example of an area with a rural character, which lay just outside the northern town wall and was still in use after the town expansion of the seventeenth century.

7.6.2 Outbuildings

The distinction between barns and sheds can often not be made based on the outline of the outbuilding. However, sometimes traces of permanent habitation are absent, or disappear in a later period of use and only outbuildings remain in agriculturally use, as at a site in Arnhem-Op de Beek[448] were only a haystack has been found (dating to 1250-1350). Sometimes a combination of agricultural structures hints at the possible presence of a former farmstead on a site.

Evidence of possible barns or stables have been recovered at Breda-Achter de Lange Stallen (1600-1900).[449] At a site in Venlo-Keizerstraat[450] (1300-1500) lightly built structures, such as barns and (garden) houses, matched the agricultural character of the farming quarter.

7.6.3 Dung pits

As previously mentioned (Chapters 5 and 6), dung pits are one of the most frequent indicators for the presence of animals in Dutch towns. Dung was frequently used again as a fertilizer for vegetable gardens and hotbeds. Sometimes dung pits are the only trace of locally kept animals. At a site in Leeuwarden-Harmoniekwartier, excavators identified dung pits, which they claimed had incorporated dung and straw which was being ripened for use as fertilizer.[451]

7.6.4 Subdivision

Archaeological investigations frequently recover evidence that land has been sub-divided by means of ditches, fences or walls. While a connection to urban farming activities may seem obvious in some clearly rural parts of the urban fringe, such evidence may be overlooked in other urban contexts because it is seen in terms of property management and protection, rather than practical measures to keep animals on or out of a property.

The subdivision of land itself and size of the plots can indicate rural activities. At the site Leiden-Aalmarkt[452] (1200-1300) the size of the excavated plots indicated that this part of the town had a rather agrarian character in this period.

Ditches and drainage features alone may not be clear proof of agrarian activities, but when combined with evidence from finds of dung pits, barns, or traces of tillage, the presence of urban farming practices is more readily more visible. There are several good examples of agricultural land divisions which have been found in association with other indicators of farming in Dutch historic towns. At a site in Alkmaar -Doelenstraat St. Jorisstraat[453] (1000-1200) ditches served as subdivision to subdivide the plots, but also provided drainage to improve the soil conditions and make the land more suited for use as arable land or pasture.[454] Similar examples have been excavated in Amersfoort-Utrechtsestraat 30-32 (1200-1300), where ditches and a row of fence poles divided agricultural activities just outside the town walls in the thirteenth century. [455]

7.6.5 Fences

The division of land by fencing serves to protect enclosed fields and meadows. Nevertheless, sometimes it is sometimes difficult to link a row of archaeologically excavated fencing to agrarian practices. At a site in Breda-Gasthuiscomplex[456] (1300-1400) a fence was recorded that connected to an outbuilding, possibly a barn. This fence may therefore have served as a corral.

7.6.6 Ditches, drainage and tillage

Fences, trench systems and tillage are found at a site in Amersfoort-Smallepad[457] (1200-1400) where ditches subdivided the arable land into long and narrow plots and provided drainage.

Archaeological excavations in Doetinchem at Randweg-Oost[458] (1500-1900) and Perlstein[459]

446 Médard & Vaars 2015, 77.
447 Hielkema & Van Kruining 2014, 13.
448 Van der Mark, Wemerman & Van de Venne 2009, 155.
449 Alma & Van Engeldorp Gastelaars 2012, 6.
450 Van Horssen 2013, 66.
451 Dijkstra 2015, 34.
452 Dijkstra 2011, 327.
453 Loopik 2013, 93.
454 Loopik 2013, 93.
455 Stolk 2017, 14
456 Hendriks, De Kievith & Peters 2013, 81.
457 Snieder 2006, 42.
458 Scholte Lubberink, Van der Kroft & Zielman 2016, 50.
459 Van der Linden 2007, 58.

(1500-1850) have produced evidence that arable land was worked by hand with shovels or spades, and also ploughed. The fields were drained by ditches.

7.6.7 Land use and raised layers

Expanding towns often build new quarters on land plots which have been formerly used as arable land, such as at Medemblik-Gedempt Achterom 45 (1250-1600).[460] Several sites show evidence that the soil has been improved, which over time has led to elevation. This phenomenon is present at sites in Utrecht-Stationsstraat[461] (1500-1850), where a 85 cm thick layer of garden soil, which had accumulated over a long time period, was excavated. At other sites such as at Doesburg -Gasthuisstraat 23-29[462] (1300-1400) similar layers, even enriched with dung, have been found in association with vegetable gardens.

7.6.8 Undeveloped land

There is evidence that undeveloped land was used for agrarian purposed in medieval Utrecht-Sint Jacobsstraat[463] (1200-1400). Formerly developed plots were also sometimes reclaimed for rural activities as part of ruralisation. After the demolition of houses a site in Leeuwarden-Harmoniekwartier[464] was temporarily used for farming (probably for keeping livestock) during the sixteenth century, but was built over in the early modern period.

7.6.9 Archaeozoological and archaeobotanical analysis

Archaeozoological and archaeobotanical research can add valuable information about what animals were kept or which crops were grown, but not directly linked to a specific location in or outside the town. It generates information on a broader temporal and spatial scale. The zooarchaeological analysis of animal remains from a site in Groningen-Boterdiep excavation[465] (1500-1600) showed a huge increase in pig bones over the sixteenth century, which was tentatively interpreted as an indication of local livestock farming.

Botanical analysis has frequently been used to provide evidence for arable farming and horticulture at sites. Arable land and pastures for example could be traced by pollen analysis close to the site Alkmaar-Paardenmarkt (1200-1300).[466] At Venlo-Maasboulevard deel 2 rye cultivation in the vicinity of the site could be reconstructed.[467] Through analysis of archaeobotanical remains local processing of crops can also be traced as the example at Wijk bij Duurstede-Steenstraat[468] (1200-1300) shows.

7.7 Urban farming in relation to ruralisation

There are few archaeological reports that explicitly discuss the phenomenon of ruralisation. Ruralisation is closely connected to decline and the subsequent the availability of fallow land. In many Dutch towns, periods of economic and population decline led to decay and the demolition of houses, allowing the possibility of agrarian activities, but the scale varied greatly.

In addition, it must be noted that ruralisation is a process in contrast to urban farming which is a single activity. Tracing this complex process of ruralisation by only one of the many actions involved proves difficult. Therefore, in the examples outlined here the biography of the research area as a whole is summarized (including activities associated with urban farming) to confirm ruralisation.

As a cautionary note, it can be said that it might only be possible to trace ruralisation archaeologically if work is undertaken on a large enough scale. It should also be noted that the phenomenon of ruralisation is not limited to so-called 'failed towns' but also occurred in regular sized and long-lived towns.

An early example of ruralisation may be seen in Tiel-Westluidensepoort.[469] In this example a formerly inhabited area shows less settlement debris and features from the eleventh century onwards, possibly indicating a shift to a more agricultural function. This can be connected to economic decline after the eleventh century in this former trading post.

460 Schrickx 2013, 119.
461 Stiller 2013, 28.
462 Kastelein & Fermin 2017, 31.
463 Van Wieren 2017, 19.
464 Dijkstra 2015, 105.
465 Huis in 't Veld 2015, 293.
466 Hakvoort *et al.* 2015, 257.
467 Van der Velde *et al.* 2009, 626.
468 Bouma 2012, 22.
469 Leijnse 2017, 224.

At a site in Gouda-Bolwerk[470] excavation unearthed the remains of a possible vegetable garden dating to the sixteenth century within the ruins of a former building. At a site in Alkmaar-Laat/Bloemstraat (Houtmarkt)[471] less finds and features (like cesspits) occurred from 1650, possibly as a result of population decline and the re-purposing of former houses as storage, sheds or barns. Archaeological research in Medemblik-Gedempt Achterom 45 revealed that townhouses had been demolished between c. 1675-1725 during a period of economic decline.[472] Later on the area was converted into an orchard.

Enkhuizen is one of the best and drastic examples of ruralisation. In the period between 1622 and 1850 the town declined and the population shrunk from c. 22,000 to c. 5,400 citizens (see also Chapter 2).[473] In the southern part of the town urban town houses were pulled down and farmsteads appeared around 1750 (e.g. site Enkhuizen-Zuider Boerenvaart 43).[474] At several research locations within the town farms or traces of farming have been identified, including Enkhuizen-Molenweg (1850-1950).[475]

7.8 Concluding remarks

Farmsteads within towns occur during all periods of time and in almost every type of town. The reasons why these farms existed are manifold and depend on the region (see also Chapter 8), period and socio-economic developments of the specific town. Most traces of urban farming in this study show activities on a small scale or household level. Therefore, it seems obvious that urban farming added to the level of self-sufficiency of the citizens, and from the evidence surveyed it seems clear that even highly restricted spaces within medieval and later towns were used to keep a pig or to maintain a vegetable garden.

Activities associated with urban farming can be connected with ruralisation, but in many cases it is a practice that continued small-scale throughout all periods.

470 Dijkstra, Houkes & Ostkamp 2010, 75.
471 Bitter & Van den Berg 2014, 111.
472 Schrickx 2013, 42.
473 De Vries 1987, 74-75.
474 Griffioen 2012, 7.
475 Duijn 2011, 15.

8 Urban farming: geographical and chronological distribution

H. van Londen

8.1 Introduction

This chapter focusses on regional and chronological patterns of urban farming based on the combined collected data. It serves as a prelude to the synthesis. Firstly, historical provinces – represented by the towns of this study – are compared according to the main themes of arable farming, animal husbandry, fish farming, horticulture and orchards. The label 'general urban farming' reflects data that points undeniably to urban farming – like the presence of a farmstead – but cannot be attributed to a particular theme. The purpose of this comparison is to see whether regional similarities or differences occur and what the general patterns are. Secondly, all of the main categories of activities are put into chronological order, thereby allowing the development of urban farming to be traced over time. Of course, the data has its weaknesses, especially when it comes to statistical representation. Too much may be demanded of such a limited database. The patterns revealed are perhaps therefore to be best interpreted as hypotheses, rather than as hard evidence.

The temporal framework – with all its weaknesses – is compared with population density numbers of selected towns, relying on the work of Van Oosten.[476] In the discussions regarding urban farming, a correlation is assumed between the scale of urban farming activities on the one hand and population density dynamics on the other. The underlying assumption is that open spaces within the town walls facilitated urban farming activities, which resonates with the concept of ruralisation (Chapter 2). The aim therefore is not only to find numbers on urban populations or town sizes, but to combine these variables to understand the lack, or abundance, of space over time within the walls, checking whether such a correlation can be substantiated.

The very promising initial outcomes from this comparison gave a reason to dig in deeper and to look for spatial correlates, especially in relation to urban functions. To achieve this the maps of Jacob van Deventer (1575) were used because the typography of his maps was consistent and on a trustworthy scale.[477] Through the maps of Jacob van Deventer, the percentage of build-up spaces versus open spaces has been calculated. The built environment consists, for instance, of housing blocks, squares, castles, and greens. Open spaces are represented as gardens, orchards, cemeteries and parks. The ratio between open and built-up space has been calculated through a GIS analysis. The analysis represents only one time slice, that of the sixteenth century, before the urbanisation peak of c. 1670 in Holland, also before the decline of the inland towns.[478] This analysis therefore gives an insight into the open spaces that were theoretically available for urban farming in a period known for its (relative) prosperity and moderate population density.[479]

This chapter concludes with the spatial distribution of urban farming indicators in selected towns per province, using the Van Deventer maps as background. The distribution will be interpreted in relation to the typography of the maps and the overall framework that has evolved through this study, with some additional information from secondary sources.

8.2 Regional and chronological overviews

8.2.1 Historical provinces

To gain a regional overview, the data of selected towns that has been assembled by this study has been sorted by historical provinces. As described in Chapter 3, urban farming indicators were assessed through keywords and the relevant information was then entered into a database. Table 8.1 shows the representation of data per historical provinces based on the total scores of towns, meaning the sum of best quantitative and qualitative data (Fig. 8.1; see App. 4 for the detailed list).[480] Holland is best represented, followed by Guelders. Friese Landen, Limburg and Zeeland are least represented. For future comparison more data is needed, especially from these areas. Added to the list are small feudal estates (Dutch: *heerlijkheden*) such as the towns of Buren and Culemborg, located close to Tiel. These towns were founded by lords living in castles close by and are highlighted here because of their different urban farming profiles. The influence of manorial estates may be a subject that is worth pursuing in future research into urban farming.

476 Van Oosten 2014.
477 Kosian, Van Lanen & Weerts 2016.
478 Paping 2014, 1.
479 Abrahamse & Rutte 2014, 187.
480 Rutte & IJsselstijn 2014, 174.

Fig. 8.1 Historical provinces c. 1350 after Rutte & IJsselstijn 2014, 174. Note the small manorial area (grey) south of Sticht Utrecht (Nedersticht), where Culemborg and Buren are located.

Table 8.1 Themes per province. Percentages reflect the best combined quantitative and qualitative data. Holland is best represented, followed by Guelders and Sticht Utrecht (Nedersticht). Friese Landen, Limburg and Zeeland are least represented.

Province	Themes					
	arable farming (%)	general urban farming (%)	orchards (%)	horticulture (%)	animal husbandry (%)	fish farming (%)
Brabant	10.6	4.6	0.6	9.7	5.9	0.0
Friese Landen	0.0	0.4	2.2	0.7	0.5	0.0
Guelders	25.3	19.7	9.1	16.1	12.8	31.2
Holland	37.0	52.6	43.0	37.2	56.7	8.6
Limburg	0.6	2.0	10.9	2.4	0.7	25.4
Other seigniories (manorial towns)	0.4	0.2	0.5	0.6	1.5	0.0
Sticht Utrecht (Nedersticht)	17.2	8.8	10.3	13.6	8.2	0.0
Sticht Utrecht (Oversticht)	5.9	4.3	12.5	10.4	8.2	34.8
Zeeland	3.0	7.4	10.8	9.4	5.5	0.0
Total	**100**	**100**	**100**	**100**	**100**	**100**

8.2.2 Regional distribution

The range of urban farming themes have been charted per historical province, based on the ranking of best possible data (Fig. 8.2 a-i and Table 8.2). The outcomes show the spread of activities for each province regardless of chronology as the data will not allow for such detail. As may be expected, animal husbandry and horticulture form the majority of all urban farming activities everywhere. Holland deviates from this ratio with a very substantial part of animal husbandry (42%) and relatively low share of horticulture (19%), compared to the other provinces. These numbers for animal husbandry are topped by the manorial towns'

Table 8.2 Urban farming ranges per province. Animal husbandry and horticulture are the dominant themes of urban farming in all provinces.

Province	Themes						Total (%)
	arable farming (%)	general urban farming (%)	orchards (%)	horticulture (%)	animal husbandry (%)	fish farming (%)	
Brabant	19.9	14.5	0.3	34.9	30.3	0.0	**100**
Friese Landen	0.0	16.3	16.3	32.6	34.8	0.0	**100**
Guelders	19.7	25.7	2.2	24.0	27.2	1.2	**100**
Holland	10.1	24.1	3.7	19.5	42.4	0.1	**100**
Limburg	4.2	22.5	22.6	30.3	12.3	8.1	**100**
Other Seigniories (manorial towns)	6.5	6.5	2.8	17.6	66.8	0.0	**100**
Sticht Utrecht (Nedersticht)	20.5	17.7	3.8	31.2	26.7	0.0	**100**
Sticht Utrecht (Oversticht)	9.7	11.7	6.4	32.8	36.6	2.8	**100**
Zeeland	5.8	24.0	6.5	34.6	29.1	0.0	**100**

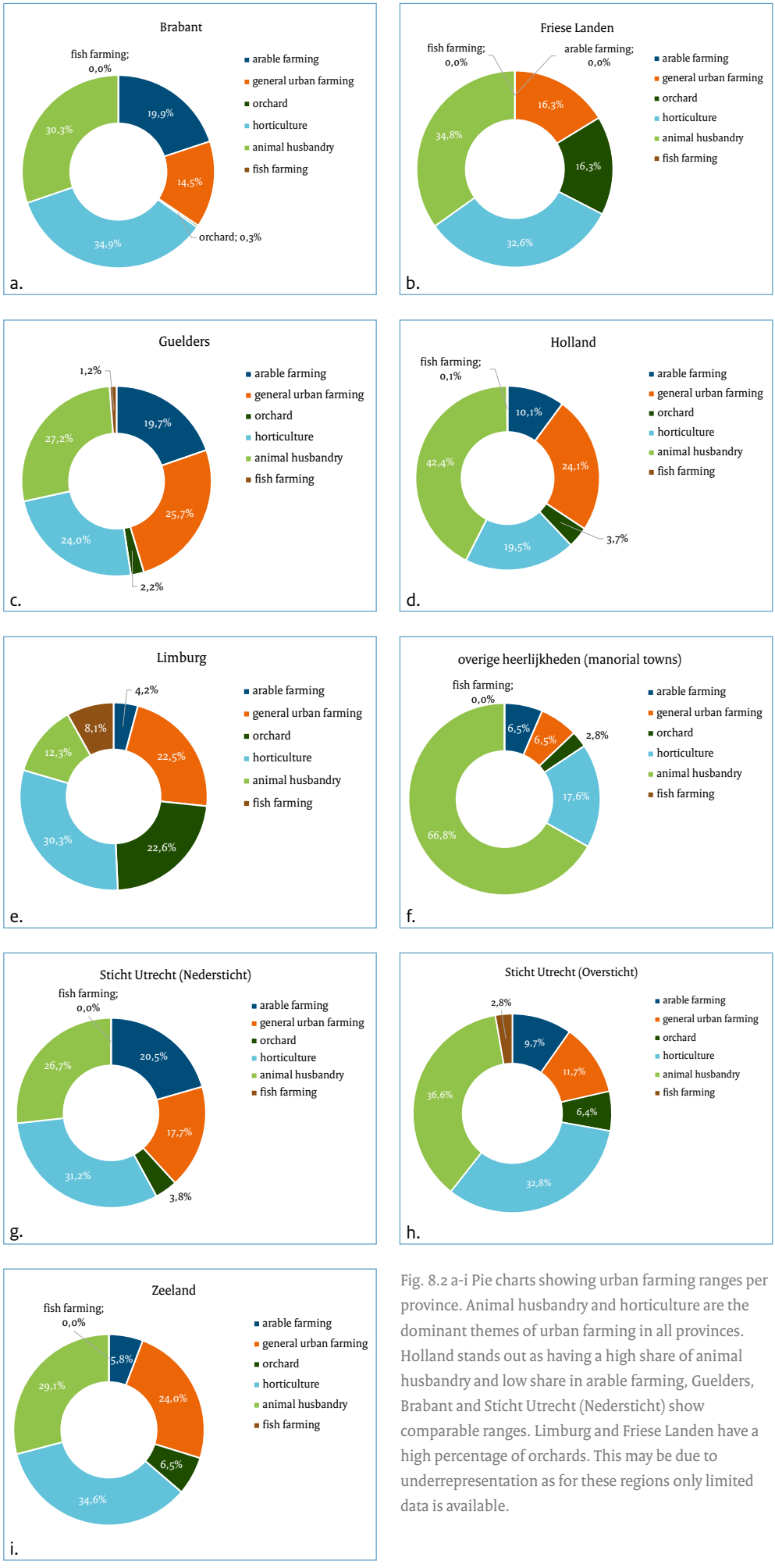


Fig. 8.2 a-i Pie charts showing urban farming ranges per province. Animal husbandry and horticulture are the dominant themes of urban farming in all provinces. Holland stands out as having a high share of animal husbandry and low share in arable farming, Guelders, Brabant and Sticht Utrecht (Nedersticht) show comparable ranges. Limburg and Friese Landen have a high percentage of orchards. This may be due to underrepresentation as for these regions only limited data is available.

category (Fig. 8.2f) respectively 66% and 17% for horticulture. Orchards are best represented in Friese Landen (Fig. 8.2b) and Limburg (Fig. 8.2e), although in absolute terms the evidence from these regions is relatively slight. Arable farming forms about 20% of the spectrum in Brabant (Fig. 8.2a), Guelders (Fig. 8.2c) and Sticht Utrecht (Nedersticht) (Fig. 8.2g). Again, Holland (Fig. 8.2d) deviates with c. 10% share of arable farming as do Limburg (Fig. 8.2e), Sticht Utrecht (Oversticht) (Fig. 8.2h) and Zeeland (Fig. 8.2i). There was regional variety in the range of urban farming that was practised. In Holland the emphasis lay on animal husbandry, while Guelders had a more equal division.

8.2.3 Chronological patterns

Here, urban farming indicators are grouped together over time regardless of place (Fig. 8.3a and 8.3b). The graphs show multiple peaks that can be assigned to the development of towns up to 1450 and the period of de-urbanisation between 1650 and 1850. It can be seen that horticulture and orchards stand out in particular, as well as animal husbandry. The sixteenth century is least represented in the archaeological indicators that were gathered by this study. The graph suggests that more food was imported from outside the town walls during this period. The countryside during this period was thriving. Arable farming and animal husbandry are at their peak before the sixteenth century, while orchards and horticulture seem to develop in towns in more recent periods. Arable farming seems to have diminished in early modern towns while the level of animal husbandry that was practised remained constant.

Indicators for horticulture, animal husbandry and orchards show a peak in the period 1700-1850. Arable farming and animal husbandry are at their peak during the early growth of towns,

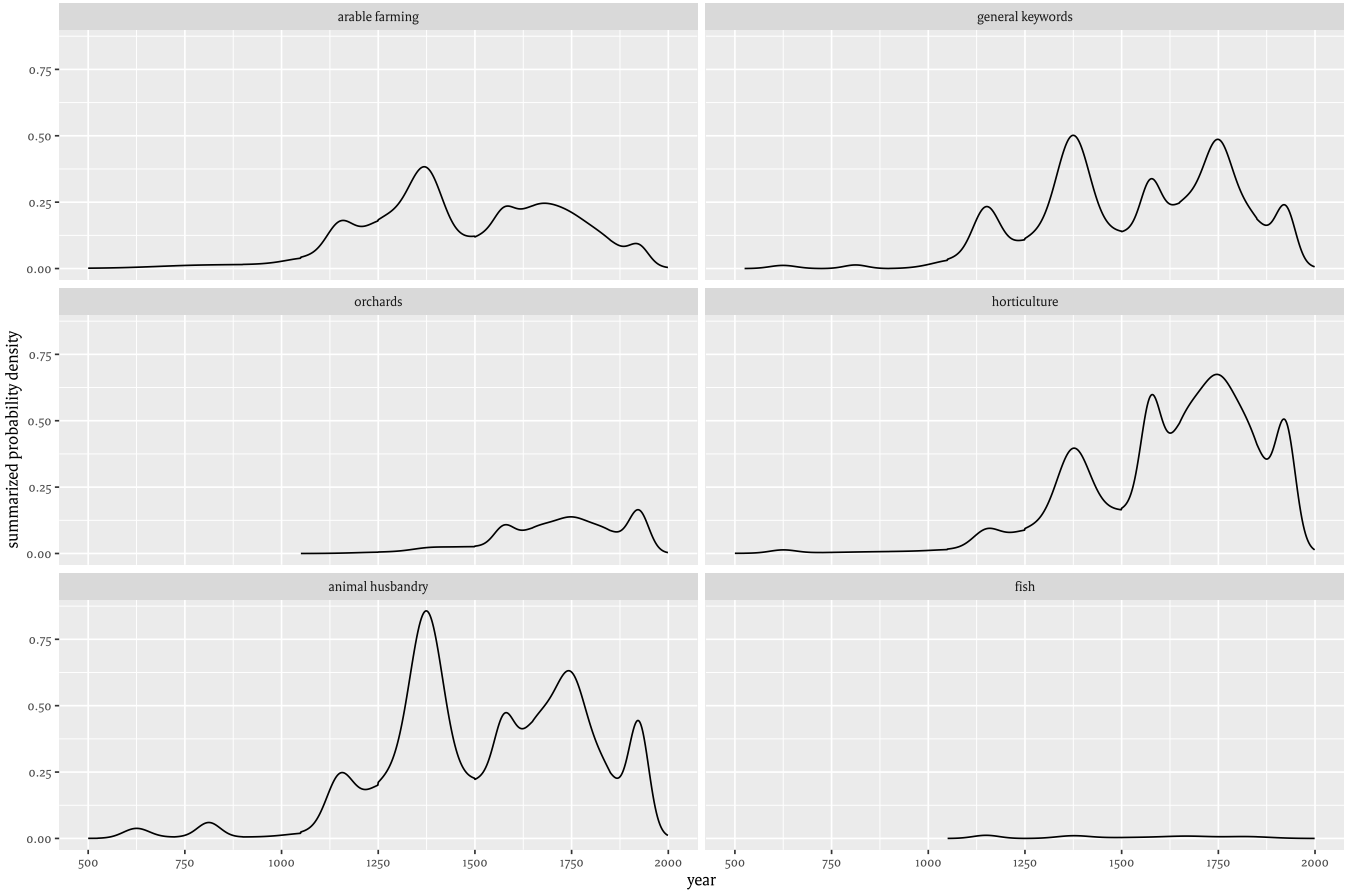


Fig. 8.3a Summarized density plots of dated urban farming keywords found in this study.

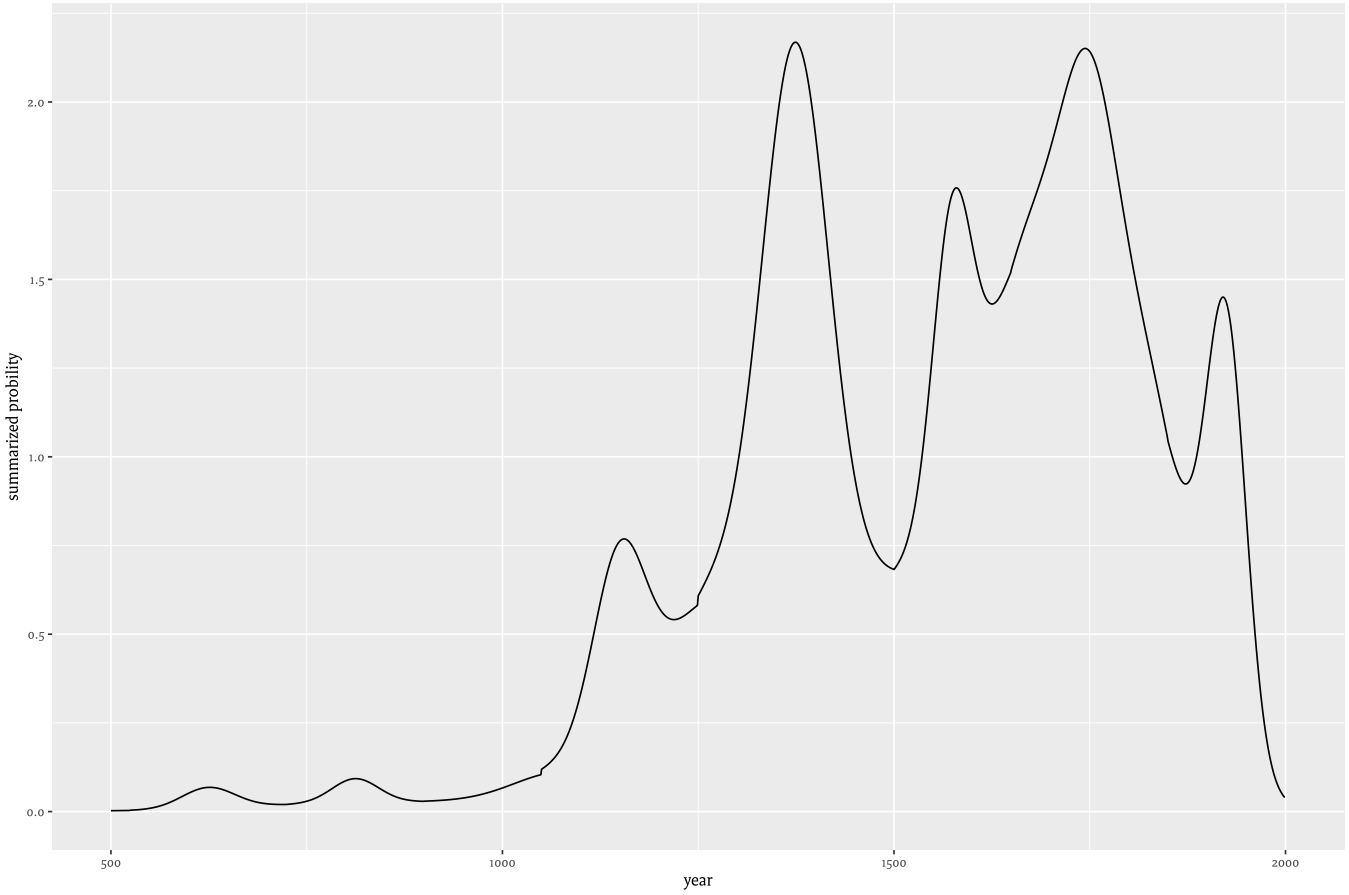


Fig. 8.3b Urban farming indicators from this study combined (with the help of Ronald Visser). The graph shows a peak during urbanisation growth (thirteenth and fourteenth century) as well as decline (late seventeenth until late nineteenth century). A 'dip' is noticed at the end of the fifteenth century and beginning of the sixteenth. Here, urban farming indicators are at their lowest, pointing to an increased food supply from out of town.

while orchards and horticulture seem to develop in later phases. The keeping of animals in towns stayed the same.

8.3 Urban density

8.3.1 Urban population, town size and density

The urban demography of the Northern Netherlands between 1400 and 1850 has been studied for some time.[481] From c. 1400 onwards, accurate estimates of population size are thought to be possible (Fig. 8.4 and Fig. 8.5). According to Paping, at that early time, more people lived in towns inland (c. 34%), compared to the coastal area (approx. 30%). However, soon after, proportions turned around completely. Throughout the historical period differences can be seen between coastal and inland towns. In general, the population grew fairly constantly from 1400 (750,000/800,000) to approx. 1660 with only one clear stagnation phase at the end of the fifteenth century. A rapid urbanisation of the coastal area is evident between 1580-1670. Paping argues that the population in the 'Golden Age' has so far been slightly overestimated, seemingly causing sharp fluctuations in population in the eighteenth century. He points to a slow de-urbanisation process in the inland areas from the sixteenth century onwards. In the coastal area, this process occurred far more swiftly between 1700 to 1850 (Fig. 8.6). Hence, while in 1700 c. 46% of

[481] Lourens & Lucassen 1997; see Paping 2014 for an overview.

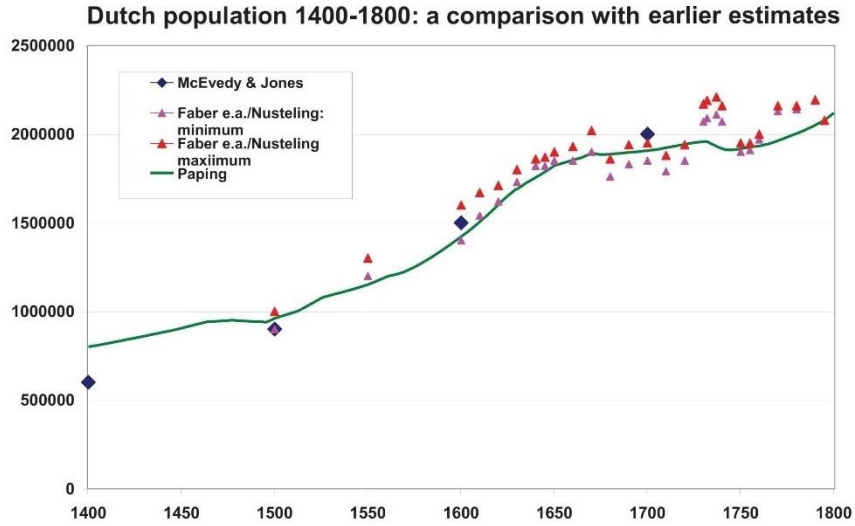


Fig. 8.4 Dutch overall (towns and countryside) population development 1400-1800 (after Paping 2014, 9).

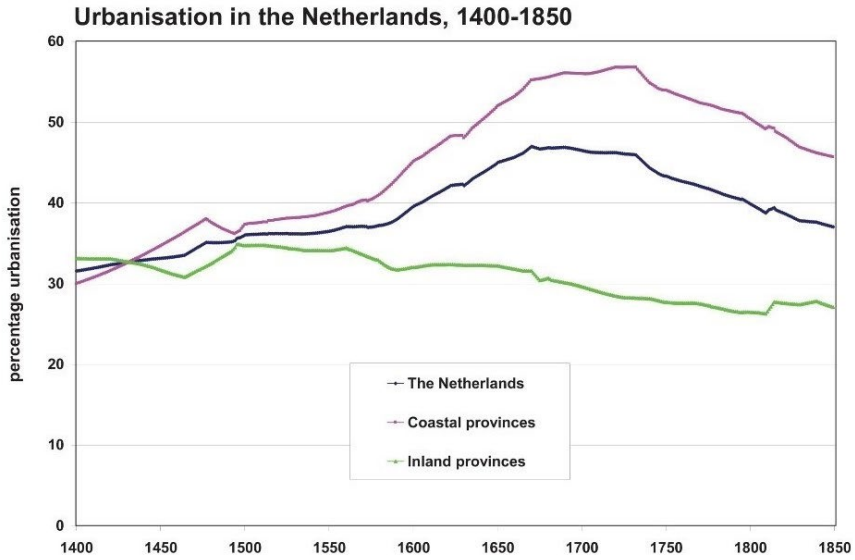


Fig. 8.5 Dutch urban population development 1400-1850 (after Paping 2014, 12).

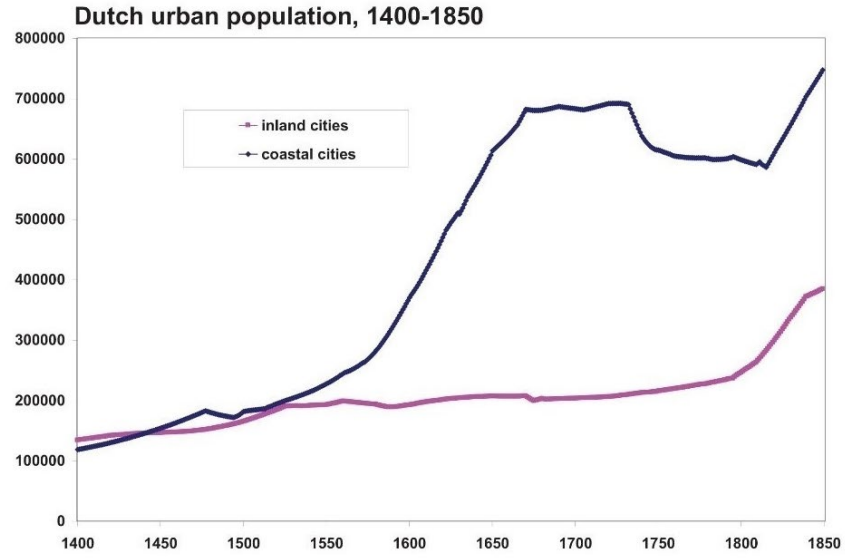


Fig. 8.6 Dutch coastal and inland urban population development 1400-1850 (after Paping 2014, 15).

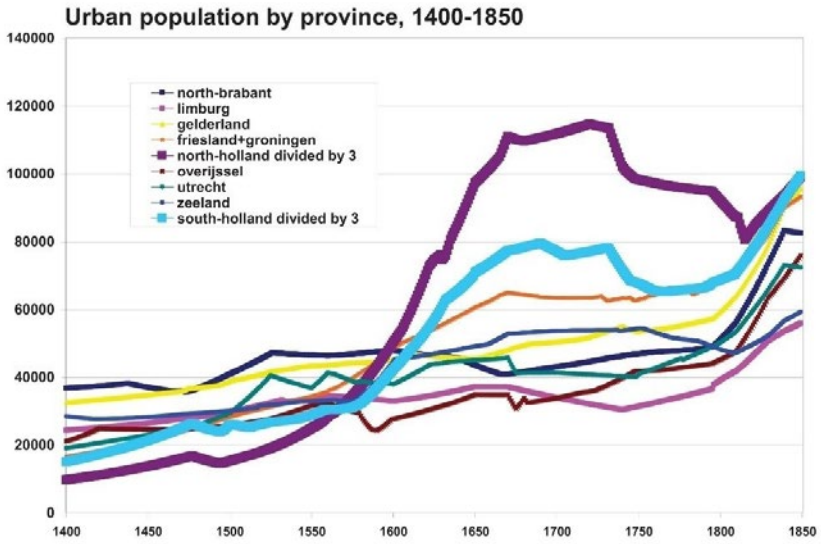


Fig. 8.7 Urban population development by province 1400-1850 (after Paping 2014, 15).

the population lived in towns, in 1850 this percentage had decreased to 37%. In the eighteenth century, there was a period of population stagnation when some people moved to the countryside, especially in the province of Holland. Paping points to strong regional differences (Fig. 8.7). This transition was accompanied by the shift in economy from industry and services to agriculture in the early nineteenth century.[482]

In general, the size of towns increased over time, following urban spatial development at an individual level. Urban development has recently been described in the study of artisanal production in Dutch towns, also in relation to economy and trade networks.[483] Most towns expanded a few times between 1200 and 1700 (Table 8.3).[484] Van Oosten conducted a detailed study of seven towns offering an overview of town scales, population and density numbers

Table 8.3 Urban areas within towns walls of 20 towns and population size (after Rutte & IJsselstijn 2014, 176-177; Abrahamse & Rutte 2014, 192-193).

Towns	Size (ha) in years				Population	
	1200	1350	1500	1700	population 1400	population 1700
Utrecht	122.7	133.1	133.1	144.2	13,000	30,000
Maastricht	55.9	55.9	123.6	123.6	7,000	18,000
Groningen	54	54	92	140.4	5,000	20,000
Deventer	26.7	35	38.8	38.8	4,500	6,700
Leiden	21.9	65.4	94.4	144.2	5,000	67,000
Nijmegen	21.8	35.9	52.6	52.6	10,800	9,000
Dordrecht	18.7	18.7	57.1	66.8	7,500	20,000
Haarlem	15.6	44	98.1	132.6	7,500	38,000
Arnhem	14	37.5	37.5	37.5	2,200	6,500
Zwolle	9.3	23	47.8	82.6	3,500	10,900
Den Bosch	9.1	92.1	98.9	108.4	14,500	10,000
Breda	9	25.3	40.3	85.1	4,800	8,000
Alkmaar	8.4	27.3	38.9	56.5	3,800	13,650
Leeuwarden	7.5	24.6	49.6	57.2	3,000	15,500

482 Paping 2014, 15
483 Blonk-van den Bercken *et al.* 2020, 11-16.
484 Rutte & IJsselstijn 2014, 176-177; Abrahamse & Rutte 2014, 192-193.

Table 8.3 Urban areas within towns walls of 20 towns and population size (after Rutte & IJsselstijn 2014, 176-177; Abrahamse & Rutte 2014, 192-193) (continued).

Towns	Size (ha) in years				Population	
	1200	1350	1500	1700	population 1400	population 1700
Delft	5.3	39.4	91.5	91.5	6,500	25,000
Amersfoort	5	31.5	68.5	69.8	3,000	9,000
Venlo	3.6	9.4	21.2	21.2	3,200	6,000
Amsterdam	-	37	88.4	469.9	4,400	219,000
Rotterdam	-	13.1	57.4	119.6	2,500	45,000
Den Haag	-	12.3	53.5	180.8	1,300	20,000

Table 8.4 Detailed account of surface, population size and population density of seven towns (after Van Oosten 2014, App. 4, 303-309).

	Period	Haarlem			Leiden			Alkmaar			Dordrecht		
		ha.	population	population/ha.	ha.	population	population/ha.	ha.	population	population/ha.	ha.	population	population/ha.
13a	1200-1225	-	-	-	-	-	-	-	-	-	-	-	-
13b	1225-1250	-	-	-	-	-	-	-	-	-	-	-	-
13c	1250-1275	32	-	-	21	1,250	60	-	-	-	16	2,800	175
13d	1275-1300	32	-	-	21	1,575	75	-	-	-	16	3,846	240
14a	1300-1325	32	-	-	21	1,900	90	-	-	-	16	5,940	371
14b	1325-1350	38	-	-	29	2,950	102	-	-	-	16	6,733	421
14c	1350-1375	52	-	-	68	4,000	59	-	-	-	56	7,526	134
14d	1375-1400	52	7,500	144	97	5,250	54	37	3,800	103	56	8,320	149
15a	1400-1425	86	8,789	102	97	5,625	58	37	4,063	110	56	8,977	160
15b	1425-1450	86	10,078	117	97	6,000	62	37	4,326	117	59	9,633	163
15c	1450-1475	86	11,367	132	97	13,000	134	37	4,589	124	59	10,290	174
15d	1475-1500	86	10,917	127	97	13,125	135	37	4,850	131	59	10,463	177
16a	1500-1525	86	12,213	142	97	12,902	133	37	7,099	192	59	10,637	180
16b	1525-1550	86	14,107	164	97	12,456	128	44	7,270	165	59	10,810	183
16c	1550-1575	86	16,000	186	97	12,000	124	44	7,965	181	62	11,830	191
16d	1575-1600	86	30,000	349	97	24,000	247	59	10,000	169	63	15,694	249
17a	1600-1625	86	39,455	459	135	47,000	348	59	12,417	210	65	18,957	292
17b	1625-1650	86	34,900	406	135	52,000	385	59	13,200	224	65	20,579	317
17c	1650-1675	86	38,000	442	144	62,000	431	59	14,000	237	66	19,077	289
17d	1675-1700	86	33,000	384	175	56,500	323	59	13,000	220	66	20,145	305
18a	1700-1725	142	29,000	204	175	47,000	269	59	12,750	216	66	20,291	307
18b	1725-1750	142	25,000	176	175	37,000	211	59	12,500	212	66	18,343	278
18c	1750-1775	142	22,000	155	175	34,000	194	59	7,865	133	66	15,182	230
18d	1775-1800	142	21,000	148	175	31,000	177	59	8,373	142	66	17,092	259
19a	1800-1825	142	22,306	157	175	29,000	166	59	9,104	154	66	19,187	291
19b	1825-1850	142	24,012	169	175	37,464	214	59	9,835	167	66	20,624	312
19c	1850-1875	142	30,530	215	175	38,943	223	59	11,344	192	66	23,853	361

Table 8.4 Detailed account of surface, population size and population density of seven towns (after Van Oosten 2014, App. 4, 303-309) (continued).

	Period	Den Bosch			Deventer			Amersfoort		
		ha.	population	population/ha.	ha.	population	population/ha.	ha.	population	population/ha.
13a	1200-1225	9,5	-	-	-	-	-	5	380	76
13b	1225-1250	9,5	-	-	-	-	-	5	485	99
13c	1250-1275	9,5	-	-	-	-	-	5	610	122
13d	1275-1300	103	-	-	-	-	-	5	725	145
14a	1300-1325	103	-	-	-	-	-	18	840	47
14b	1325-1350	103	-	-	-	-	-	18	1,320	73
14c	1350-1375	103	14,526	141	36	3,200	89	18	1,800	100
14d	1375-1400	116	14,526	125	36	4,000	111	64	2,300	36
15a	1400-1425	116	13,750	119	36	4,007	111	64	2,800	44
15b	1425-1450	116	12,973	112	36	4,500	125	64	3,300	52
15c	1450-1475	116	10,507	91	36	5,000	139	64	3,617	57
15d	1475-1500	116	15,495	134	36	5,687	158	64	3,933	61
16a	1500-1525	116	16,704	144	36	6,374	177	64	4,250	66
16b	1525-1550	116	19,220	166	36	7,060	196	64	4,800	75
16c	1550-1575	116	17,120	148	36	7,747	215	64	5,050	79
16d	1575-1600	116	15,970	138	52	3,600	69	64	5,500	86
17a	1600-1625	116	15,550	134	52	6,122	118	64	8,000	125
17b	1625-1650	116	13,400	116	52	7,748	149	64	7,050	110
17c	1650-1675	116	16,190	140	52	6,978	134	64	6,410	100
17d	1675-1700	116	11,333	98	73	6,700	92	64	7,000	109
18a	1700-1725	116	10,118	87	73	7,259	99	64	7,625	119
18b	1725-1750	116	12,547	108	73	7,818	107	64	8,250	129
18c	1750-1775	116	12,694	109	73	7,933	109	64	7,550	118
18d	1775-1800	116	12,841	111	73	8,047	110	64	8,000	125
19a	1800-1825	116	17,401	150	73	11,213	154	64	8,584	134
19b	1825-1850	116	21,961	189	73	14,379	197	64	12,889	201
19c	1850-1875	116	24,315	210	73	17,815	244	64	13,230	207

per quarter century (Table 8.4; Fig. 8.7, 8.8, 8.9). For Haarlem, Alkmaar, Leiden, Dordrecht, 's-Hertogenbosch, Deventer and Amersfoort, she calculated population density over time (Fig. 8.10). Of these, Haarlem and Leiden show the greatest decline of population density in the period after 1675-1700. These towns faced de-population shortly after expanding their town walls. The situation in Amersfoort is entirely different, with evidence for a more or less steady development. In the early urbanisation phases, Amersfoort shows a bumpy development. Dordrecht also struggled with population pressure in these years. The density in 's-Hertogenbosch shows a gradual decline from 1500-1525 onwards, until the early nineteenth century. Deventer started to decline shortly after 1550-1575 until 1600-1625 as a result of the Black Death. As was stated by Paping, de-urbanisation was strongest in the coastal areas.

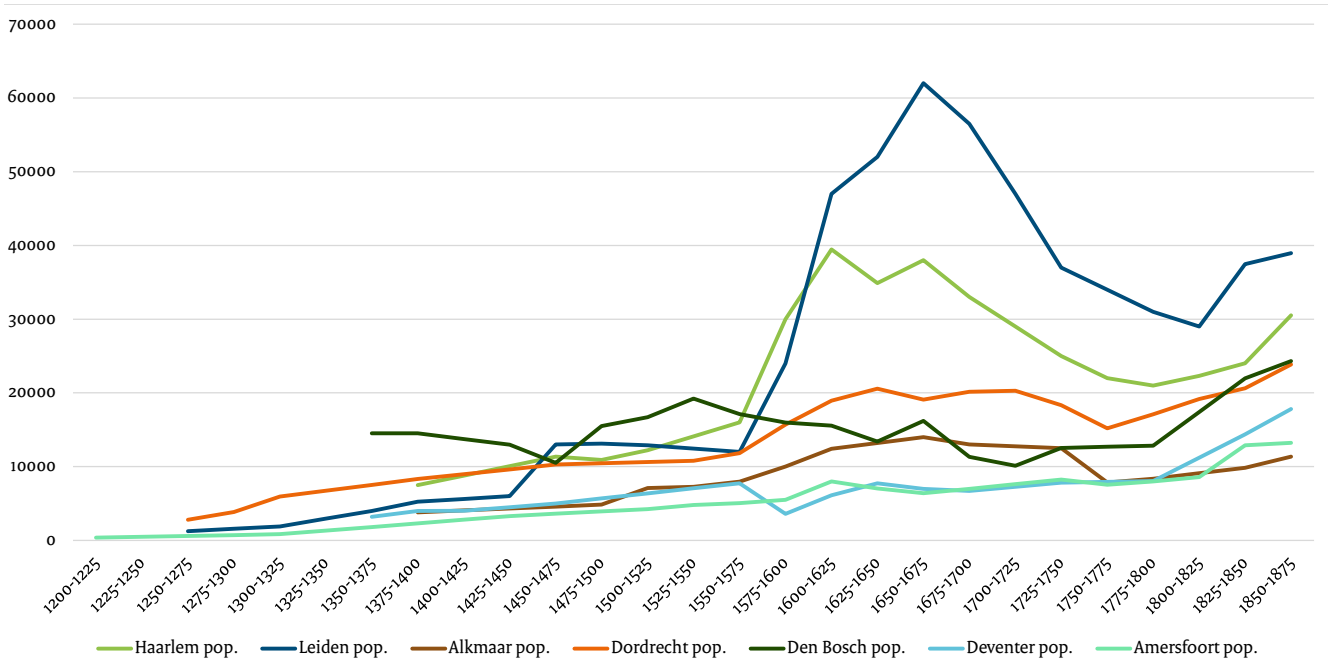


Fig. 8.8 Population size development in seven towns (after Van Oosten 2014, App. 4, 303-309).

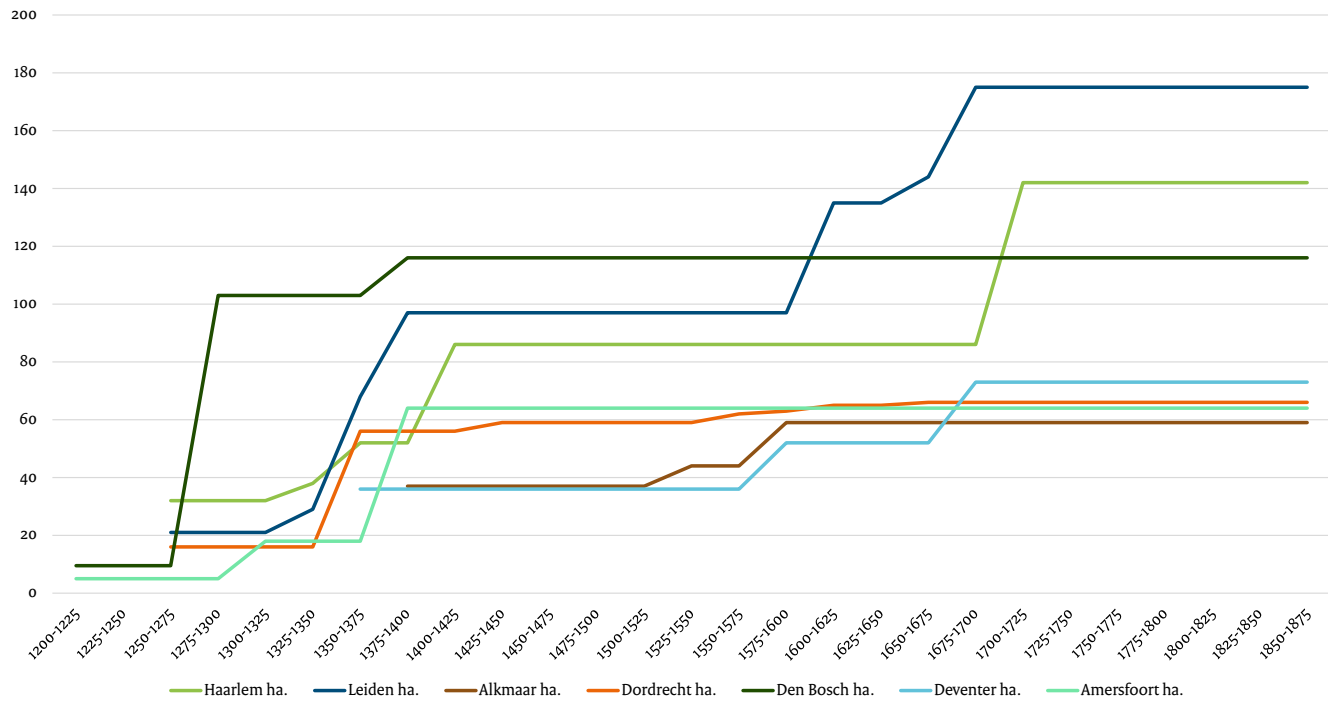


Fig. 8.9 Town size development of seven towns (after Van Oosten 2014, App. 4, 303-309).

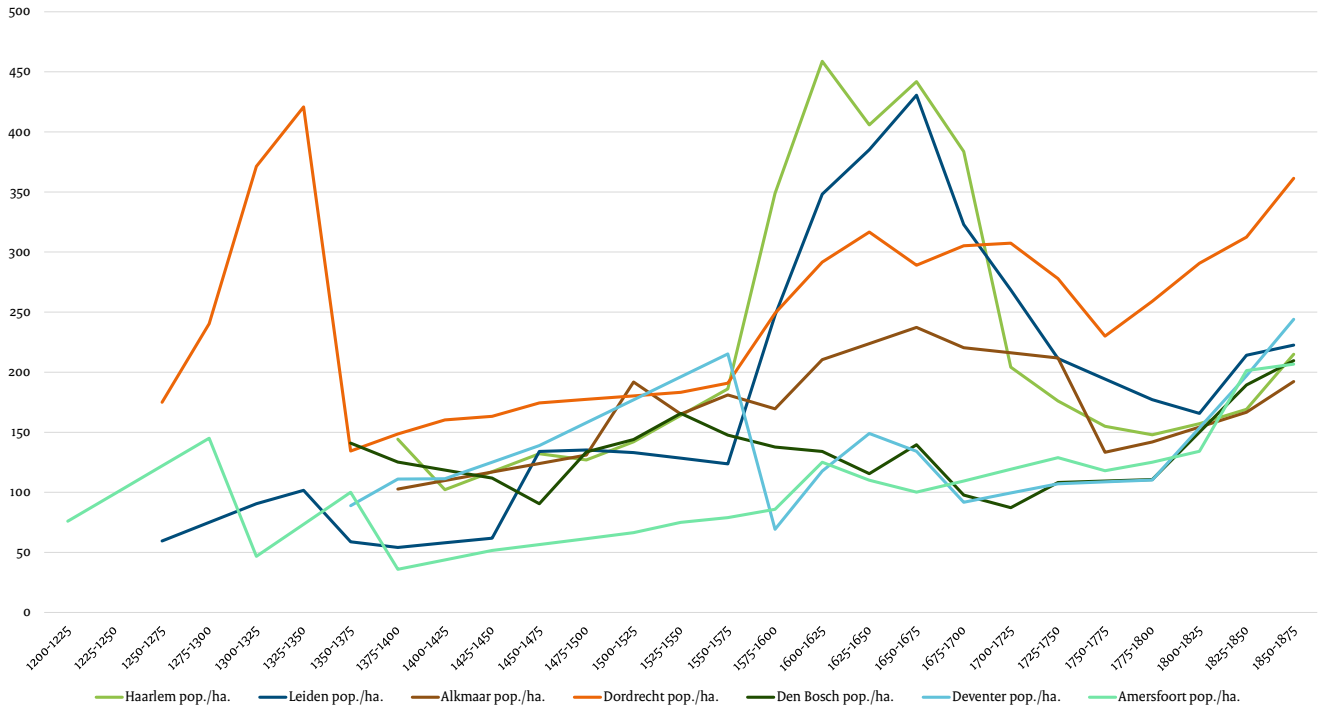


Fig. 8.10 Population density of seven towns (after Van Oosten 2014, App. 4, 303-309).

8.3.2 Density and urban farming indicators

When the chronological distribution of the data from this study is combined with the development of population density, a convincing correlation may be seen (Fig. 8.11). This analysis clearly shows that urban farming increased during de-urbanisation in the eighteenth century. In relation to the population expansion and less open spaces in towns in the seventeenth century, a decrease of urban farming was expected. However, the collected evidence seems to point, on the contrary, to a rise in urban farming as more people moved to live in towns. This means that more factors are relevant to urban farming, and its practice is not only related to population density and the availability of space within town walls. It has been suggested by Sanger that urban farming may be related to an increase in poverty during the rapid growth of the urban population in Holland in the seventeenth century, as agricultural products offered a basis for bartering goods.[485]

8.4 Built-up and open urban areas

Twenty towns have been selected to calculate the ratio between built-up and green (open) areas (Table 8.5). Both successful towns and so-called failed towns (see Chapter 2) were selected.

Table 8.5 Twenty towns selected for the surface analysis of the Van Deventer maps, calculating the ratio between built-up and open space (* so-called failed towns).

Province	Town
Brabant	Bergen op Zoom
Brabant	Den Bosch
Guelders	Bredevoort*
Guelders	Zutphen
Guelders	Tiel
Holland	Enkhuizen
Holland	Hoorn
Holland	Dordrecht
Holland	Alkmaar
Holland	Gouda
Holland	Amsterdam
Nedersticht	Utrecht
Nedersticht	Vianen *
Nedersticht	IJsselstein *
Nedersticht	Montfoort *
Nedersticht	Oudewater *
Oversticht	Groningen
Oversticht	Deventer
Oversticht	Zwolle
Zeeland	Sluis *

The cartographer, Jacob van Deventer, mapped 118 Dutch towns from 1545 until his death in 1575. He was commissioned by Philip II

485 Sangers 1952, 40.

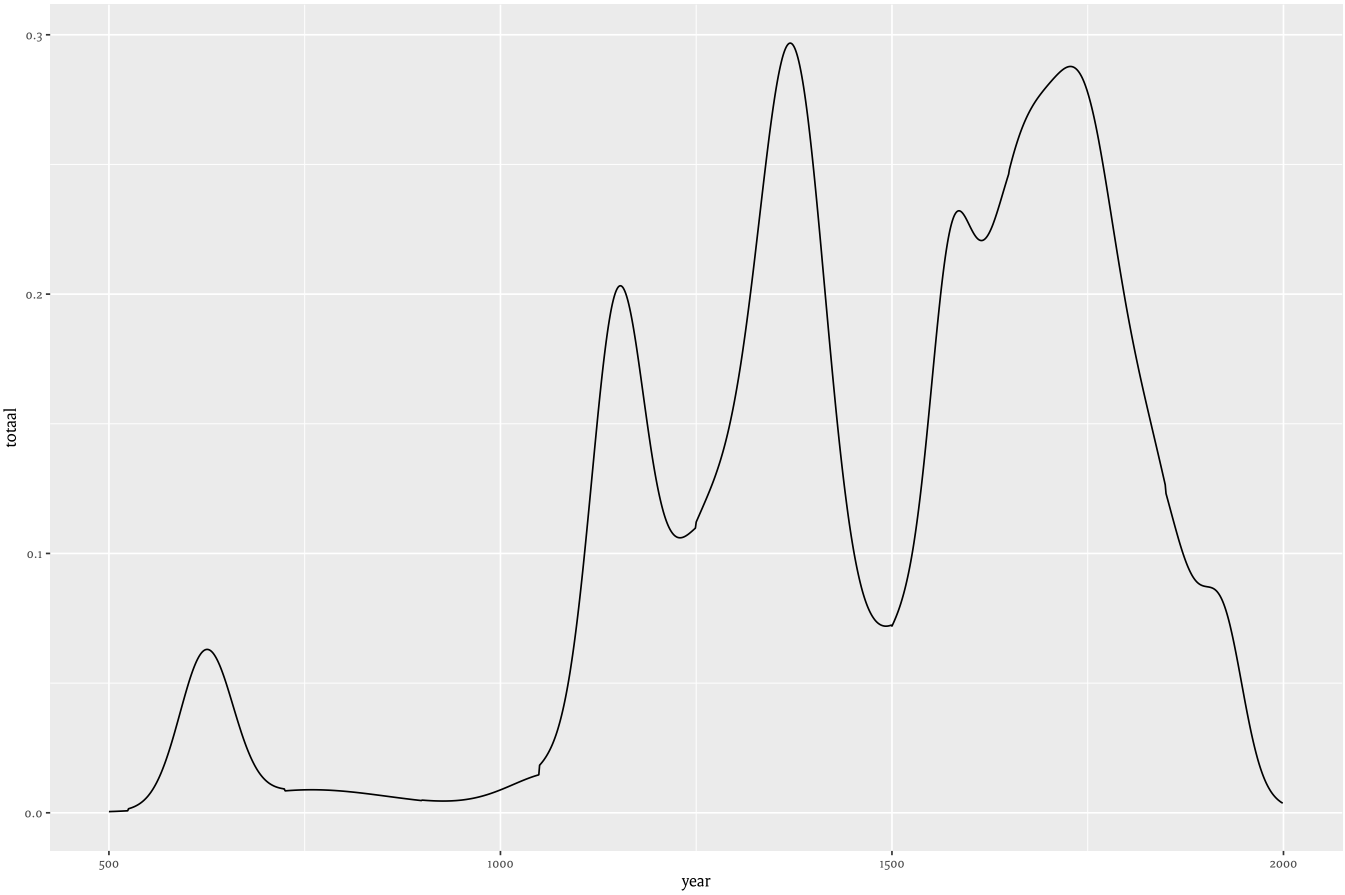


Fig. 8.11 Urban farming chronology from this study for the seven towns (with the help of Ronald Visser). Indicators for horticulture, animal husbandry and orchards show a peak in the period of early growth and decline 1700-1850.

Table 8.6 Mapped urban functions, legend used by J. van Deventer (after Kosian *et al.* 2016, 15).

Surface information on Van Deventer maps	
Built-up area	indicated as continuous built-up area
Castle	indicated as built-up part of castle grounds
Town walls	gates, towers, bastions, etc., all objects belonging to the city defences
Water gate	indicated gate or tower in the city defense where water follows its course
Wall or bulwork	indicated wall or bulwark that does not form part of city defense
Embankment	embankment with reinforced passage at Deventer Landweer
Square	city infrastructure or courtyard
Garden	designated as green and open area within building block
Park	designated as green areas instead of building blocks
Cemetery	designated as green areas around church or chapel
Bleach field	area for textile industry; designated by text or symbol
Quay	indicated as a area along the water without measuring points
Tree poles	barriers in the water as part of the cities defence system, row of poles
Dike	dark green line along the water, often marked as a road
Forest or row of trees	dark green areas outside of the town
Fenlands	blue-green areas indicating swamo or flood area close to brook or river
Dunes	marked as hills along the sea
Salt marshes	marked as shallow area (colour other than surrounding water or dotted line)
Water	indicated in blue

of Spain.[486] The Van Deventer maps are drawn using a trustworthy scale (1:8,000) and with consistent signatures and legend. The urban functions that were mapped include built-up areas, cemeteries, open squares, gardens, orchards and woodlands (Table 8.6). The maps have been made digitally available, in relation to the topographical map of the Netherlands.[487]

The surface of each category was measured by means of GIS. The outcomes are indicative rather than absolute, given the character of the source. However, it can be argued that on average, in the period 1545 to 1575 towns had 70 to 75% of their

[486] Vannieuwenhuyze 2012; Kosian *et al.* 2016; Rutte & Vannieuwenhuyze 2018.
[487] Kosian *et al.* 2016.

Fig. 8.12 Roermond by Van Geelkercken (1654). The fields are used as commons.

area built-up. Zutphen (59.4%), Zwolle (58.3%) and Bergen op Zoom (46.1%) have less housing, Groningen (81.4%), Amsterdam (82.4%) and Oudewater (83.7%) are the most densely built in this period. The less successful towns such as Sluis (29.5%), Vianen (40.7%) and Bredevoort (8%) had not even filled 50% of their urban areas.

Urban farming within the town walls is expected to have taken place in gardens (and orchards). These were often urban commons, as can be seen in a depiction of Roermond in 1654 by Van Geelkercken (Fig. 8.12). On average, gardens make up about 15 to 16% of a (successful) town plan. Dordrecht, Alkmaar, Utrecht and Tiel have more surface, approximately 24% of the urban area, designated as garden (Table 8.7). The less successful towns do not have larger garden areas, but instead have large parks. This may be explained by their relation to nearby castles and their founding history.

This analysis shows that, just before the great population expansion of the seventeenth century in Holland and the gradual decline of the inland regions (see Table 8.3; Table 8.4), a substantial part (15%) of the town area within the walls – so therefore separate from the urban fringe – would have been available for urban farming activities if people were so inclined. Some households certainly took advantage of this potential, however, according to the archaeological data it is exactly in this period that more food is imported into towns from outside. Explanations may be found in the prosperous economy of rural areas at the time.

8.5 Spatial distribution of archaeological indicators

8.5.1 Selected towns

20 towns best represented in the database in combination with an even geographical distribution were selected for spatial analysis (Table 8.8; Fig. 8.1). Below, these towns are grouped by their historical province. This allows comparisons to be made within and between historical provinces, searching for parameters that may be relevant for tracing urban farming patterns. Unfortunately, the large variations in the amount of data that is available from different towns hampers the analysis and comparison between towns and regions. Data on the regions Limburg and Friesland are very limited and do not allow comparison. Data is dependent on modern day spatial development in town centres, local research agendas and which urban activities were historically present and have been recognised by archaeological

Table 8.7 Twenty selected towns. Ratio built-up and green area according to the legend used by Van Deventer (with the help of Jitte Waagen, University of Amsterdam). Towns in Holland show the highest built-up area.

			Built-up area							Green area					
Province	Town	Size (ha. in 1575)	town walls (%)	built-up (%)	castle (%)	square (%)	quay (%)	embankment (%)	total (%)	garden (%)	park (%)	trees/forests (%)	cemetery (%)	ramen (%)	total (%)
Brabant	Den Bosch	81.5	4.3	74.4	-	-	-	-	78.7	18.9	-	-	2.4	-	21.3
Gelre	Bredevoort	38.7	1.0	5.6	1.4	-	-	-	8.0	2.0	-	90.0	-	-	92,0
Gelre	Zutphen	36.4	5.3	54.0	-	0.1	-	-	59.4	9.1	27.8	-	3.6	-	40.56
Holland	Enkhuizen	21.9	4.9	74.0	-	0.4	-	-	79.3	12.1	4.8	2.5	1.3	-	20.7
Holland	Hoorn	30.9	4.5	73.3	-	0.0	-	-	77.8	5.9	16.3	-	-	-	22.2
Holland	Dordrecht	40.6	6.4	56.7	-	1.3	1.9	-	66.2	22.4	10.3	-	1.1	-	33.8
Holland	Alkmaar	34.4	2.9	67.8	-	3.5	-	-	74.2	23.3	0.1	-	2.3	-	25.7
Holland	Gouda	33.7	6.7	71.9	0.9	0.8	-	-	80.3	15.2	4.5	-	-	-	19.7
Holland	Amsterdam	46.2	2.5	79.3	-	0.5	-	-	82.4	11.9	-	3.1	2.6	-	17.6
Nedersticht	Utrecht	90.5	3.3	62.7	1.6	0.5	-	-	68.1	24.5	0.8	-	6.5	-	31.9
Nedersticht	Vianen	28.8	3.4	35.0	2.4	-	-	-	40.7	13.4	45.3	-	0.6	-	59.3
Nedersticht	IJsselstein	89.8	16.0	55.2	3.3	0.9	-	-	75.4	9.7	9.9	-	5,0	-	24.6
Nedersticht	Montfoort	72.8	9.6	68.1	-	-	-	-	77.7	11.1	10.5	-	0.7	-	22.3
Nedersticht	Oudewater	11.6	11.5	71.8	-	0.4	-	-	83.7	16.3	-	-	-	-	16.3
Nedersticht	Tiel	23.7	4.6	70.1	-	0.4	-	-	75.1	24.9	-	-	-	-	24.9
Oversticht	Groningen	47.6	4.7	70.9	-	5.9	-	-	81.4	12.2	2.6	-	3.7	-	18.6
Oversticht	Deventer	33.6	10.7	57.2	-	2.3	-	9.4	79.5	7.0	-	6.0	3.4	4.1	20.5
Oversticht	Zwolle	49.8	3.0	55.3	-	-	-	-	58.3	3.0	37.0	-	1.7	-	41.7
Zeeland	Bergen op Zoom	67.6	2.9	40.5	1.2	1.5	-	-	46.1	6.6	2.9	44.3	-	-	53.9
Zeeland	Sluis	51.8	1.5	22.4	3.4	2.2	-	-	29.5	6.9	60.6	-	3.0	-	70.5

Table 8.8 Selected towns for spatial analysis.

Province	Town
Oversticht	Deventer
Oversticht	Groningen
Oversticht	Zwolle
Guelders	Arnhem
Guelders	Doetinchem
Guelders	Nijmegen
Guelders	Tiel
Guelders	Zutphen
Nedersticht	Utrecht
Nedersticht	Amersfoort
Holland	Alkmaar

Province	Town
Holland	Enkhuizen
Holland	Gouda
Holland	Hoorn
Holland	Leiden
Holland	Vlaardingen
Brabant	Bergen op Zoom
Brabant	Den Bosch
Brabant	Eindhoven
Zeeland	Vlissingen

interventions. The collected data is therefore not a direct reflection of a town's actual past.

In the following sections we begin with an overview in which the provinces and towns are contextualised. Next, we examine the historical

development of towns. The historical maps of Jacob van Deventer (1550-1575) and Joan Blaeu (c. 1660) serve to relate the archaeological information to urban zoning. Later maps are only available for some towns within this selection. Moreover, they would provide an incomparable typography. Therefore, they are left out of this analysis. The periods represented by the maps of Van Deventer and Blaeu are known to be important. In Holland the maps capture the enormous urban growth of the seventeenth century. In other provinces population decline is witnessed while the towns expand and add fortifications, leaving much open space inside their new walls. The period also contained the Eighty Years' War against Spain (1568-1648) and the last episodes of the Black Death. We then provide a brief overview of sites with urban farming activities. This condensed overview is included to help explain the spatial distribution that has been revealed.

8.5.2 Sticht Utrecht (Oversticht)

Oversticht was the northern fiefdom under episcopal lordship since the eleventh century.[488] Political power over the civil principality rested with the Bishopric of Utrecht (1024–1528) whose incumbents served as prince-bishoprics of the Holy Roman Empire until 1528, when power was seized by Charles V from the house of Habsburg. After that the province, like all other provinces, came under Spanish rule. Deventer was administratively and religiously the most important town. Groningen also belonged to this area for a while, but was disputed. It quickly grew independent to become the most important centre of the north, where it served the staple market and trade network.[489] In the southern part of the province, the landscape was dominated by the IJssel river, that connected towns like Deventer and Zwolle to long distance trading networks towards the German Rhineland and the Baltic. The rural surroundings were known for their rich agricultural produce which came from raised fields (*esdekken*), fertilized with using dung, and town waste.

The evidence from Deventer, Groningen and Zwolle is presented below. All three of these towns were dependent on the river and partly sea trade. With the exception of Zwolle, they are among the oldest urban settlements in the Netherlands, with origins in the ninth and tenth century.[490] Groningen is best represented in the database. Deventer and Zwolle show evidence of arable farming especially in the urban fringe, as is depicted in cartography. Horticulture and animal husbandry are located within the town walls. Groningen has indications for a mixed practice in the town centre, also arable farming. However, animal husbandry is clustered mostly in the oldest centre, while horticulture seems best represented in the northern seventeenth century expansion of the fortifications.

Deventer

Deventer developed in the ninth century from an ecclesiastical domain into a trading settlement along the river IJssel. The town grew alongside the riverside quay. The bishop of Utrecht and the town officials maintained close ties which led to the construction of a church and episcopal palace in the town centre. Eventually, Deventer became an important player in the *Hanseatic League* and hosted several international yearly trade markets. In the middle of the sixteenth century the town's economy declined, due to increased competition from Holland, but also because of the Black Death which struck in 1580. Stagnation is noted from 1575 onwards and lasted until 1875. In the late nineteenth century the town flourished again. A detailed account of the urban development is given by Mittendorff.[491] The defence earthwork from the tenth century defined the centre until the eastern expansions in the fourteenth century (*Bergkwartier*). The quay shifted to make place for the central square (*Brink*). In the 300 year period between 1400 to 1700 the size of the urban area developed from c. 36 to 73 ha and remained this size until the late nineteenth century. In the same period the population grew from c. 3,200 to c. 6,700, but not in a linear fashion. The Black Death halved the population from 7,747 (1500-1575) to 3,600 inhabitants (1575-1600) (Table 8.4). The highest density was experienced between 1550 and 1575 and this coincides with the time when Van Deventer maps were drawn (Fig. 8.13). Blaeu's map from 1649 shows urban farming within the town walls (Fig. 8.14). In Blaeu's time population numbers were restored to the levels before the Black Death, and the town expanded from 36 to 52 ha.

488 Rutte & IJsselstijn 2014, 174.
489 Rutte & Abrahamse 2014, 74.
490 Rutte & IJsselstijn 2014, 172.
491 Mittendorff 2007, 20-39.

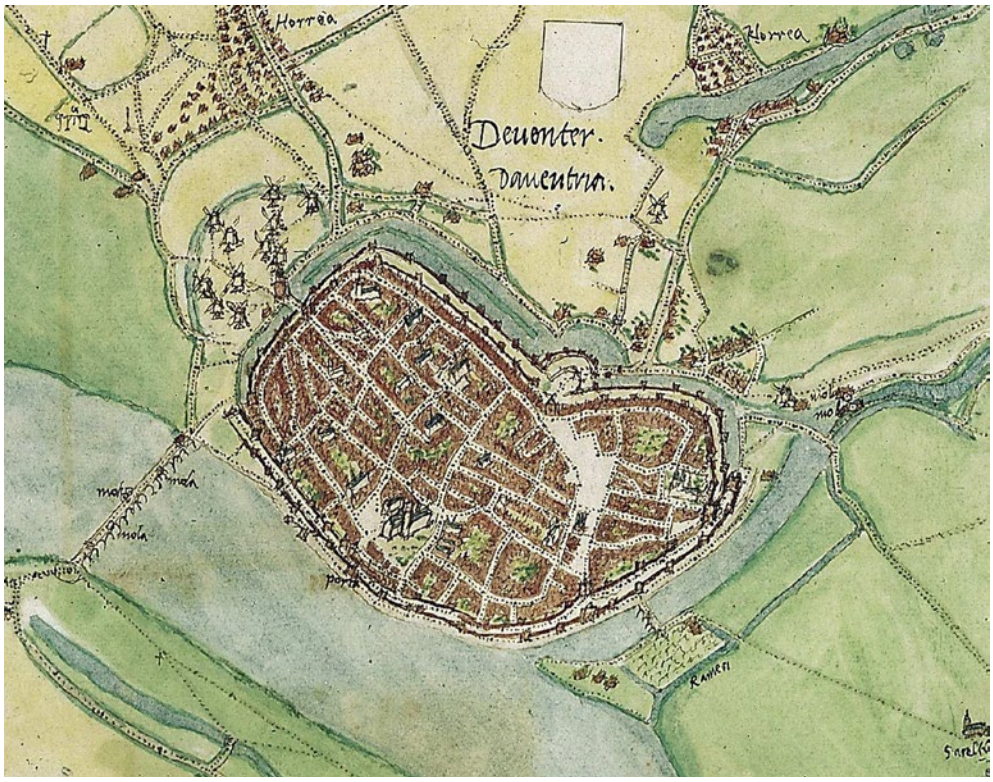


Fig. 8.13 Deventer in 1575 by Jacob van Deventer (36 ha). Housing blocks make up (79.5%) of the area, with gardens at 7%. The light green area opposite the southwest gate is the *ramen*, the place where dyed textiles were hung out to dry. This phase depicts the highest population density.

Fig. 8.14 Deventer in 1649 by Blaeu (52 ha). The north and east expansions within the new fortifications of 1600 are used for farming.

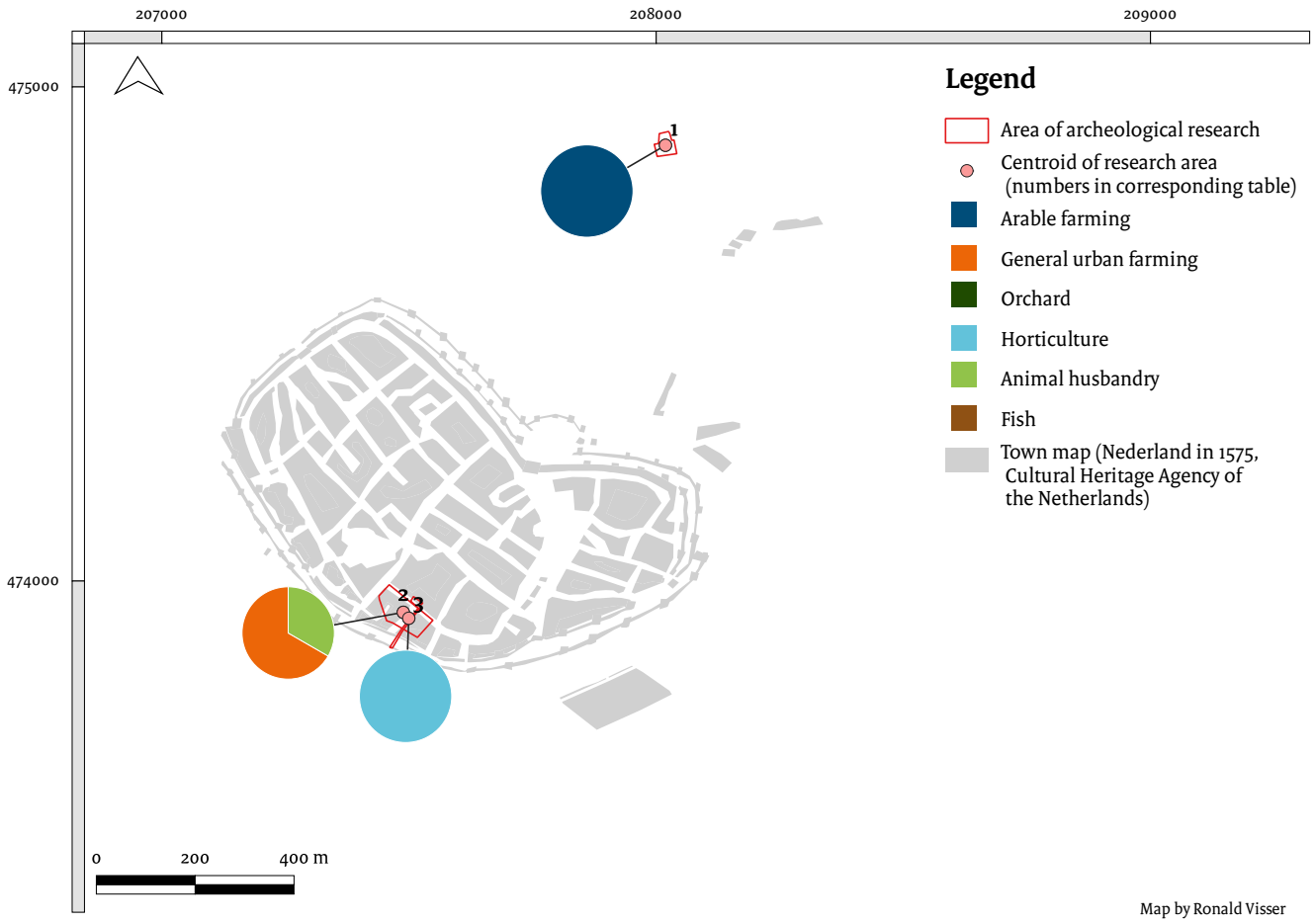


Fig. 8.15 Deventer. The figure shows the distribution of sites plotted on the Van Deventer map. Arable farming is located in the urban fringe, horticulture and animal husbandry in the centre. These sites are placed in a housing block close to a park.

Table 8.9 Scored themes in selected research locations in Deventer.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Molenbelt	2065202100	2	-	-	-	-	-
2	Burseplein/Stadskantoor	2132449100	-	2	-	-	1	-
3	Burseplein/Stadskantoor	2683290100	-	-	-	1	-	-

Deventer is represented in this study by three research locations providing valuable information about urban farming (Fig. 8.15, Table 8.9):

- Burseplein Stadskantoor, two investigations (2132449100 and 2683290100);
- Molenbelt (2065202100).

Some archaeological evidence has been reported, but too little to find patterns. Arable farming is attested in the urban fringe, horticulture and animal husbandry in the centre dating mostly to the late medieval period. At Burseplein Stadskantoor a complete cow skeleton (1400-1500) was excavated in the bottom of a pit.[492] A garden is mentioned in

[492] Vermeulen, Mittendorff & Bartels 2007, 34.

historical sources (1150-1350). Cadastral sources refer to a barn at this location dating to the early modern period.[493] Just next to this site, at Nieuwbouw Stadhuiskwartier, historical sources record the presence of several vegetable gardens.

Just outside the town, at Molenbelt, parcels of land divided to form fields were in use for arable farming from the tenth to the nineteenth century.[494] Excavations also recovered evidence of post holes which may have related to structures used for storage. In the direct vicinity – just two kilometres away from town – lies the rural area of *Rielerenk*. This area has been archaeologically assessed by means of test trenching. The area provides a good example of agricultural production for the town under the direct authority of the town officials from 1568 onwards.[495] Further archaeological evidence for arable farming has been recognized in Deventer's urban fringe.[496]

Groningen

Groningen developed from a village next to the river *Drentsche Aa* and the *Hunze* that formed a connection towards the North Sea in the ninth century. From the eleventh century onwards defence walls were erected in several phases. The town grew steadily in size – from 54 ha (1350) to 92 ha (1500), incorporating a tidal harbour (*Noorderhaven*) and connecting to channels that had been dug (*Reitdiep* and *Schuitendiep*) in 1470. Just as in Deventer, the highest density was experienced between 1550 and 1575 and coincides with the time the Van Deventer maps were drawn (Fig. 8.16). In the sixteenth century the town was fortified during the Eighty Years' War. The latest expansion, dating from 1624, left the town with plenty of open space (c. 144 ha) (Fig. 8.17; Fig. 8.18). The eastern and north-western parts kept its agrarian function. After a long and prosperous development, economic stagnation occurred from 1660 until 1890.[497]

493 Vermeulen, Mittendorff & Bartels 2007, 34.
494 Hermsen 2005, 16.
495 Vermeulen & Eeltink 2007, 43.
496 Van der Wal, Berends & Mittendorff 2011
497 Rutte & Abrahamse 2014, 74-77.

Fig. 8.16 Groningen in 1565 by Van Deventer (92 ha). Housing blocks are the most visible land use (81.4%); followed by gardens (12.2%). This phase depicts the highest population density.

Fig. 8.17 Groningen in 1649 by Blaeu (c. 140 ha). The plan is rotated to the right, north is pointing west. The north and east expansions within the new fortifications of 1600 are used for farming. The urban fringe is depicted as farmland.

Fig. 8.18 Groningen in 1652 by Haubois. The urban fringe is used as farmland. 'Vertoninghe van Groningen Comende van Vrieslant', detail of the map by Haubois (1652) (Collection Groninger Archieven).

Groningen has fourteen locations within the town where farms and agricultural activities have been identified throughout different periods of time (Fig. 8.19, Table 8.10). These are:

- Boterdiep, two investigations (2314261100 and 2467839100);
- Brugstraat and A-Brug (2238292100);
- Gedempte Damsterdiep (2169434100);
- Grote Markt Oostzijde, two investigations (2184257100 and 2239507100);
- Kijk in 't Jatstraat 103 (4560457100);
- Lutkenieuwstraat (2454805100);
- Lutkenieuwstraat-Tehuis (2066175100);
- Poelestraat 36 (2290367100);
- Vismarkt 26, two investigations (2406148100 and 2407922100);
- Visserstraat 29-33 (2382359100);
- Violenstraat 4 (2352445100).

Groningen has many and various indications for a mixed urban farming practice in the town centre. These date from its earliest urban formation to the modern period. Looking at the level of main themes, animal husbandry seems to be mostly clustered in the oldest centre, while

Fig. 8.19 Groningen. The distribution of sites plotted on the Van Deventer map. A mixed farming practice is noted in the oldest centre, horticulture, animal husbandry and fish farming in the northern seventeenth century expansion.

Table 8.10 Scored themes in selected research locations in Groningen.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Lutkenieuwstraat Tehuis	2066175100	2	1	1	2	2	-
2	Gedempte Damsterdiep	2169434100	-	-	-	1	2	-
3	Grote Markt Oostzijde	2184257100	1	-	-	-	4	-
4	Brugstraat en A-Brug	2238292100	1	-	-	-	3	-
5	Grote Markt Oostzijde	2239507100	-	-	1	2	1	-
6	Poelestraat 36	2290367100	-	1	-	-	1	-
7	Boterdiep	2314261100	-	1	1	4	5	1
8	Violenstraat 4	2352445100	1	1	-	2	-	-
9	Visserstraat 29-33	2382359100	-	1	-	1	-	-
10	Vismarkt 26	2406148100	-	1	-	-	1	-
11	Vismarkt	2407922100	1	-	-	-	-	-
12	Lutkenieuwstraat	2454805100	2	-	-	2	1	-
13	Boterdiep	2467839100	-	-	-	3	-	-
14	Kijk in 't Jatstraat	4560457100	-	1	-	2	4	-

horticulture seems best represented in the northern seventeenth century expansion of the town walls.

Farmsteads were located at Vismarkt 26[498] (1000-1400), Boterdiep (1100-1400)[499] and the Kijk in 't Jatstraat 103[500] (1775 to 1964). Land divisions and other features of the Lutkenieuwstraat and Lutkenieuwstraat-Tehuis[501] suggest agrarian use between the eleventh and sixteenth centuries. Animal husbandry is indicated by neonate skeletal parts of sheep/goat at Boterdiep[502] (1200-1400), and from the same research location a huge increase in pig bones, indicating local livestock farming (1500-1600).[503] Two fish ponds have been traced at Boterdiep.[504] Dung pits from the full and late Middle Ages have been excavated at Vismarkt 26 (1200-1400).[505] Archaeobotanical research on a dung pit (1500-1650) from Boterdiep revealed characteristic weeds from vegetable gardens.[506] Historical information (dating between 1586 and 1629) about the lease of plots of land recorded the presence of a cabbage garden of 60 r² (*r=roede*, old measurement unit of land); approximately 1,000 m²) in the area. In the Lutkenieuwstraat-Tehuis (1050-1500) walnut wood has been identified which points to the possible presence of former orchards of walnut trees.[507] It is known from historical sources that young walnut trees were traded from the fourteenth century onwards. This site also produced charcoal from apple or pear trees (1050-1850).[508] In addition to fragments of wood and charcoal from fruit trees, pollen from walnuts and/or sweet chestnuts was recovered from excavated contexts.

Plough marks have often been noted by archaeological investigations in formerly undeveloped parts of Groningen, or plots around the town. At a site on Lutkenieuwstraat[509] and Lutkenieuwstraat -Tehuis[510] plough marks from the eleventh and twelfth century and from the late Middle Ages were recorded, indicating that the plot had been in long term use as a field.

Zwolle

Zwolle came into being as a settlement before the tenth century, occupying a strategic location on high point between the rivers IJssel and Vecht and bordering the river Aa. The town was controlled by the bishopric of Utrecht and contained a church and episcopal domain. Zwolle received the privilege to build a defensive wall and was formally recognized as a town in 1230.[511] The town was a prosperous commercial centre and part of the Hanseatic League, and grew in size in the following centuries. It is noteworthy how many houses were built outside the walls (Fig. 8.20). In later phases, as was witnessed by Blaeu in the seventeenth century, the urban fringe reverted to farmland (Fig. 8.21). Stagnation set in from 1660 and lasted until 1880.

Zwolle is represented by six research locations indicating urban farming practices (Fig. 8.22, Table 8.11). These are:

- Achter de Broeren (2050111100);
- Blekerswegje (2278541100);
- Dennenstraat (2319721100);
- Fenix Terrein (2138816100);
- Meeuwenlaan (2271591100);
- Pannekoekendijk Mussenhage (2257870100).

Most evidence of farming has been found outside the late medieval town centre. The information is especially related to animal husbandry and horticulture. The only site within the walls is Achter de Broeren. Here, finds of dung and dung pits have been made in excavated urban contexts (1475-1525).[512] Dung pits have also been excavated in the urban fringe, at locations on Pannekoekendijk Mussenhage (1300-1500)[513] and Blekerswegje (1400-1500).[514] Dung recovered from these pits was said by the excavators to have been ensiled for later use as compost or fertilizer. Blekerswegje is partly situated in the former outskirts of the town, where from 1384 the town laws applied.[515] These regulations stipulated that the farmers in this area were allowed to let their cattle graze on the commons. Historical sources show that even much later on there was still talk of agricultural activities in this extra mural area. In 1805, for example, it was decided that a maximum of twelve bulls could be grazed in the area.[516] Former meadows have been recognized through field systems formed by ditches in Pannekoekendijk Mussenhage, where the area was most probably used as pasture land between the tenth and thirteenth centuries.[517] Part of a drainage ditch associated with a haystack (fifteenth century) was documented during the investigation of this location.[518] Plough marks have been traced at the Meeuwenlaan (1300-1400).[519]

498 Bergsma 2014, 6.
499 Huis in 't Veld 2015, 24.
500 Wieringa 2018, 11.
501 Jelsma 2016, 35; Huis in 't Veld 2008, 86.
502 Huis in 't Veld 2015, 162; 626
503 Huis in 't Veld 2015, 293.
504 Huis in 't Veld 2015, 55
505 Bergsma 2014, 12.
506 Vrede & Dopmeijer 2015, 340.
507 Vrede 2008, 72.
508 Vrede 2008, 72.
509 Jelsma 2016, 30.
510 Huis in 't Veld 2008, 25.
511 Rutte & Abrahamse 2014, 150-153.
512 Klomp 2007, 25.
513 Clevis & Klomp 2014.
514 Klomp 2002, 5.
515 Klomp 2002, 2.
516 Klomp 2011, 9.
517 Clevis & Klomp 2014, 69.
518 Clevis & Klomp 2014, 53.
519 Groenhuijzen 2009, 10.

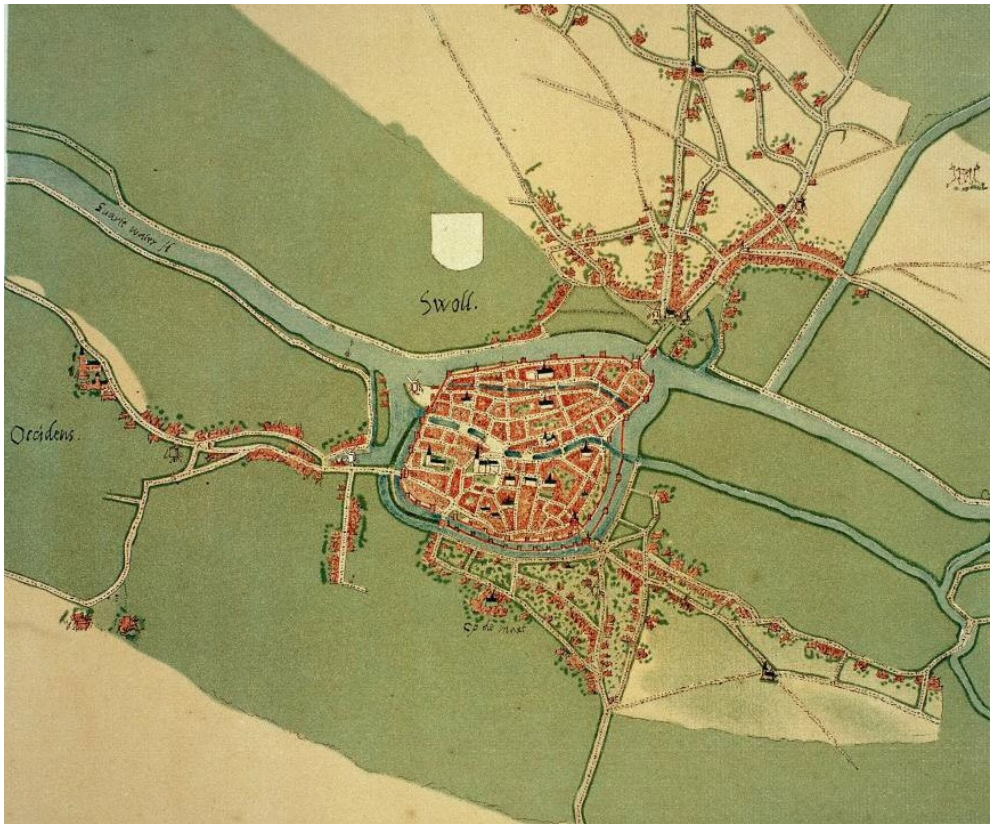


Fig. 8.20 Zwolle in 1575 by Van Deventer (47.8 ha). The town is mostly occupied by housing blocks (58.3%), with parks (37%), and gardens (3%).

Fig. 8.21 Zwolle in 1652 by Blaeu (82.6 ha). The plan is rotated to the right, north is pointing west. The urban fringe is depicted as farmland and some orchards can be seen on the right.

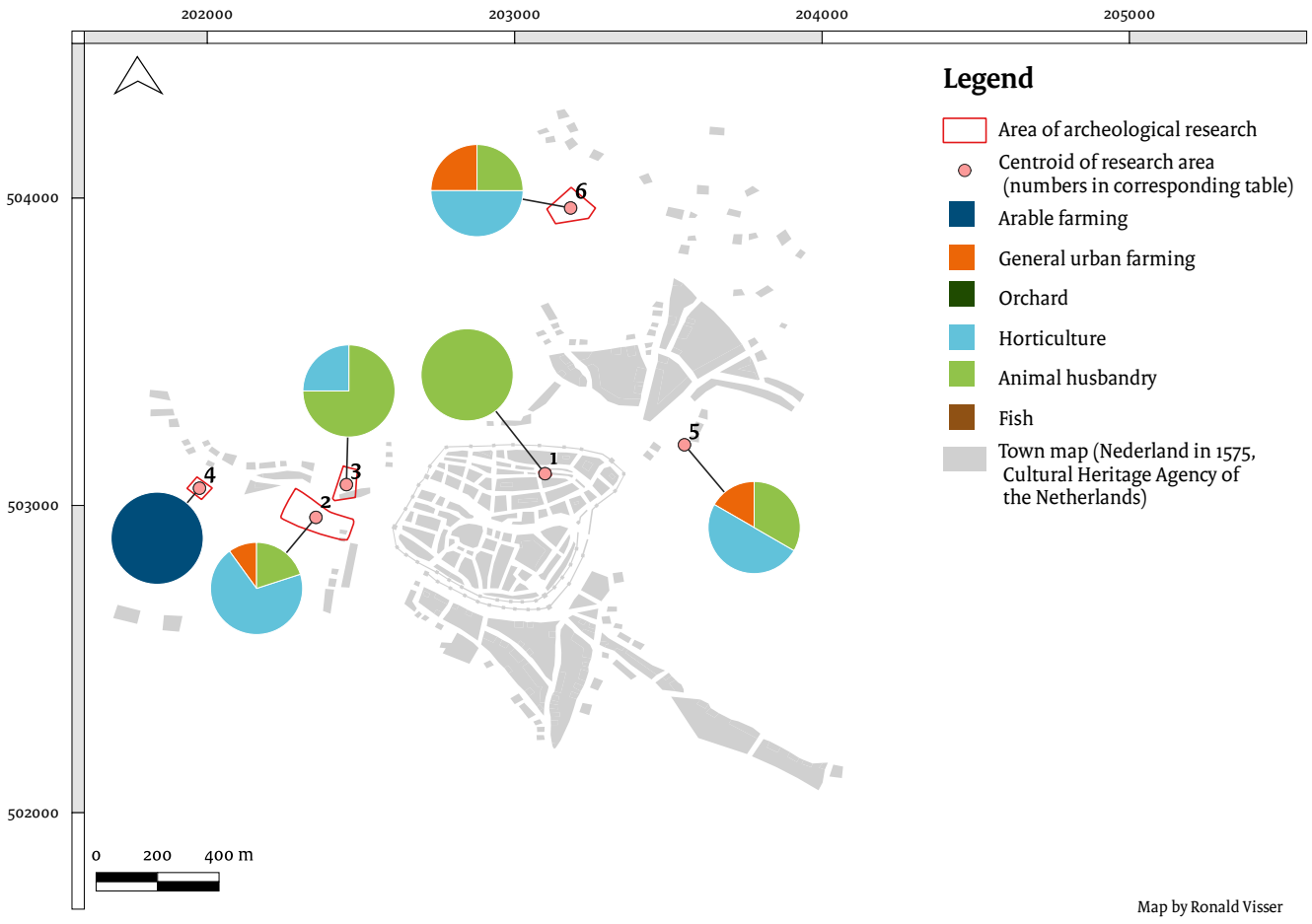


Fig. 8.22 Zwolle. The distribution of sites plotted on the Van Deventer map. Farming practice may be seen outside the oldest centre with an emphasis on animal husbandry and horticulture.

Table 8.11 Scored themes in selected research locations in Zwolle.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Achter de Broeren	2050111100	-	-	-	-	1	-
2	Fenix Terrein	2138816100	-	1	-	7	2	-
3	Pannekoekendijk/ Mussenhage	2257870100	-	-	-	1	3	-
4	Meeuwenlaan	2271591100	2	-	-	-	-	-
5	Blekerswegje	2278541100	-	1	-	3	2	-
6	Dennenstraat	2319721100	-	1	-	2	1	-

8.5.3 Guelders

The duchy of Guelders originated in c. 1200 and included the county of Zutphen. A long dynasty of counts and dukes ruled over the province. Wealth was acquired among other ways through the levy of the many (river) tolls, on the Rhine and IJssel rivers.[520] The territory was divided into several districts. Arnhem (Veluwe Quarter), Nijmegen (Nijmegen Quarter), Roermond (Main Quarter) and Zutphen (county Zutphen) were the main hubs in an administrative, trade and socio-political network.[521] The duchy had a socio- economically dominant position, but could not compete with Holland in the sixteenth century. The reasons that have been listed for its loss of position are the silting up of the river IJssel, which blocked the passage to the Zuiderzee, the declining importance of the Hanseatic League, the Habsburg-Guelders' Wars, and the Eighty Years' War (1568-1648). During the latter, the duchy became split, and the northern three districts participated in the Union of Utrecht (1579), the alliance of provinces to fight the Spanish conquerors. On top of that, many towns suffered from the Black Death in the late sixteenth and early seventeenth centuries, leading to serious de-population. An urban demographic recovery is nevertheless noted in all cases from the late nineteenth century onwards.

The evidence from Arnhem, Doetinchem, Nijmegen, Tiel and Zutphen is presented below. Of these towns, Zutphen and Tiel are best represented in the database. Tiel and Nijmegen both border the river Waal, Arnhem and Zutphen are on the river IJssel. Doetinchem was indirectly connected to the main rivers through an old course of the IJssel river. All of these towns were dependent on river trade. With the exception of Doetinchem, these towns belong to the oldest urban settlements of the Netherlands, going back to the ninth and tenth century. Doetinchem was founded through lordly urban politics.[522] Doetinchem stands out from the rest of these towns because it had a limited spectrum of arable farming and animal husbandry, while the other towns had a more mixed spectrum of urban farming.

Arnhem

Arnhem started out as a rural settlement in the tenth century, and was the administrative centre for the surrounding region. The wealth brought by the river trade allowed Arnhem to develop into a town two centuries later (14 ha) when the duke of Guelders bestowed Arnhem with various rights, including market privileges. In the thirteenth and fourteenth centuries the town grew in population and size, mainly towards the north and east of the older core. Trade stagnated in the fifteenth century, but the town retained its medieval form until the nineteenth century (37.5 ha) (Fig. 8.23). Convents were constructed, however, and c. 1600 the walls were replaced by fortifications to defend the town against the Spanish conquerors (Fig. 8.24).[523] The population grew from 2,200 (1400) to 6,500 (1700).

Arnhem is represented in the database by seven research locations (Fig. 8.25, Table 8.12). These are:

- Hoogstede-Klingelbeek (2329474100);
- Koningstraat Klarestraat (2223922100);
- Ruitenberglaan (2381168100);
- Op de Beek (2031125100);
- Oude Oeverstraat (2336926100);
- Oude Oeverstraat Verbindingstunnel (2382861100);
- Westervoortsedijk (2458150100).

Traces of different urban farming practices have been recorded. Inside the walls horticulture is mainly visible. Arable farming can be identified around the town. Some of this farming dates to the town's earliest phases of urban development, but most dates to the late medieval period. Pre-urban farmsteads were found at Op de Beek[524] (1000-1250). Furthermore, a hexagonal granary with a diameter of 9 m has been excavated (1275-1300) in which arable products or hay were stored.[525] Complete skeletons of adult pigs or piglets were documented at the Oude Oeverstraat (1550-1650) as well as evidence of fertilization with sods (1400-1500).[526] Various finds of flowerpots are attested from different sites.

520 Weststrate 2008.
521 Noordzij 2008, 285.
522 Rutte & IJsselstijn 2014, 172.
523 Rutte & Abrahamse 2014, 35.
524 Van der Mark, Wemerman & Van de Venne 2009, 154.
525 Wemerman 2009, 34.
526 Loopik 2017, 165, 194.

Fig. 8.23 Arnhem in 1575 by Van Deventer (37.5 ha). Note the habitation on both the western and eastern sides of the town.

Fig. 8.24 Arnhem in 1652 by Blaeu. The plan is rotated to the right, north is pointing west. The urban fringe is in use as farmland.

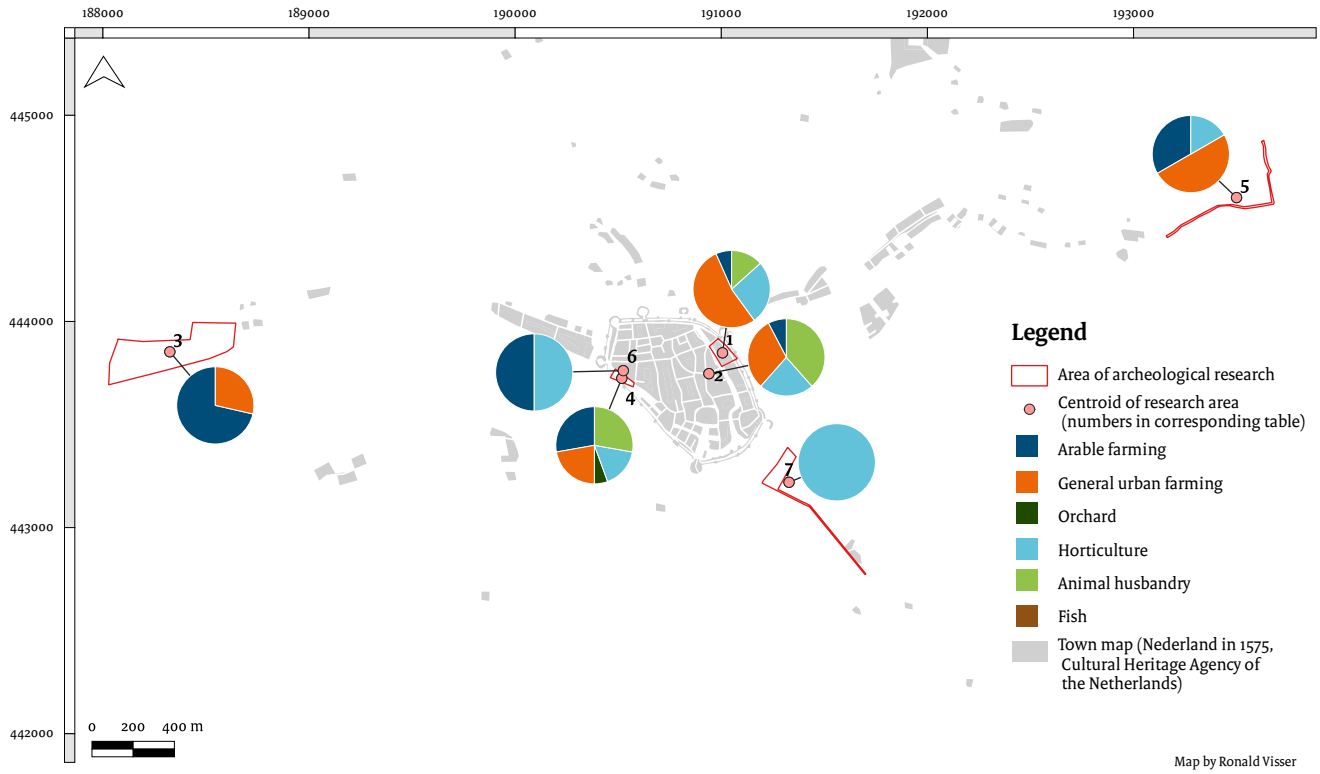


Fig. 8.25 Arnhem. The distribution of sites plotted on the Van Deventer map. Indicators are found both inside and outside the walls, with an emphasis on horticulture in the centre.

Table 8.12 Scored themes in selected research locations in Arnhem.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Op de Beek	2031125100	1	8	-	4	2	-
2	Koningstraat/Klarestraat	2223922100	1	4	-	3	5	-
3	Hoogstede-Klingelbeek	2329474100	5	2	-	-	-	-
4	Oude Oeverstraat (noord)/ Nieuwe Oeverstraat (zuid)/ Kortestraat (oost)	2336926100	5	4	1	3	5	-
5	Ruitenberglaan	2381168100	2	3	-	1	-	-
6	Oude Oeverstraat Verbindingstunnel	2382861100	1	-	-	1	-	-
7	Westervoortsedijk	2458150100	-	-	-	1	-	-

Fig. 8.26 Doetinchem (1559-1575) by Van Deventer. It can be seen that large areas within the walls are open.

Doetinchem

The first historical mention of Doetinchem dates from 838 and refers to a manorial estate with a church (*villa Duetinghem*) – located on the old course of the river IJssel – on land that was donated to the bishop of Utrecht. The next documentary evidence relates to permits to erect town walls which were finished after 1350. The enclosed town had a slightly egg-shaped plan with gateways in all of the four directions leading to the central market place and church (St. Catherine's church). The west gate (the *Watergate*) faced the river. The town served a locally oriented trade network mainly in the form of farming produce.[527] The oldest map of Doetinchem[528] (around 1560 by Jacob van Deventer) shows small sheds or buildings on the site of the later cattle and animal market (Fig. 8.26). These include sheds for grain storage (horrea) but possibly also for granaries or haystacks. From the town hall administration of Doetinchem[529] (from 1530) it is recorded that grazing fees generated a major source of income for the town. The population in Doetinchem was decimated by the Black Death in the late sixteenth century.

Doetinchem is represented in the database by eight research locations (Fig. 8.27, Table 8.13). These are:

- Hamburgerstraat 46 (2405962100);
- Holterhoek 2 (2308195100);
- Huberroos (2257173100);
- Keppelseweg 80 (2301999100);
- Perlstein (2072825100);
- Randweg-Oost (2408076100);
- Terborgseweg 63 (2453711100);
- Veemarkt (2221402100).

Most indicators for arable farming exist outside the walls, while animal husbandry is found more in relation to the centre. This is in contrast to Arnhem, which showed a more diverse pattern in farming activities. Research at Randweg-Oost[530] (1500-1900) and Perlstein[531] (1500-1850) recovered evidence of arable land use.

527 Eskes & Kooiman 2008, 13.
528 Pronk 2011, 33.
529 Van der Linden 2007, 58.
530 Scholte Lubberink, Van der Kroft & Zielman 2016, 50.
531 Van der Linden 2007, 58.

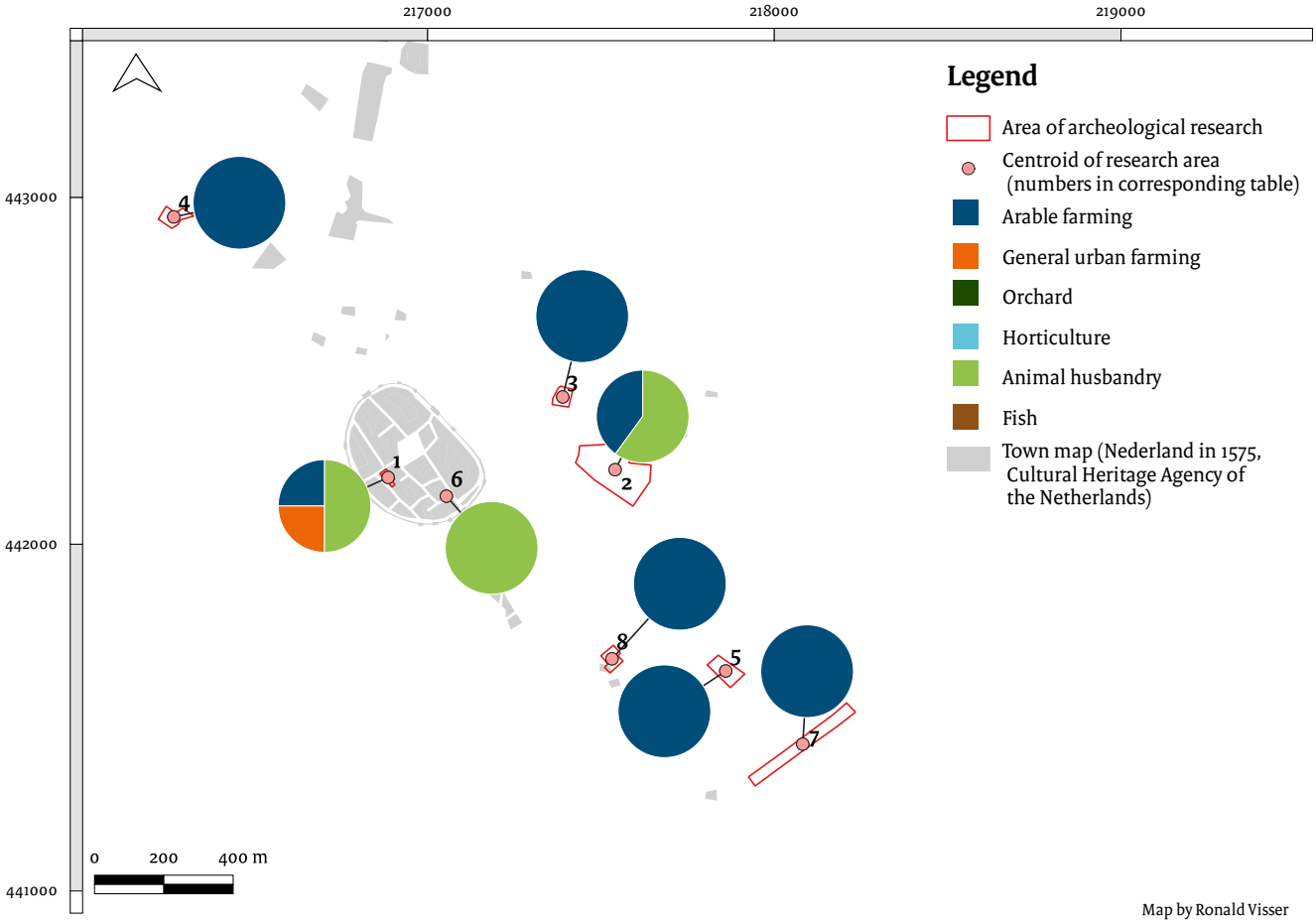


Fig. 8.27 Doetinchem. The distribution of sites plotted on the Van Deventer map. Most indications for arable farming are outside the walls, while animal husbandry is found closer to the centre. There is hardly a mixed spectrum.

Table 8.13 Scored themes in selected research locations in Doetinchem.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Perlstein	2072825100	1	1	-	-	2	-
2	Veemarkt	2221402100	2	-	-	-	3	-
3	Huberroos	2257173100	1	-	-	-	-	-
4	Keppelseweg 80	2301999100	1	-	-	-	-	-
5	Holterhoek 2	2308195100	2	-	-	-	-	-
6	Hamburgerstraat 46	2405962100	-	-	-	-	1	-
7	Randweg-Oost (vindplaats 1)	2408076100	1	-	-	-	-	-
8	Terborgseweg 63	2453711100	1	-	-	-	-	-

Fig. 8.28 Nijmegen in 1557 by Van Deventer (52.6 ha). The Valkhof lies east. The south end shows green open spaces. Various windmills are located alongside the arterial roads, serving the town.

Fig. 8.29 Nijmegen in 1649 by Blaeu (52.6 ha). The plan is rotated, north is pointing south. Fields for farming are clearly depicted within the walls. The urban fringe is a rather vague indication of farmland, Blaeu has chosen to emphasise the river Waal.

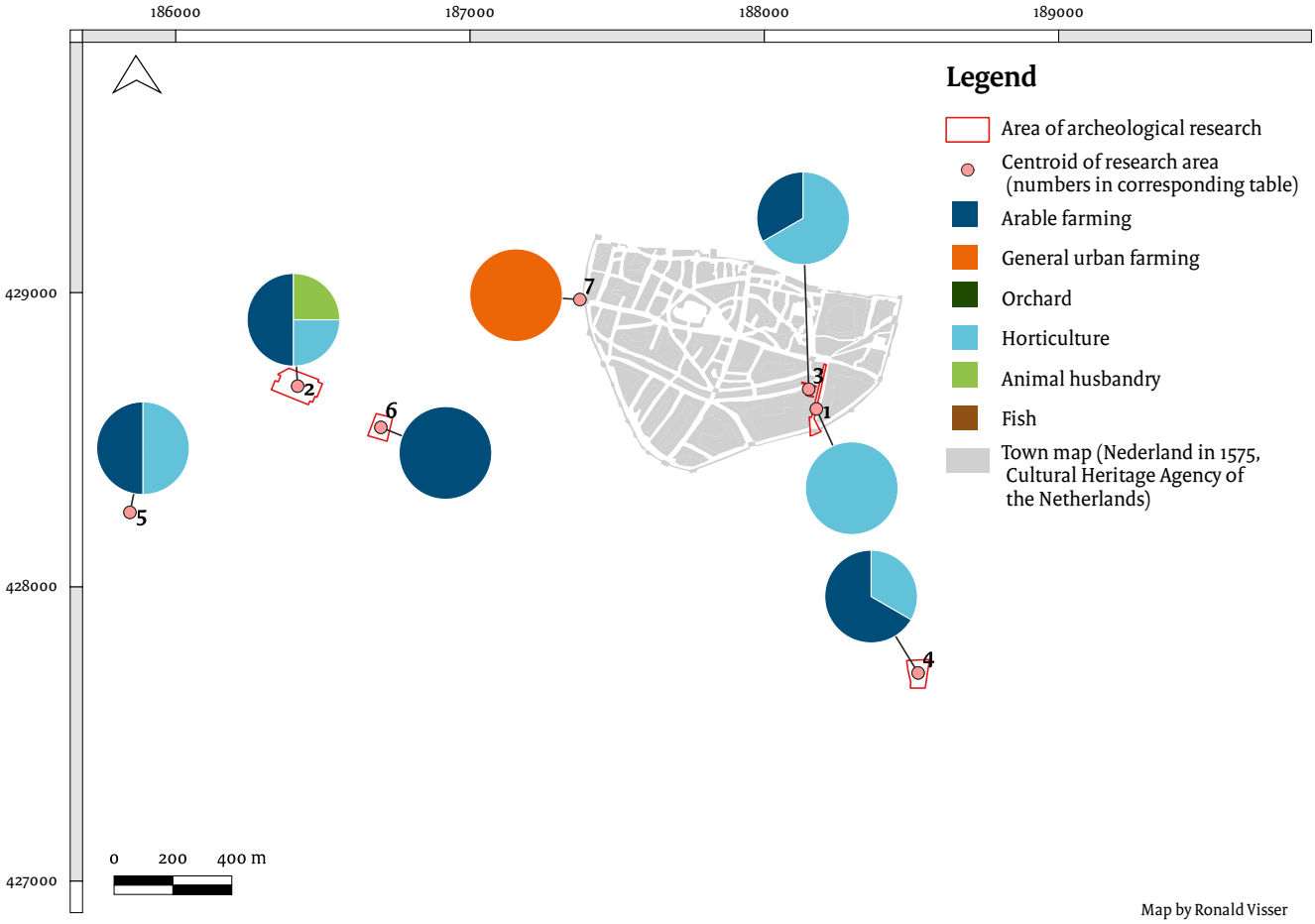


Fig. 8.30 Nijmegen. The distribution of sites plotted on the Van Deventer map. Most indications for arable farming exist outside the walls. Indicators for horticulture in the centre are shown as green patches on the map. There is hardly a mixed spectrum.

Table 8.14 Scored themes in selected research locations in Nijmegen.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Hertogstraat en Hertogplein	2188412100	-	-	-	2	-	-
2	Waterkwartier, Nijmegen-West	2268773100	2	-	-	1	1	-
3	Hertoghof	2275300100	1	-	-	2	-	-
4	Van Beethovenstraat	2421027100	2	-	-	1	-	-
5	Oscar Carrestraat	2431274100	1	-	-	1	-	-
6	Spechtstraat	3985885100	1	-	-	-	-	-
7	Nieuwe Markt	4024000100	-	1	-	-	-	-

Nijmegen

The medieval history of Nijmegen started in the eighth century, when Charlemagne built a fortified residence (*palts*) on the highest point, het Valkhof. This site was developed by his successors into a fortress in 1155. However, the town emerged out of two centres, the second being a commercial settlement close to the Waal river. In the thirteenth century the expanding settlement acquired a town charter and walls were erected (21.8 ha). The next two centuries were prosperous, and the town extended towards the south, where the sloping ground was incorporated within the new walls in 1450. (52.6 ha). As in the case of Arnhem, the growth of Nijmegen stagnated in the late fifteenth century. The Black Death more than halved the population in 1635-1636 as 6,000 of the town's 10,000 inhabitants died.[532] Improvements were made to the defences in the seventeenth and eighteenth centuries, when Nijmegen became a military base. In the late nineteenth century

[532] Noordegraaf & Valk 1996,59.

Nijmegen flourished again.[533] When the maps of Van Deventer (1557, Fig. 8.28) and Blaeu (1649, Fig. 8.29) are compared, it can be seen that 13 years after the devastating impact of the Black Death the farmland in the southern area of the town within the walls had increased.

Nijmegen is represented in the database by seven research locations (Fig. 8.30, Table 8.14). These are:

- Van Beethovenstraat (2421027100);
- Oscar Carrestraat (2431274100);
- Hertoghof (2275300100);
- Hertogstraat and Hertogplein (2188412100);
- Nieuwe Markt (4024000100);
- Spechtstraat (3985885100);
- Waterkwartier (2268773100).

Most indicators point to arable farming and horticulture outside the town walls. In the centre, the locations Hertoghof and Hertogstraat, coincide with the open areas in the south seen on the Van Deventer map. Here, there is evidence of horticulture and arable farming (1250-1700).[534] Traces of arable fields from various periods have been found at various locations around the old core of Nijmegen, including Waterkwartier[535] (1200-1900) and Oscar Carrestraat (1500-1900).[536]

Tiel

Tiel lies at the branching of the rivers Waal and Linge. The rural settlement developed around St. Maartens church and is mentioned in documentary sources in 885. The geographically favourable position between two rivers – and the raiding of the contemporary commercial centre of Dorestad by the Vikings in 863 all contributed to the successful development of Tiel as a rival trading centre. A church, convent and ring fortress were all constructed at Tiel in the ninth century. In the tenth century later, a fortified residence (palts) was added, sustaining the socio-economic and political significance of the town. Tiel went on to blossom in the tenth and eleventh centuries.[537] Quarters were added to the centre, including one with a possible agrarian quarter on the south of the town.[538] Excavations which were undertaken in the old centre of the town prior to 2000 have recently been published and present detailed evidence for tenth and eleventh century activities.[539] Within a short period of time, however, the silting-up of the river Linge and a Viking raid heralded the downfall of the town. In later centuries Tiel was fought over by the dukes and counts of Guelders, Holland, Brabant and Limburg. A town wall was constructed in the thirteenth century, extra channels and bastions were added in 1520, enclosing an area of c. 25 ha.

Tiel is represented in the database by eight research locations providing valuable information about urban farming (Fig. 8.31, Table 8.15). These are:

- Bleekveld (2005740100);
- Dominicuskwartier (2243598100);
- Fabriekslaantje, two investigations (2457665100 and 3297051100);
- Hogendijkstraat (2462451100);
- Plein 21-27 (2049010100);
- Prins Willem Alexanderschool (2418906100);
- Westluidensepoort (2452180100).

The majority of the indications for mixed farming lie outside of the town walls. Two excavations at Dominicuskwartier and Bleekveld, in the centre, coincide with green patches both on Van Deventer's and Blaeu's maps (Fig. 8.32, Fig. 8.33). The first research location yielded many indications for urban farming. Orchards pictured in Blaeu's map have been traced archaeologically .

Farmsteads and/or barns, animal graves and dung pits have all been found at Dominicuskwartier (1400-1500).[540] Several fish traps were also recovered from a moat (1600 and 1750). Dung pits from the full and late Middle Ages have been found in Prins Willem Alexanderschool (1125-1375) as well as a haystack (1250-1300).[541] Evidence for another former haystack was found on a site in Fabriekslaantje (1300-1400).[542] Plots of land containing stables were excavated at a site in Plein 21-27 (1778).[543] In Westluidensepoort, a hotbed was traced (up to 900).[544] Vegetable gardens are suspected in the backyard (885-1050).[545] Evidence for a herb garden, dating to a later period was recovered at Fabriekslaantje (1700-1750).[546] Archaeological evidence for orchards was also found at Fabriekslaantje[547] (1650-1850) and Hogendijkstraat (1600-1850).[548] Arable fields were also identified at the latter location (1300-1625).[549] A fragment of a scythe, and part of an iron watering can was recovered by an excavation in the Dominicuskwartier (1350-1400).[550]

533 Rutte & Abrahamse 2014, 118-121
534 Habraken 2013, 17.
535 Harmsen 2015, 107.
536 Van Hemert 2015, 6.
537 Leijnse 2017, 19-20.
538 Verhelst 2006.
539 Oudhof, Verhoeven & Schuuring 2013.
540 Van Renswoude & Habermehl 2014, 425.
541 Verhelst & Van Renswoude 2015, 150.
542 Habermehl & Boreel 2015, 31.
543 Spitzers & Van Genabeek 2009, 11.
544 Leijnse 2017, 84.
545 Van Haaster 2017, 183; Leijnse 2017, 84.
546 Van der Meer 2017, 138.
547 Habermehl & Boreel 2015, 7, 62.
548 Van den Brink, Hebinck & Schurmans 2015, 20.
549 Van den Brink, Hebinck & Schurmans 2015, 1.
550 Van Renswoude & Habermehl 2014, 232.

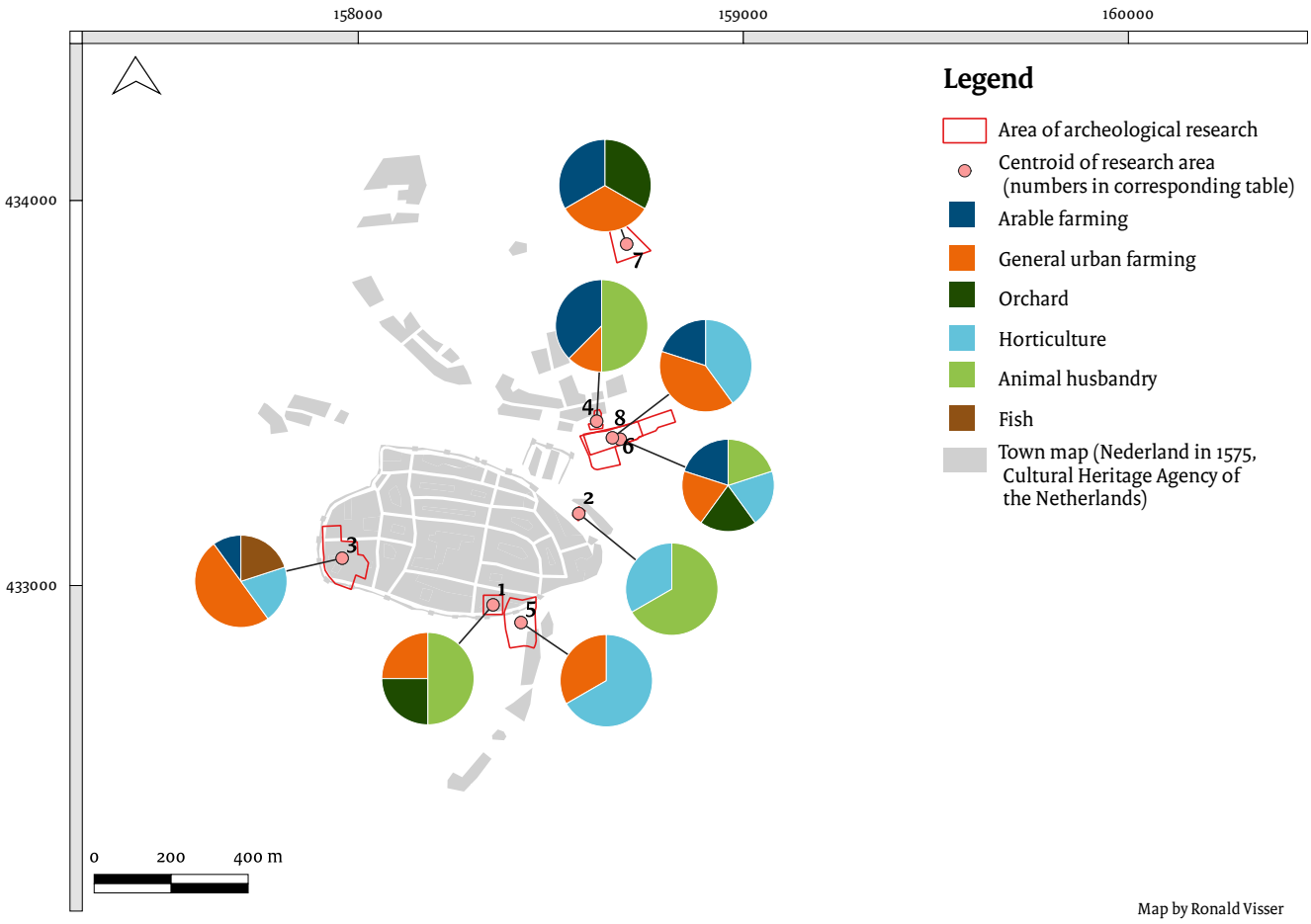


Fig. 8.31 Tiel. The distribution of sites plotted on the Van Deventer map. Most indications for mixed farming are found outside the walls. Two excavations within the walls coincide with green patches on the map.

Table 8.15 Scored themes in selected research locations in Tiel.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Bleekveld	2005740100	-	1	1	-	2	-
2	Plein 21-27	2049010100	-	-	-	1	2	-
3	Dominicuskwartier	2243598100	1	5	-	2	-	2
4	Prins Willem Alexanderschool	2418906100	3	1	-	-	4	-
5	Westluidensepoort	2452180100	-	1	-	2	-	-
6	Fabriekslaantje	2457665100	1	1	1	1	1	-
7	Hogendijkstraat	2462451100	1	1	1	-	-	-
8	Fabriekslaantje	3297051100	1	2	-	2	-	-

Fig. 8.32 Tiel in 1560 by Van Deventer (c. 25 ha). The town lies in the south within a fork of the silted-up river Linge and the Waal. The south-west quarter shows green open spaces (gardens 24%). The urban fringe is depicted as pastureland. Many houses are located along the arterial roads.

Fig. 8.33 Tiel in 1649 by Blaeu (25 ha). The plan is rotated, north is pointing south. On this map fields are clearly shown within the walls. The urban fringe is depicted rather vaguely as farmland, and Blaeu has chosen to emphasize the Waal river.

Zutphen

Zutphen was an administrative centre in the Carolingian period (c. 780 to 900). In the aftermath of Viking raids, an earthwork ring fortress was built to defend the settlement (890). As in the case of Nijmegen and Tiel, an imperial palace (palts) was added for the German Holy Roman emperor. In 1046 Zutphen was donated to the bishop of Utrecht who erected a church and monastery next to the palace. He delegated the towns administration to the count of Zutphen, and soon after, the dynasty ruled independently. In the late twelfth century the count granted the town its town rights. One hundred years later, in the late thirteenth century, his successors founded and designed a new town called Nieuwstad. Both centres were enclosed within a fortified circuit of

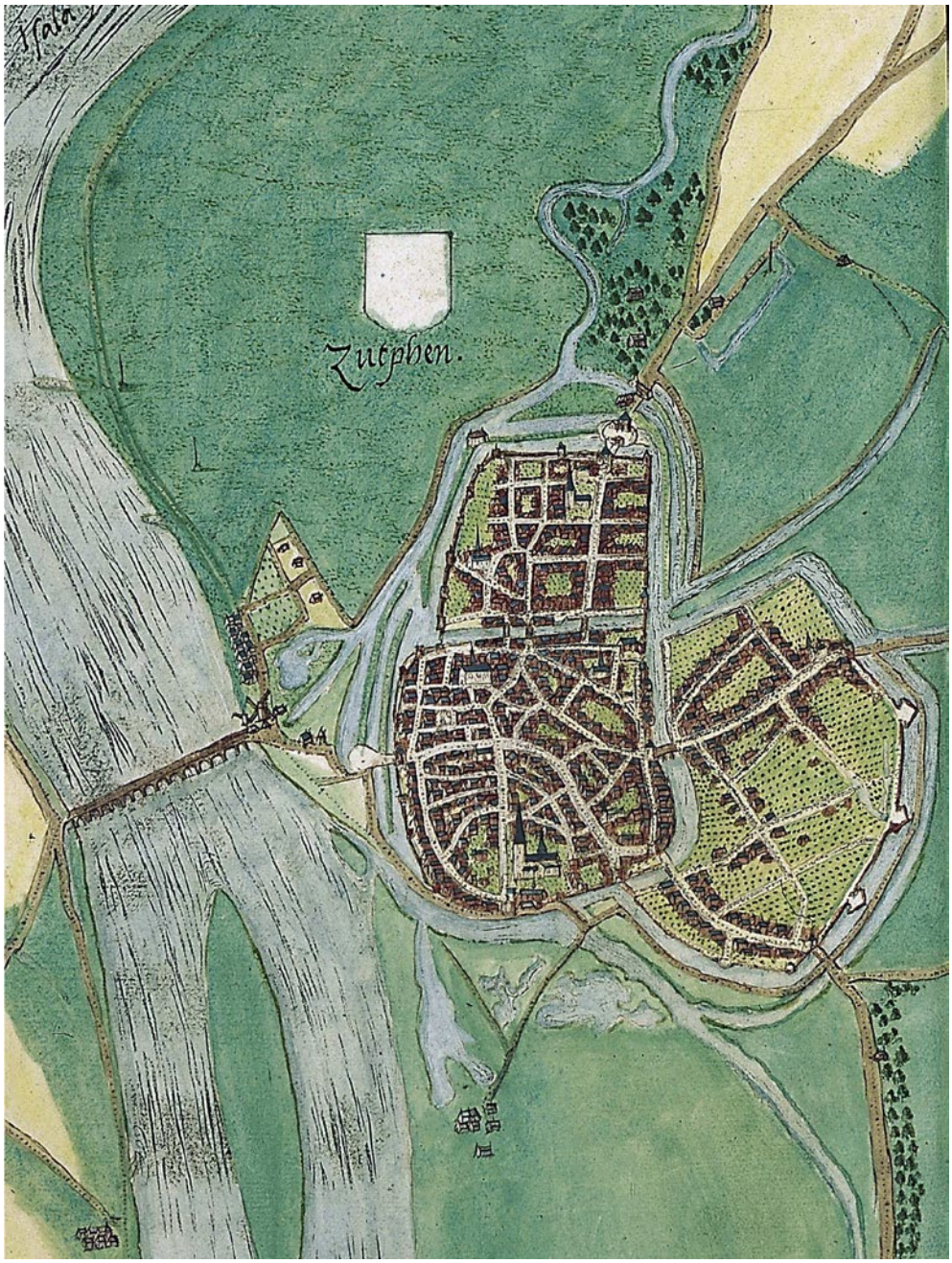


Fig. 8.34 Zutphen in 1560 by Van Deventer (c. 40 ha). The town lies in the south in a fork of the rivers Berkel and the IJssel. The Nieuwstad is depicted as green open spaces (gardens 24%). The urban fringe is depicted as pastureland.

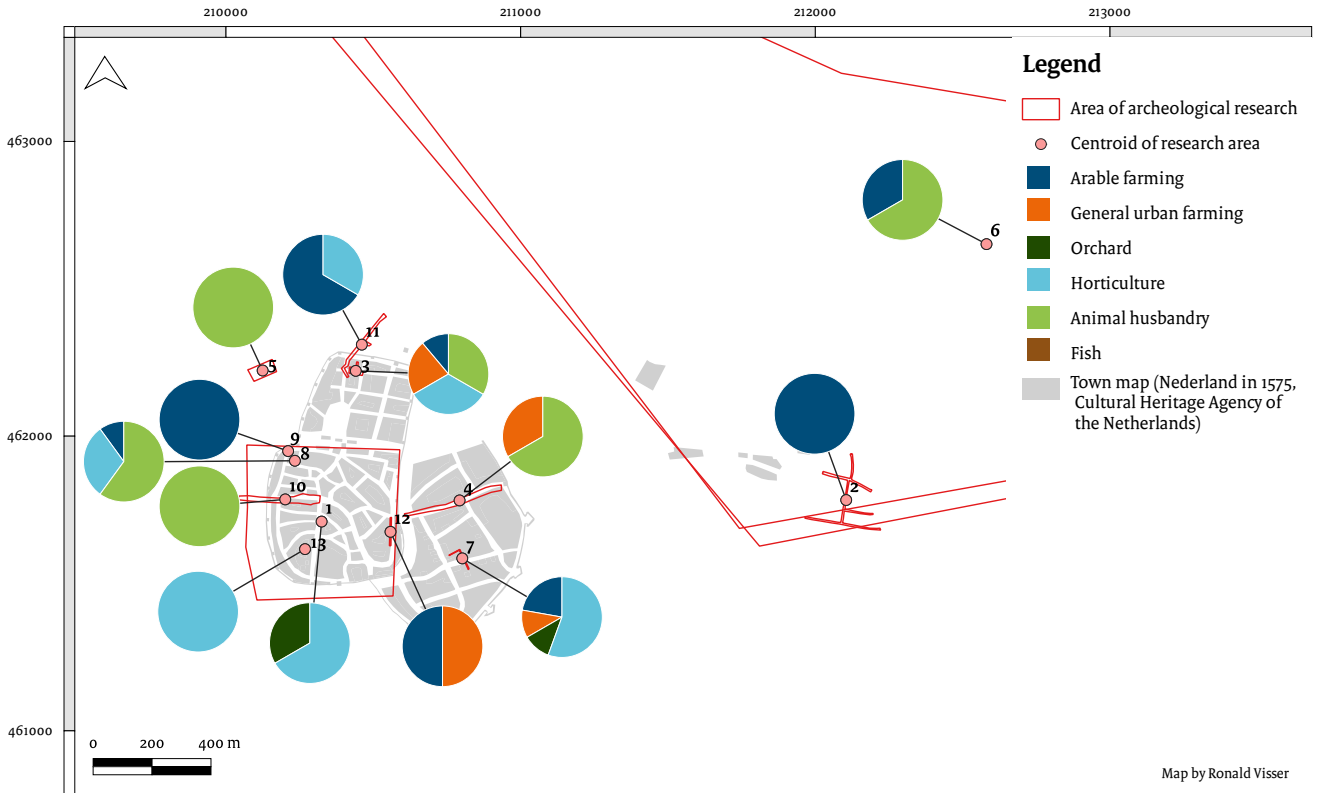


Fig. 8.35 Zutphen. The distribution of sites plotted on the Van Deventer map. Most indications are located within the walls, where the spectrum is mixed. In the urban fringe urban farming activities refer to arable farming and animal husbandry.

Table 8.16 Scored themes in selected research locations in Zutphen.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Zutphen Centrum	2098892100	-	-	1	2	-	-
2	Warnsveld Bongerdspad Schoolstraat Molenstraat Tuinstraat	2204069100	2	-	-	-	-	-
3	Het Kruittorenplein (Nieuwstad 69)	2220528100	1	2	-	3	3	-
4	Laarstraat	2240170100	-	1	-	-	2	-
5	Mars Havenstraat	2350760100	-	-	-	-	2	-
6	Lochem Wolfelerenk	2369723100	1	-	-	-	2	-
7	Polsbroek	2398421100	2	1	1	5	-	-
8	Broederenkerkplein	2413195100	1	-	-	3	6	-
9	Rozengracht	2429728100	1	-	-	-	-	-
10	Groenmarkt-Marspoortstraat	2470835100	-	-	-	-	1	-
11	Het Kruittorenplein (Achterom)	3297165100	2	-	-	1	-	-
12	Overwelving Nieuwstad Bornhovestraat Basseroord Pelikaanstraat	3297302100	1	1	-	-	-	-
13	s-Gravenhof 4	3980505100	-	-	-	3	-	-

town walls in the fourteenth century (c. 40 ha). Another extension, the *spittal*, was set aside for construction of a hospital. The spittal lay outside the town gates, as was customary, to isolates cases of leprosy and other infectious diseases. The town prospered due to its participation in the Hanseatic League, but stagnated in the fifteenth and sixteenth centuries, only to regain its the wealth in the eighteenth century as marketplace for local agricultural produce.[551] At the time of the Van Deventer map (c. 1560), Zutphen had a population of c. 6,000 (Fig. 8.34).[552] However, two outbreaks of the Black Death, in 1624 and again in 1636, had serious consequences for the town's population. [553]

Zutphen is represented by thirteen research locations within the town where farms and agricultural activities have been identified throughout different periods of time (Fig. 8.35, Table 8.16). These are:

- Broederenkerkplein (2413195100);
- 's-Gravenhof 4 (3980505100);
- Groenmarkt-Marspoortstraat (2470835100);
- Het Kruittorenplein, two investigations (2220528100 and 3297165100);
- Laarstraat (2240170100);
- Lochem Wolfelerenk (2369723100);
- Mars Havenstraat (2350760100);
- Polsbroek (2398421100);
- Rozengracht (2429728100);
- Overwelving Nieuwstad, Bornhovestraat, Basseroord, Pelikaanstraat (3297302100);
- Warnsveld Bongerdspad, Schoolstraat, Molenstraat, Tuinstraat (2204069100;
- Zutphen Centrum (2098892100).

Most indications are located within the walls, where the spectrum is mixed. In the urban fringe, urban farming activities refer to arable farming and animal husbandry. The raised fertilised fields (esdekken) at Warnsveld demonstrate its agricultural character. The town of Zutphen owned the meadows, such as the largest parts of the Mars. The town's people could buy shares to graze their cattle there. On a whole, a close correlation may be seen between the historic cartographic evidence and archaeological findings.

Pre-urban farmsteads were found at a location on Kruittorenplein (1300).[554] These included metal hinge belonging to a flail which was recovered from a thirteenth century context in a well. Several archaeological discoveries from

Fig. 8.36 Zutphen in 1649 by Blaeu (40 ha) with added fortifications. The plan is rotated, north is pointing west. Urban farming fields are clearly depicted within the walls. A few traces of pastureland were found in the urban fringe.

551 Groothedde 1991; Blonk-van den Bercken *et al.* 2020, 219.
552 Visser 1985, 20.
553 Regionaal archief Zutphen, het archief van het oude Gasthuis (1380-1848).
554 Fermin & Groothedde 2009, 15.

Broederenkerkplein point to inhabitation and farming activities on the earthwork ring fortress in the (late) medieval period. At a site in Zutphen Centrum vegetable gardens and orchards which can be seen on the map of Blaeu 1649 and the cadastral maps were in existence until the 1980s (Fig. 8.36). The plots extended towards a location in the Polsbroek, where a pitchfork and spade have been excavated. A map by Van Geelkercken from 1639 shows many vegetable gardens at locations in the Polsbroek and Nieuwstad. Detailed information from various sites relate to urban farming from different periods, such as cultivation layers, dung, flowerpots, garden walls and botanical remains of fruits and vegetables. Excavations at Mars Havenstraat (1700-1800) recovered the skeletal remains of a neonatal sheep/goat.[555]

8.5.4 Sticht Utrecht (Nedersticht)

Het Sticht was under the rule of episcopal lordship from 1024 until 1528 and part of the Holy Roman Empire. Utrecht came to power due to its central location (between the German hinterland and the coast via the Rhine) and the support of Catholic dioceses. In wars with Holland (see Section 8.5.5), Het Sticht lost parts of its territory, and its power crumbled. The main trade routes from the inland waterways shifted towards the coastal areas. At the end of the Middle Ages, the power of the town (and region) declined. From the fourteenth onwards other regions, including Flanders, and later Holland, began to grow economically. The bishop of Utrecht ruled until in 1528, Charles V from the house of Habsburg finally conquered Utrecht. The territories of het Sticht were split. The core territories around the town of Utrecht became the Lordship of Utrecht, while the northern parts were annexed by the County of Drenthe. The southern domains became part of the Lordship of Overijssel.

In this province, we will focus on the evidence from Utrecht and Amersfoort. Archaeological research in Utrecht has provided the most extensive information on urban farming, but this is closely followed by data from Amersfoort. Both towns grew steadily within their town walls without the need to expand in the sixteenth of seventeenth centuries. Both towns stagnated in the sixteenth century and remained more or less stable in size and population until the nineteenth century.

Utrecht

As stated earlier, Utrecht had a proto-urban character from the Carolingian period onwards and remained an important ecclesiastical centre throughout the Middle Ages. After the bishop of Utrecht town granted town rights in 1122, the town was surrounded by a defensive earthen wall and a moat. This line of defences enclosed the castle and included the adjacent commercial district, as well as the Chapter houses of Sint-Pieter and Sint-Marie, the western and southern settlements, and the area around the Oudegracht. The ramparts surrounding the town followed the town wall with a lot of undeveloped space inside (up to 123 ha). The rampart remained unchanged for centuries because the town did not expand on a large scale for a long time. The oldest stone houses were located along the Oudegracht in the twelfth century.[556] With the digging of the Nieuwegracht at the end of the fourteenth century the street pattern within the town was largely completed and the town area became largely built up. From the late Middle Ages onwards until the nineteenth century, the town experienced several periods of political struggles and shifts between and within different powers, including the guilds, reformation and occupations by Spaniards and French. Utrecht remained the largest town in the Northern Netherlands until the middle of the sixteenth century. From the sixteenth century until the nineteenth century the population remained roughly 30,000. Although Utrecht was initially less affected by the decline in merchant shipping, unemployment rose sharply, especially after 1750. The first urban expansion took place in the second half of the nineteenth century. The highest population density was reached c. 1500, more or less coinciding with the time the Van Deventer maps were drawn (Fig. 8.37).

The map shows large building blocks with large green gardens in their centre. The building density is less towards the outer parts of town, towards the town boundary more open green spaces are visible, especially on the western side of the town. Outside the town rural settlements can be seen to the east, west and south-east of the town. Based on the evidence of Van

555 Fermin & Kastelein 2013, 66.
556 Cleijne *et al.* 2017, 200.

Fig. 8.37 Utrecht in 1560 by Van Deventer (c. 122 ha). The town shows build up areas (62.7%) with a lot of open and green spaces (gardens 24.5%). The town is directly surrounded by rural settlements with bigger gardens, fields and pastureland.

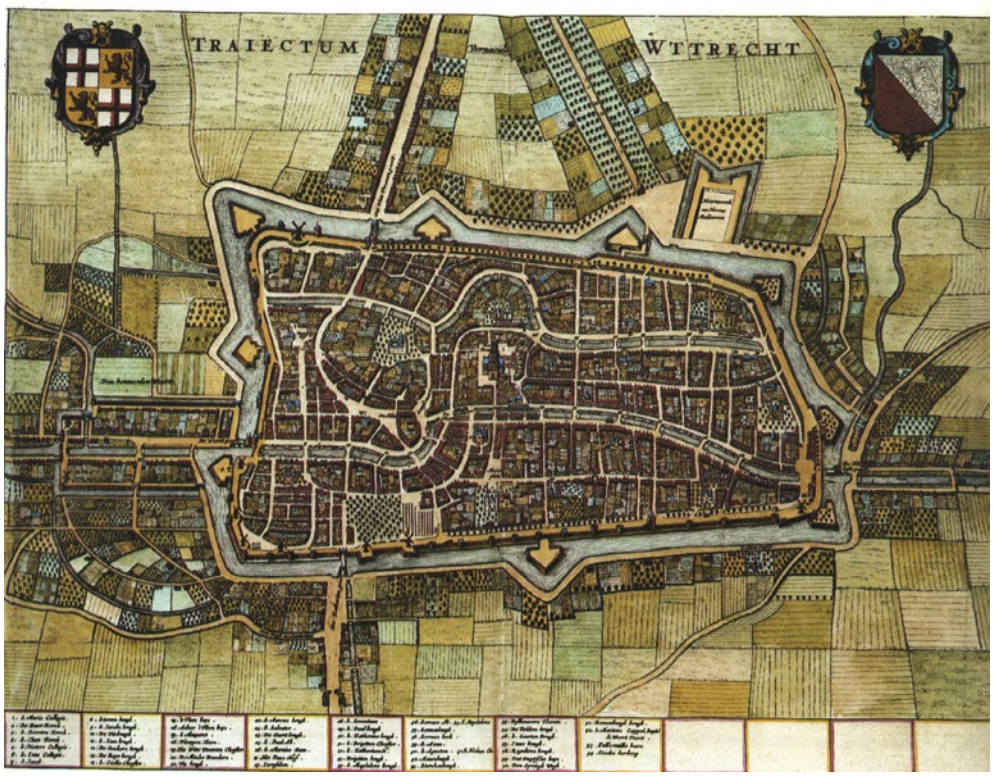


Fig. 8.38 Utrecht in 1652 by Blaeu (133 ha, population size 30,000). Gardens and orchards are clearly depicted within the walls. The urban fringe is used for horticulture, but also arable farming.

Fig. 8.39 Utrecht. The distribution of sites plotted on the Van Deventer map. Most traces are located within the walls, where the spectrum is dominated by horticulture. Around the urban fringe of the town agrarian activities are more diverse.

Table 8.17 Scored themes in selected research locations in Utrecht.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Visschersplein	2035451100	-	-	-	3	-	-
2	Wittevrouwenstraat 9-10	2054284100	-	-	-	1	-	-
3	Vredenburg	2172560100	-	1	-	3	-	-
4	Oudegracht 74	2219857100	-	-	-	1	-	-
5	Gansstraat 38-44	2225201100	1	-	-	1	1	-
6	Catharijnesingel (Riolering)	2246935100	-	1	-	-	-	-
7	Smakkelaarsveld	2249479100	-	2	-	4	-	-
8	Stationsstraat	2275503100	2	1	-	2	-	-
9	Kromme Nieuwegracht, Achter Sint Pieter en Pausdam	2286082100	-	-	-	1	-	-
10	Briljantlaan 5	2373319100	-	1	1	4	5	-
11	Ganzenmarkt	2416095100	3	2	-	3	-	-
12	Sint Jacobsstraat	2477526100	-	1	-	1	2	-

Deventer's map Utrecht had a relatively large amount of garden space with almost a quarter (24.5%) of the town's area in use as town gardens. Blaeu's map from 1649 shows urban farming within the walls (Fig. 8.38) and also in the urban fringe.

Utrecht is represented in this study by twelve research locations (Fig. 8.39, Table 8.17):

- Briljantlaan (2373319100);
- Catharijnesingel (2246935100);
- Gansstraat 38-44 (2225201100);
- Ganzenmarkt (2416095100);
- Kromme Nieuwegracht/ Achter Sint Pieter en Pausdam (2286082100);
- Oudegracht 74 (2219857100);
- Sint Jacobsstraat (2477526100);
- Smakkelaarsveld (2249479100);
- Stationsstraat (2275503100);
- Visschersplein (2035451100);
- Vredenburg (2172560100);
- Wittevrouwenstraat 9-10 (2054284100).

It can be seen that traces of urban farming have been found on quite a lot of sites in Utrecht. Horticulture, especially, as well as some arable farming and animal husbandry are present. The activities show no zoning but two of the three excavated sites which have produced evidence for animal husbandry are situated just outside the town walls (Gansstraat[557], Briljantlaan[558]). Four sites within the town only yielded evidence for horticulture. The frequency and percentage in which evidence for horticulture has been found in Utrecht is unique in this study. This long tradition of horticulture both within and outside the town, is additionally confirmed by historical sources.[559] Historical sources confirm the presence of orchards and vegetable gardens in the fourteenth century. The town did not expand beyond the town walls until the nineteenth century. Urban farming within the town walls was possible because the population remained fairly stable during medieval and early modern times. Due to this fact a lot of sites show traces of urban farming continuing from medieval times towards the early modern period, including an example on Sint Jacobsstraat.[560] Sites situated within the town walls such as Utrecht-Ganzenmarkt (dating to the medieval period) show a diverse mix of activities including arable farming, horticulture, and indicators of general urban farming.[561] Furthermore, as the town was not densely occupied, this left a lot of open spaces, suitable for gardens. A shift from diverse urban farming activities towards a monoculture (like horticulture) is visible at the site Smakkelaarsveld.[562] Older traces in this area (dating to medieval times) suggest mixed rural exploitation in contrast to the later use in early modern times.

Amersfoort

The strategic position of the settlement motivated the Bishop of Utrecht to build one of his courts in Amersfoort in 1203. Shortly after 1200 a large-scale intervention took place with the digging of the Korte- and the Langegracht. This improved the drainage and flow of waste water outwards the north-west. The bishopric granted the settlement town rights in 1259. The new chart and privileges stimulated trade and crafts and enabled the citizens to organize the cultivation and drainage of the adjacent area of the Gelderse Vallei. The town had previously been surrounded by an earthen rampart, and the first stone town wall was constructed at the end of the thirteenth century. The wall ran from the current outline of buildings of Muurhuizen, on to the inside of the Westsingel, Zuidsingel, Weverssingel and het Zand (18 ha). In 1340 there was a major town fire in which about half of the buildings were destroyed or damaged. The harbour was re-build outside the Koppelpoort c. 1400. Around 1450 a second town wall was completed, which tripled the surface area of the walled town (64 ha). The population grew from 840 in 1300-1325 to 1,800 in 1350-1375.[563] In 1450 the town had 3,300 inhabitants, and this number grew steadily to 4,250 inhabitants in 1500.[564] The peak was reached in 1632, when c. 8,000 people lived in Amersfoort. In the sixteenth century, the town suffered greatly from acts of war. The economic prosperity of the fourteenth century did not continue and stagnation set in. The growth of the urban area stagnated already in the fifteenth century and Amersfoort only built outside its medieval walls at the end of the nineteenth century (Fig. 8.40, Fig. 8.41). The population grew again from c. 1700 onwards and reached 12,889 inhabitants in 1840.[565]

Amersfoort is represented by six research locations indicating urban farming practice (Fig. 8.42, Table 8.18). These are:

- Kreupelstraat/Achter de Kamp (2013832100);
- Smallepad (2095870100);
- Westsingel Hellestraat (2183917100);
- Koestraat 14-16 (2222172100);

557 Bouma 2011, 9.
558 Asch & Moolhuizen 2016, 159.
559 Sangers 1952, 28.
560 Van Wieren 2017, 13-19.
561 Van der Mark 2015, 56, 185-195; Van der Linden & Hänninen 2015.
562 Verbruggen 2013b, 91-93.
563 Snieder 2009, 85.
564 Rommes 2009, 230.

Fig. 8.40 Amersfoort in 1570 by Van Deventer (c. 64 ha). The town shows a densely build centre and more open spaces and larger gardens towards the outskirts of town. Areas outside the town are cultivated and show horticulture and arable land.

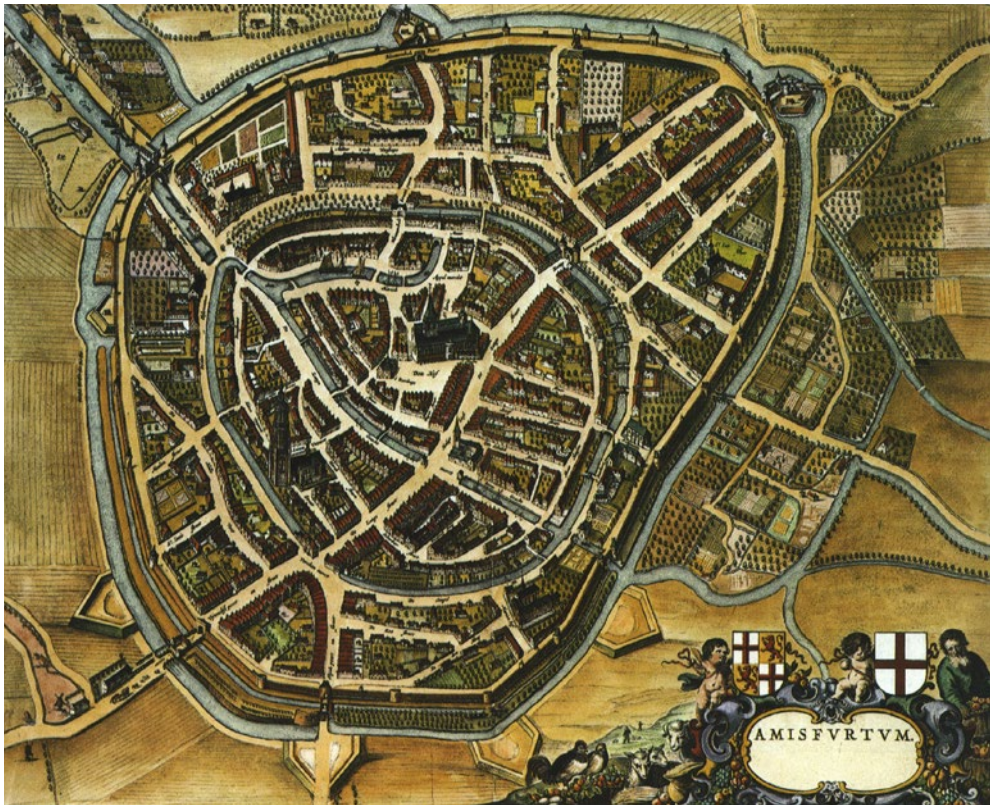


Fig. 8.41 Amersfoort in 1652 by Blaeu. The existing rural settlements just outside the town walls expanded between 1550 and 1650 and the town is surrounded by horticulture, orchard and arable farming.

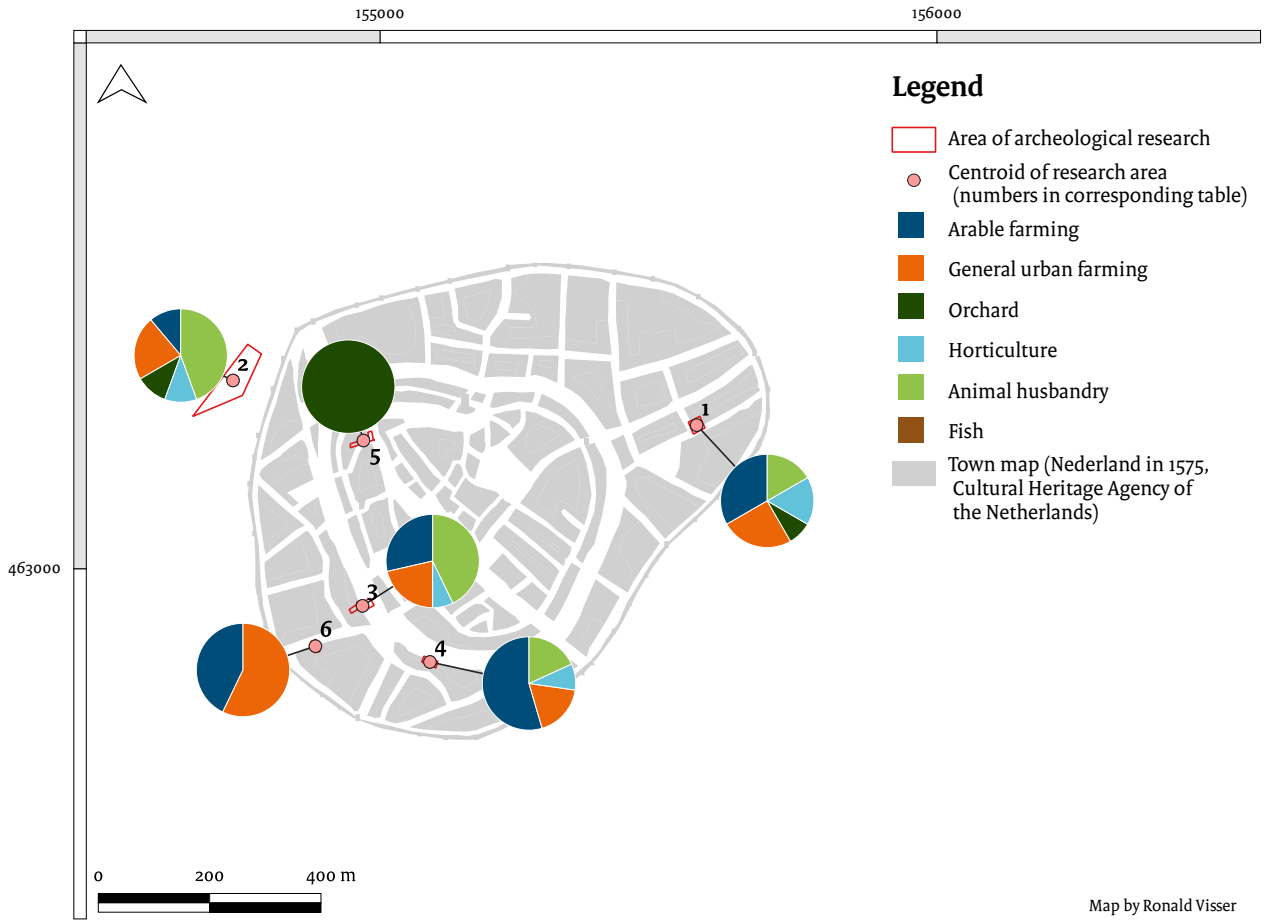


Fig. 8.42 Amersfoort. The distribution of sites plotted on the Van Deventer map. Most indications are located within the walls, where the spectrum is mixed. However, the emphasis lies on arable farming or animal husbandry.

Table 8.18 Scored themes in selected research locations in Amersfoort.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Kreupelstraat; Achter de Kamp	2013832100	4	3	1	2	2	-
2	Smallepad	2095870100	1	2	1	1	4	-
3	Westsingel Hellestraat	2183917100	4	3	-	1	6	-
4	Koestraat 14-16	2222172100	6	2	-	1	2	-
5	Elleboogkerk	2342888100	-	-	1	-	-	-
6	Utrechtsestraat 30-32	2381395100	3	4	-	-	-	-

- Elleboogkerk (2342888100);
- Utrechtsestraat 30-32 (2381395100).

Archaeological research shows that urban farming within the town walls continued in Amersfoort from the medieval period until the early modern times. Five of the six sites are within the old town of Amersfoort. The diverse pattern of agrarian practices is visible but not limited to the earliest period.

A farmstead existed in the thirteenth and fourteenth centuries at a location on Kreupelstraat/Achter de Kamp and many traces show a diverse agrarian use over the centuries until the area became part of a communal space where crops were grown in the seventeenth century.[566] Evidence for the cultivation of tobacco, which increased from 1615 onwards until 1780 is one particularly noteworthy activity. A comparable situation was found at Koestraat 14-16.[567] This area was probably used for arable farming but retained a rural character. Traces of haystacks, sheds or barns were found by excavators and these had continued in use after the area had been enclosed by the town wall. Blaeu's map shows haystacks and relatively open spaces in this area (Fig. 8.41).

565 Van der Woud 2010, 26.
566 Van Dijk & d'Hollosy 2007, 11-19.

8.5.5 Holland

The earldom Holland gained independence c. 1100, but had been in existence as a much smaller area for at least a century based on property rights that included parts of the present province of Zuid-Holland, along with Zuid-Kennemerland in the north. Vlaardingen is a good example of such early land ownership. In the twelfth century the earls expanded their realm by repeated military conquests focusing for instance on Dordrecht because of its huge toll income. Time and effort were invested in the reclamation of the fenlands towards the east. The province of Holland reached its current form in the fourteenth century, encompassing parts that had hitherto belonged to Sticht Utrecht (Nedersticht). The court – the political and administrative centre – was located in The Hague.

From the end of the thirteenth century onwards, urban development shifted from the southern to the northern Netherlands. It concentrated on a large number of port towns in the low-lying part of the Netherlands on easily navigable waterways (e.g. Enkhuizen Hoorn, Edam, Amsterdam, Gouda, Rotterdam and Vlissingen). In many cases, the port was the central point.[568]

The drainage of the fenlands started oxidation processes, resulting in land subsidence and the drowning of crops. In the fourteenth century, arable farming diminished in importance and grain needed to be imported. The emphasis changed to animal husbandry, leading to a surplus of butter, cheese and meat for the markets.[569] The polders were protected by dikes and water management. Channels were dug that interconnected natural rivers, serving water traffic of towns like Gouda, Haarlem, Leiden and Delft. Holland was also known for its horticulture in the fourteenth century, because of the presence of the court and many convents.[570]

When the Black Death devastated the population in the south of Europe, the river trade suffered in the north and the focus shifted towards sea trade. Holland became the dominant province because of its economic success. It played a leading role in the resistance against Spain during the Eighty Years War and throughout the Dutch Republic (1588-1795). Many people migrated to the towns, this included immigrants as well as the rural population from surrounding areas. Amsterdam grew rapidly, developing urban expansions in a hurry in the sixteenth and seventeenth centuries. The Black Death also reached Holland, however. Several outbreaks occurred between 1450 and 1668. Indeed, the plague was a – sometimes yearly – recurring phenomenon. Death rates differed each year, but a mortality rate of 10% was not exceptional.[571] Because of their economic success and political power, the towns in Holland entered into stagnation much later than the inland towns, in the late seventeenth century. Industrialisation brought prosperity back in the late nineteenth century, similar to other regions.

Alkmaar

Alkmaar started as a rural settlement on one of the coastal barriers in the twelfth century, already possessing a church built of tuff. Its location next to a small freshwater lake *Het Voormeer*, connected the settlement to a network of waterways, assuring economic success. Alkmaar was dependant on these waterways until the nineteenth century. The town was granted rights in 1254. The count, Floris V, built two castles, the *Nieuwburg* and the *Middelburg* c. 1282. These served as defended strategic positions in his fight against the Frisians.

Alkmaar grew in size in consecutive phases between 1200 and 1850 from 37 ha (1350) to 44 ha (1525) and 59 ha (1600) including fortifications. The town served as a regional market for farming produce, especially dairy. Growth is documented in the maps of Van Deventer (1550, Fig. 8.43) and Blaeu (1649, Fig. 8.44). The population size increased from c. 8,000 (1550) to c. 14,000 (1650). Farming intensified in the urban fringe during the later period and some open spaces within the walls were built over. A map by Cornelis Drebbel (1597) shows ploughing and the harvesting of grain fields on the sandy ridges (*geestgronden*), grass harvesting on the marshy hay meadows, cattle in the meadows and bird catching with nets, all in the urban fringe (Fig. 8.45). The start of stagnation can be dated to 1660, a few years after Blaeu drew his map. Alkmaar recorded outbreaks of the Black Death for ten years, between 1599 and 1657.[572] Over this time the

567 d'Hollosy & Verhamme 2011, 17-19.
568 Rutte & IJsselstijn 2014, 172.
569 Rutte & IJsselstijn 2014, 175.
570 De Boer & Cordfunke 1995; www.geschiedenisvanzuidholland.nl/verhalen/het-ontstaan-van-holland.
571 Noordegraaf & Valk 1996. Focus lies on the late medieval period in Holland.

Fig. 8.43 Alkmaar in 1560 by Van Deventer (c. 44 ha population size c. 8,000). The town borders the fresh water lake, *Het Voormeer.* Large areas remain as green open spaces (gardens 23%). The urban fringe is depicted as communal pastureland.

population dropped from c. 14,000 to c. 13,000 inhabitants. However, the largest demographic decline is documented in c. 1750, when the number of recorded inhabitants dropped from 12,500 to 7,865 due to economic decline (Table 8.4).

Alkmaar is represented in the database by nine research locations (Fig. 8.46, Table 19):

- Doelenstraat St. Jorisstraat (2315541100);
- Gedempte Nieuwesloot 46 Doelenveld (2341097100);
- Gedempte Nieuwesloot (2372582100);
- Gasthuisstraat (2069245100);
- Laat Houtmarkt (2047926100);
- de Laat 208-212 (2349310100);
- Paardenmarkt (2287970100);
- Schoutenstraat (2428172100);
- Spanjaardstraat (2181081100).

Almost all traces of urban farming are located within the town walls where the spectrum is mixed, with an emphasis on animal husbandry. The majority lies in the part of the fourteenth century expansion. Furthermore, these archaeological findings correlate with the cartographic evidence. A selection is presented below.

The oldest traces of dung that have been recovered dates from the tenth century and

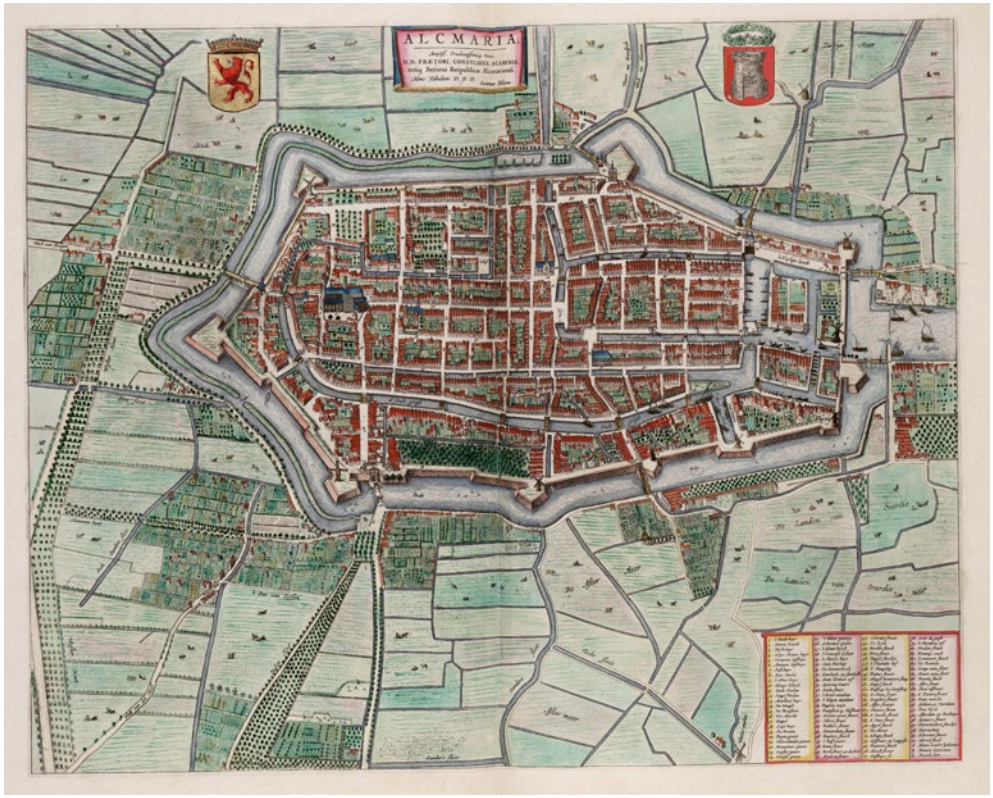


Fig. 8.44 Alkmaar with fortifications in 1649 by Blaeu (59 ha, population size c. 1,000). Orchards are clearly depicted within the walls. The urban fringe shows evidence of intensified urban farming, with pastureland for grazing cattle, and horticulture.

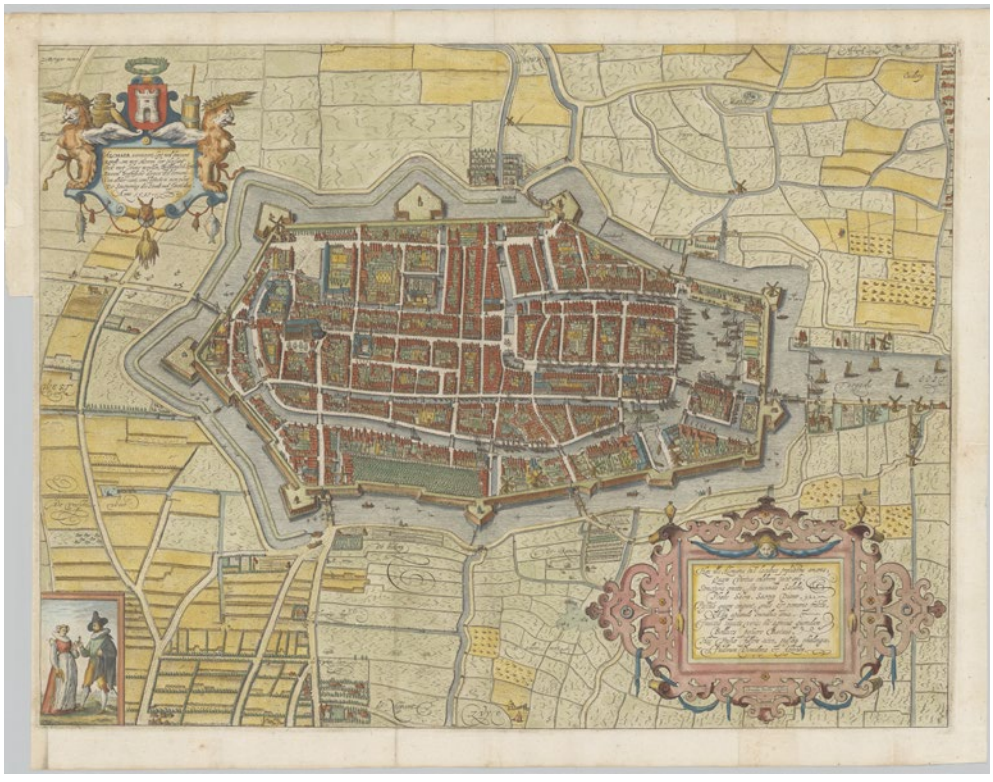


Fig. 8.45 Alkmaar in 1597 by Drebbel showing ploughing and harvesting of grain fields on the sandy ridges (1-3), grass harvesting on the marshy hay meadows (4), cattle in the meadow (5) and bird catching with nets.

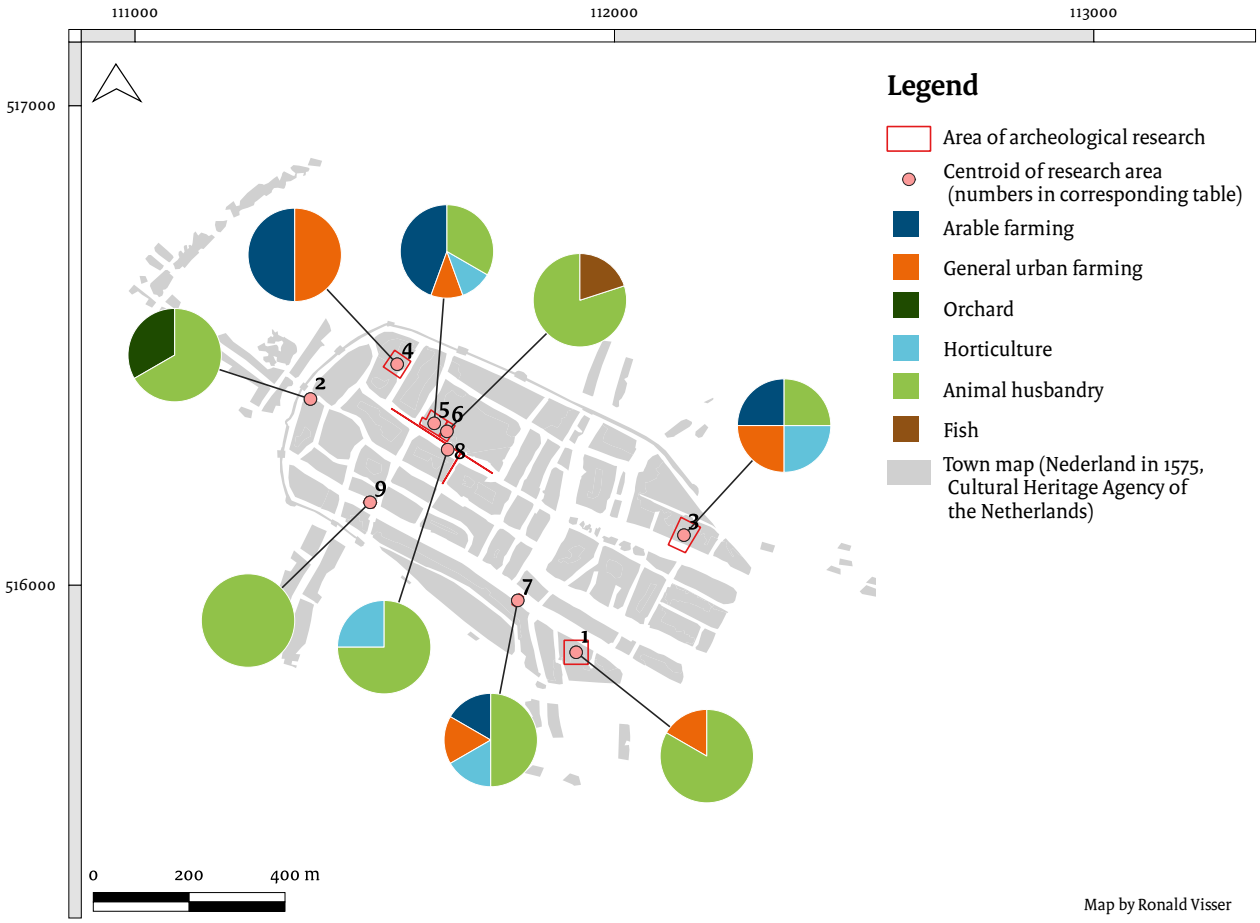


Fig. 8.46 Alkmaar. The distribution of sites plotted on the Van Deventer map. Most indications are located within the walls, where the spectrum is mixed. However, the emphasis clearly lies on animal husbandry.

Table 8.19 Scored themes in selected research locations in Alkmaar.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Laat Houtmarkt	2047926100	-	2	-	-	10	-
2	Gasthuisstraat	2069245100	-	-	1	-	2	-
3	Spanjaardstraat	2181081100	1	1	-	1	1	-
4	Paardenmarkt	2287970100	2	2	-	-	-	-
5	Doelenstraat/St. Jorisstraat	2315541100	4	1	-	1	3	-
6	Gedempte Nieuwesloot 46/ Doelenveld	2341097100	-	-	-	-	4	1
7	Laat 208-212	2349310100	1	1	-	1	3	-
8	Gedempte Nieuwesloot	2372582100	-	-	-	2	6	-
9	Schoutenstraat	2428172100	-	-	-	-	1	-

were found at sites in de Laat 208-212[573], with additional evidence in the eleventh century at Doelenstraat St. Jorisstraat.[574] Two farmsteads from the fifteenth century have been found at Laat Houtmarkt.[575] These farmhouses contained a barn on the south side. The ditch or gully in the middle of the barn served for the removal of dung indicating that cattle were being stalled. Later information on barns is provided by cadastral data from 1832. This map evidence correlates with houses at a site on Gedempte Nieuwesloot 46 Doelenveld.[576] In this case it is stated that the house had a barn for agricultural purposes. The same cadastral overview shows that the adjacent parcels of land consisted of meadows, owned by the town of Alkmaar.

The presence of arable land and pastures in the vicinity of a site at Paardenmarkt were identified by pollen analysis (1200-1300). [577] Earlier evidence in the form of threshing waste and rye straw (1375-1425) was found in the infill of a well, indicating that this crop had been grown locally.[578] A large number of seeds of grassland plants were recovered by an excavation at Oudorp-Lauwershof (1275-1600).[579] The analysis of these samples suggested that the seeds came from an area of extensive grassland and had ended up in the settlement in fodder for grazing animals, or through the movement and storage of hay.

A six-post structure found during the excavation of a site at Gedempte Nieuwesloot 46 Doelenveld was interpreted as a haystack (900-1200).[580] At Paardenmarkt the skeletal remains of a carp were found in a well (1125-1200).[581] In the report of Spanjaardstraat (1550-1780) the finds of flowerpots were interpreted as pots that had been to grow kitchen herbs for daily use, rather than being used for ornamental flowers.[582]

Enkhuizen

Enkhuizen developed from two rural parishes in the twelfth century. The first settlement (Enghusen), a fishermen's village, suffered from floods from the Zuiderzee and the villagers relocated behind the dikes closer to the neighbouring parish. The town was granted town rights in 1356. Shortly after, the first town wall was erected and the construction of the ports began (*Zuiderhaven* and *Rommelhaven*). The economy – oriented towards the sea – was based on fishing (herring) and long-distance trade. Prosperity in the fifteenth century led to the construction of two parish churches as well as several monasteries (Fig. 8.47). Enkhuizen also boomed and expanded in the sixteenth and seventeenth century. It received the right to compensation for the beaconing of the shipping route via Vlie and Marsdiep. It was influential in the establishment of the East Indies Company (VOC) in 1602 and the West Indies Company (W.I.C.) in 1621. Between 1593 and 1600, the town underwent a considerable expansion on the west side although this space was never fully filled.

Stagnation came after 1660, when the town faced increased competition from Amsterdam. In 1622, Enkhuizen had a population of c. 21,000. This had dropped to c. 5,000 in 1840. Outbreaks of the Black Death were recorded in eleven years in the period between 1599 and 1669.[583] The number of houses decreased dramatically, from 3,600 houses in 1630 to only 1,000 in 1840. Many vacant houses were demolished and orchards and vegetable gardens were established, especially in the area of the never fully developed urban expansion of 1593 (Fig. 8.48).[584] In the early nineteenth century there were more than 30 town farms in Enkhuizen. This area is known as the *Boerenhoek* (Farmers' Corner).[585]

Enkhuizen is represented in the database by six research locations where farms and agricultural activities have been identified throughout different periods of time (Fig. 8.49, Table 8.20). These are:

- Molenweg (2286925100);
- Kaasmarkt-Noorderhavendijk (2287840100);
- Schootsveld (2460986100);
- Vijzelstraat (2296037100);
- Westerstraat (2429469100);
- Zuider Boerenvaart 43 (2269283100).

Most traces of urban farming are not located outside the walls depicted by Van Deventer, but inside the town. Most signs of diverse urban farming are located in the area of the seventeenth century expansion. The emphasis lies on horticulture and orchards. In the old centre animal husbandry is best represented. The archaeological distribution correlates with cartographic evidence and trend towards ruralisation. Evidence from the Molenweg excavation offers a textbook example of ruralisation.[586] In the eighteenth and nineteenth centuries, after vacancy and decay, houses in the area were demolished and orchards were laid out. During the excavation, a thick layer of

572 Noordegraaf & Valk 1996, 231.
573 Bitter 2013, 54.
574 Loopik 2013, 23.
575 Bitter & Van den Berg 2014, 33-45.
576 Griffioen et al. 2015, 11.
577 Hakvoort *et al.* 2015, 257.
578 Moolhuizen 2013, 82.
579 Van Haaster 2015, 60.
580 Griffioen *et al.* 2016, 7.
581 Beerenhout 2015, 143; Van Neer & Ervynck 1993, 42.
582 Bitter & Roedema 2010, 79.
583 Noordegraaf & Valk 1996, 231.
584 Vermeer & Koeman 2018.
585 Summary taken from Stenvert et al 2010, 288-289.

Fig. 8.47 Enkhuizen in 1560 by Van Deventer (c. 44 ha population size c. 8,000).

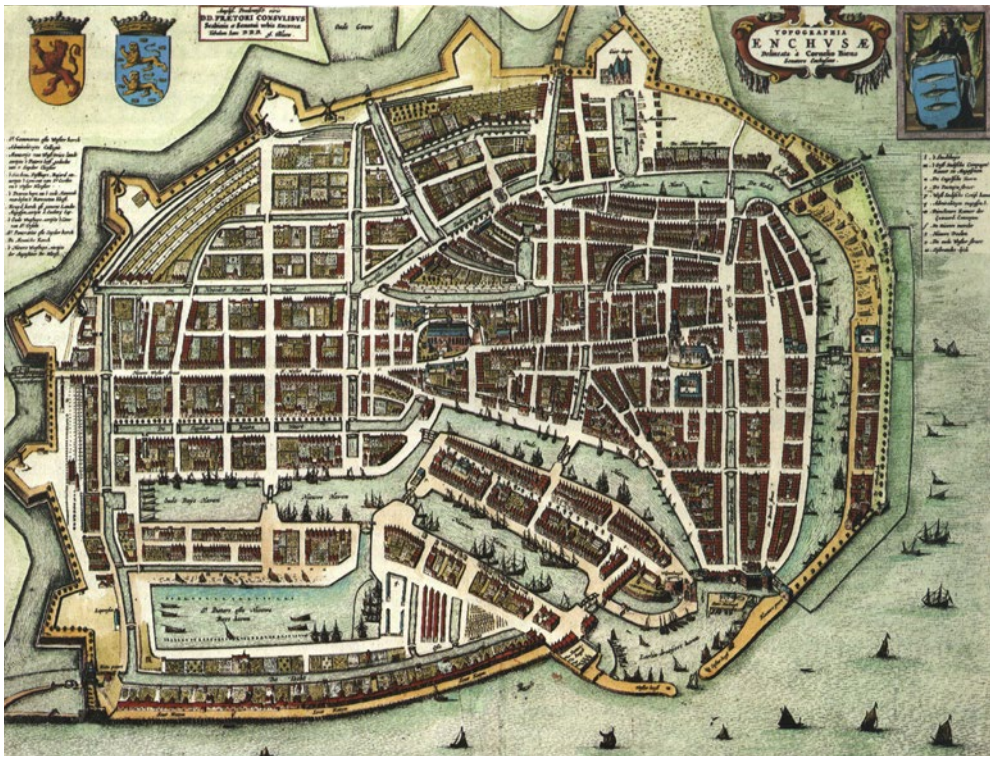


Fig. 8.48 Enkhuizen with fortifications in 1652 by Blaeu (population size c. 21,000). Pastures, orchards and vegetable gardens were created, particularly in the area of the urban expansion of 1593, In the early nineteenth century there were more than 30 town farms here. This part was called the *Boerenhoek* (Farmers' Corner). The arrow marks the location of the *Boerenhoek*.

Fig. 8.49 Enkhuizen. The distribution of sites plotted on the Van Deventer map. Most indications are located outside the walls. In the urban fringe the spectrum is mixed. In the centre the emphasis is on animal husbandry.

Table 8.20 Scored themes in selected research locations in Enkhuizen.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Zuider Boerenvaart 43	2269283100	1	3	1	1	1	-
2	Molenweg	2286925100	-	1	2	3	1	-
3	Kaasmarkt-Noorderhavendijk	2287840100	-	-	-	1	1	-
4	Vijzelstraat	2296037100	-	-	-	-	1	-
5	Westerstraat 188	2429469100	1	-	1	1	4	-
6	Schootsveld	2460986100	4	-	-	1	1	-

garden soil containing debris was found. In addition, possible drainage ditches were found which related to the areas use as an orchard. Similar evidence was found at Westeinde 107, in the urban fringe of Enkhuizen. Research at the Zuider Boerenvaart delivered evidence for a farmstead, vegetable garden, orchard and barn dating to the eighteenth century.

Animal husbandry can be traced by dung at two sites in the old centre (Kaasmarkt and Vijzelstraat), dating to the fourteenth and fifteenth centuries, resp. in an accumulated layer and in a dung pit. The latter might also reflect horticulture because of the fertilization purposes.

Gouda

A pre-urban settlement at Gouda has been dated to the eleventh century. The later town developed as a port between the rivers Hollandse IJssel and Gouwe. The town obtained a town charter in 1272. Between 1367 and 1370 there were as many as 85 different brewers in the town. Hop plants were cultivated in the area, according to historical evidence from 1334. Set in a reclaimed peat bog, Gouda is also known for its turf trade. From 1350 turf and beer – became export products which were shipped out via the river trade.[587] The old town developed within ditched enclosures and embankment in 1350 and reached its main layout during this period (Fig. 8.50, Fig. 8.51).[588] The Counts of Blois had a new castle built on the outskirts of the town between 1361 and 1384 at the confluence of the rivers Gouwe and Hollandse IJssel. This underlined the fact that the town mainly profited from the busy inland river trade between Flanders and Holland. Gouda became the fifth town of Holland and was famous for its cheese market. Economic stagnation came in the second half of the seventeenth century. Outbreaks of the Black Death were recorded in 28 years between 1480 and 1668.[589] One episode after that, in 1673, killed 20% of the population (c. 3,000 people). The Eighty Years' War also had a detrimental effect on the town's population. In the early eighteenth century (c. 1730), the clay tobacco pipe industry revived the town, but decay set in shortly afterwards until the nineteenth century.

Gouda is represented in the database by seven research locations (Fig. 8.52, Table 8.21):

- Binnenstad Gouda (2400712100);
- Bolwerk (2180539100);
- Groeneweg and Geuzenstraat (2121327100);
- Kleiweg 27-31-Slapperdel (2363761100);
- Koningshof, two investigations (2100972100 and 2113892100);
- Rioleringen (2358683100).

586 Duijn 2011, 119.
587 Ibelings & Smit 2002, 117.
588 Van den Berg, Sprokholt & Goudriaan 2002, 24-26.

Fig. 8.50 Gouda in 1550 by Van Deventer.

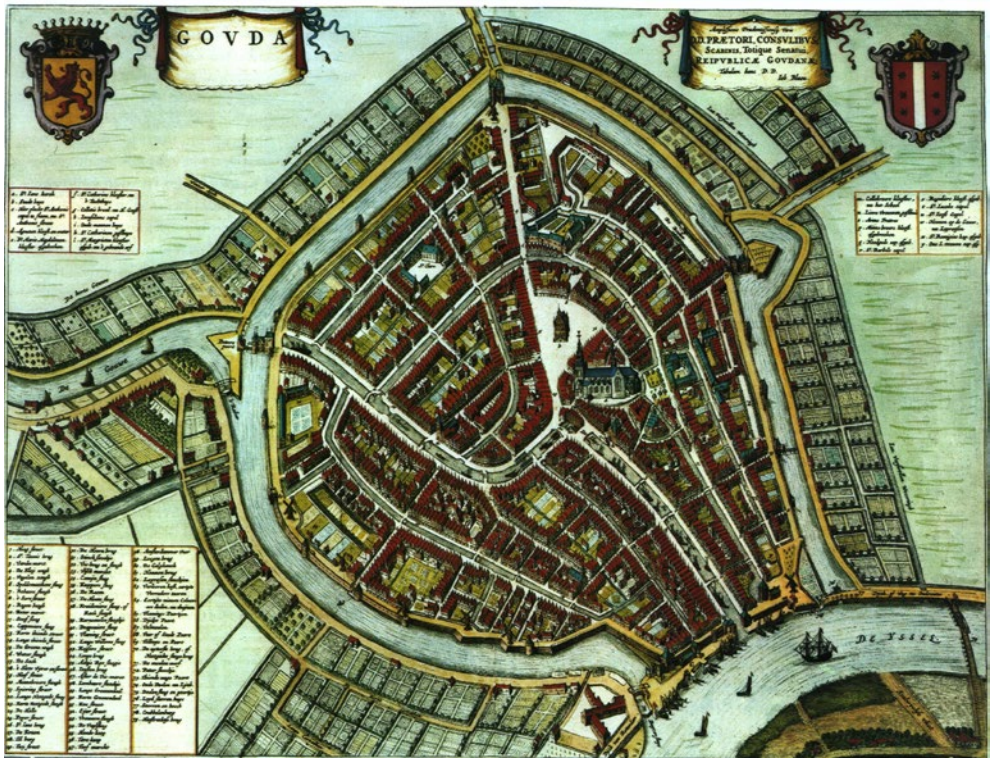


Fig. 8.51 Gouda in 1652 by Blaeu, showing one rampart (population size c. 15,000.). Orchards, and plots of land for horticulture and pastures are clearly depicted in the urban fringe. Gardens can be seen within the enclosure, notably along the waterside.

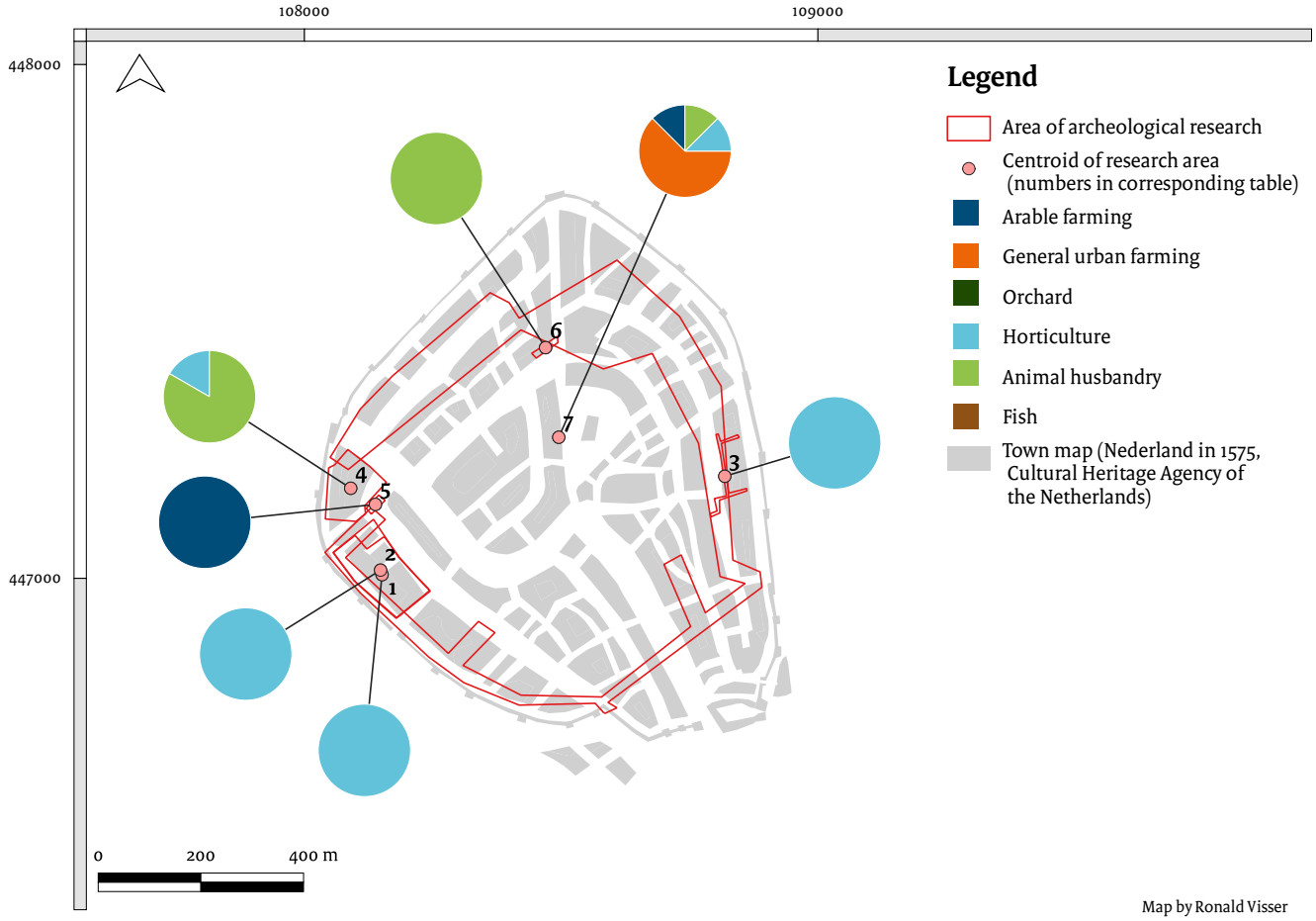


Fig. 8.52 Gouda. The distribution of sites plotted on the Van Deventer map. All indications are located inside the enclosures. Most are located along the town borders. The spectrum is mixed, but orchards are missing.

Table 8.21 Scored themes in selected research locations in Gouda.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Koningshof	2100972100	-	-	-	2	-	-
2	Koningshof	2113892100	-	-	-	3	-	-
3	Groeneweg en Geuzenstraat	2121327100	-	-	-	2	-	-
4	Bolwerk	2180539100	-	-	-	1	5	-
5	Rioleringen	2358683100	2	-	-	-	-	-
6	Kleiweg 27-31-Slapperdel	2363761100	-	-	-	-	1	-
7	Binnenstad Gouda	2400712100	1	5	-	1	1	-

Almost all findings are located in the inner town area enclosed by the channels. The spectrum is mixed, but orchards seem to be missing. The evidence for gardens corresponds to the information on historic cartographic sources.

A farmstead was traced at a location on the Koepoort (Binnenstad), dating to the late medieval period. More dung was found at a site on Kleiweg, possibly belonging to a fourteenth century farm with animal husbandry.[590]

In the Gouda-Rioleringen project arable fields with plough marks were found at a site on the Sophiastraat (1250-1500).[591] At the Koningshof, the remains of an eighteenth century garden, garden wall and flowerpots were found. Similar eighteenth century features and finds were recovered by excavations at the Groeneweg and Geuzenstraat. The remains of an ornamental bridgehead, which was probably constructed as a feature in the nineteenth century park was excavated at a site on the inner town (Binnenstad).[592]

Hoorn

Comparable to Enkhuizen, Hoorn is situated along the Zuiderzee and originated as a settlement of fishermen and farmers in the twelfth century. The town obtained a town charter in 1357 and flourished through long distance trade and the shipping of herring to the Baltic, France, Portugal. Trade with Norway brought in large amounts of Norwegian spruce wood for shipbuilding.[593] Hoorn expanded in the fifteenth and sixteenth centuries and contained a range of churches, monasteries and hospices. The town was surrounded by a rampart with four gates. By 1500, Hoorn had a population of about 5,000, mostly farmers and fishermen. At the beginning of the sixteenth century, the port was considerably expanded and fortified with walls and towers (Fig. 8.53). Hoorn played an important role in resisting the Spanish during the Eighties Years' War. The Spanish fleet was sunk in 1573 off the coast of Hoorn during a naval battle. After this, the town prospered and gained political, economic and naval power. Many ships left Hoorn for the East- and West-Indies (Fig. 8.54). Economic decline set in the late seventeenth century. The Black Death broke out 24 times between the years 1493 and 1665, at a time when the town was still successful.[594] Over the course of the eighteenth and nineteenth centuries the town's population dropped to 7,500 inhabitants and 1,600 houses and warehouses were demolished. As in the case of Enkhuizen, Hoorn faced large-scale decline and de-urbanisation.

Hoorn is represented in the database with five research locations (Fig. 8.55, Table 8.22).

- Achterstraat 19-21 (2133242100);
- Grote Noord 2-6 (2085761100);
- Kleine Havensteeg 7-9 (2257821100);
- Koepoortsweg 73 (2219946100);
- Vogelpoel, Westerdijk 13-17 (2287410100).

Five sites are located inside the centre. The spectrum is mixed. On the whole, horticulture and animal husbandry are best represented. One site is located in the urban fringe. Here, a farmstead and dung pits were recorded (Perceel Dorpsstraat in Zwaag, 1175-1225).

Dung pits from the full and late Middle Ages have been found in Grote Noord 2-6 (1310-1350), as well as remains of wickerwork (dating 1280-1310) that may have been the remnants of

589 Noordegraaf & Valk 1996, 231.
590 Van Dasselaar 2012, 14.
591 De Rijk, Wagner & Van Dasselaar 2013, 32; kunst-en-cultuur.infonu.nl/geschiedenis/52396-hoorn-de-geschiedenis-in-jaartallen
592 Engelse, Wagner & Van Dasselaar 2018, 80.
593 Lesger 1990.
594 Noordegraaf & Valk 1996, 231.

Fig. 8.53 Hoorn in 1560 by Van Deventer. The town faces the Zuiderzee. Many open spaces are depicted, c. 78% is built-on. The urban fringe is portrayed as pastureland.

Fig. 8.54 Hoorn in 1649 by Blaeu showing fortifications and intensified shipping activity. The open spaces seen on the 1560 map have been built on. Some orchards, plots of land for horticulture, are clearly depicted, with mostly pastures in the urban fringe.

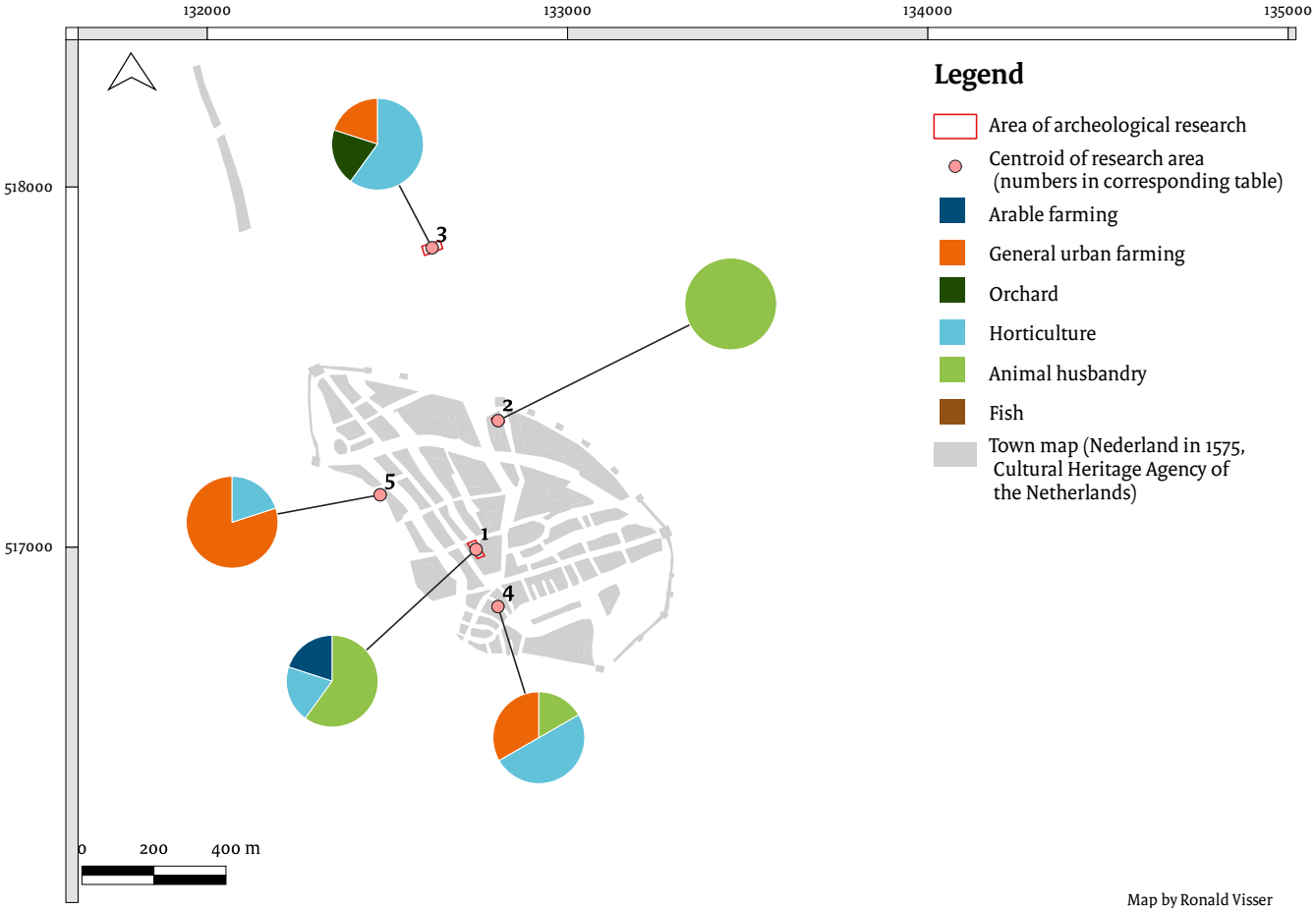


Fig. 8.55 Hoorn. The distribution of sites plotted on the Van Deventer map. Four sites are located inside the old centre. The spectrum is mixed, however animal husbandry is well represented.

Table 8.22 Scored themes in selected research locations in Hoorn.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Grote Noord 2-6	2085761100	1	-	-	1	3	-
2	Achterstraat 19-21	2133242100	-	-	-	-	1	-
3	Hoorn	2219946100	-	1	1	3	-	-
4	Kleine Havensteeg 7-9	2257821100	-	2	-	3	1	-
5	Vogelpoel, Westerdijk 13-17	2287410100	-	4	-	1	-	-

chicken coops.[595] Furthermore, an iron rake and pitchfork were recorded in an elevated layer that dated from 1300-1350.[596] At locations on Kleine Havensteeg 7-9 and Koepoortsweg 73 features were traced relating to the drainage of peat to prepare the land for agricultural use (eleventh and twelfth century). For the later periods Koepoortseweg presented various phases of garden landscaping (1650-1850): first in French, next in English style. A site on the Achterstraat revealed a building which had possibly been used as barn in the early modern period. In addition, many sites have also produced fragments of flowerpots.

595 Schrickx & Van de Walle-van der Woude 2006, 23, 27.
596 Schrickx & Van de Walle-van der Woude 2006, 252.

Leiden

Leiden developed in the twelfth century out of three pre-urban settlements that were strategically located at the confluence of two courses of the river Rhine and several land routes. Town rights were granted in 1266 and the settlement soon became fortified, with walls enclosing the old cores (21 ha). The channels enclosing the centre connected to the Rhine and the inland thoroughfare towards Haarlem, Gouda and further. Leiden prospered and expanded three times in the fourteenth century. The town grew from 29 to 68 ha and up to 97 ha in size. Leiden's first economic stagnation phase came at the end of the fifteenth century when the textile industry collapsed and the town went bankrupt in 1494. As a consequence, the population shrunk and became impoverished.

During the Eighty Years' War Leiden joined the resistance against Spain. When the town was freed in 1574 it was able to rebuild its economy. The town expanded three times in the seventeenth during century and ultimately covered an area of 175 ha. These expansions and wide area were a necessity for the town's growing population (Fig. 8.56). Earlier, numbers had increased dramatically in the second half of the fifteenth century, from c. 6,000 to c. 13,000 and again a century later to c. 24,000. But this was nothing compared to the seventeenth century. The population peaked in 1650-1675 with 62,000 inhabitants (Table 8.4, Fig. 8.57). Leiden's seventeenth century success was linked to its university and its booming textile industry for which one of the extensions in the north was destined. Economic stagnation nevertheless set in for a second time in 1670, and the textile industry suffered. At this time the lower population density led to desertion and dereliction in the textile producing areas of the town. Losses were also felt because of the Black Death, which had been numerous outbreaks between 1483 and 1666, taking many lives.[597] In the period between 1800-1825, Leiden had only 29,000 inhabitants living in a town of 175 ha. The textile industry flourished once again and the economy was restored by the end of the nineteenth century, ending a time of poverty and slums.[598]

Leiden is represented in the database with seven research locations (Fig. 8.58, Table 8.23):

- Aalmarkt 8-9 (2157413100);
- Breestraat 46-48 (2469783100);
- Boshuizerkade, noordelijke sportvelden (2453785100);
- Hooglandse Kerkgracht (3998334100);
- Kaarsenmakerstraat (3985269100);
- Roomburg (2096250100)
- Nobel location (2390589100).

Most sites are located inside the old centre. The spectrum is mixed, however animal husbandry is best represented. Many traces of arable farming were found in the Aalmarkt excavation. The oldest traces of dung date from the tenth century.[599] Additionally, a complete skeleton of a cow was recorded (dating to 1150-1175).[600] The size of the excavated plots (1200-1300) suggests that the settlement had a rather agrarian character.[601] Threshing waste recovered from soil samples indicate that oats were used as fodder (1225-1275).[602] Various traces of vegetable gardens (1050-1250) have also been identified.[603] In the weed spectrum, species have been identified that indicate intensively fertilised vegetable gardens or fields. In addition, the discovery of broad bean stalks (*Vicia faba*) and the remains of beet seeds (*Beta vulgaris*) provides evidence of former vegetable gardens in the vicinity. Celery, plums and grapes may also have been grown locally but could not be directly linked to the site. Wood of at least two different fruit trees was found, dating from between 1250-1454.[604] Other finds include a shovel, which was found in an excavation at Breestraat 46-48. The skeletal remains of a stillborn calf were recovered from the same site (1500-1600).[605]

Excavations at Kaarsenmakerstraat, located to the east of the town centre, revealed an area used for agricultural purposes including vegetable gardens (1400-1600).[606] The garden soil was tested for acidity and nitrogen. Based on the relatively high nitrogen content, it was concluded that the garden had been fertilised in the past.

A garden vase in classical style (dating to the eighteenth century) was found at a site on the Boshuizerkade.[607] This type of artifacts underlines the importance and allure of gardens and parks for the Boshuizen estate.

597 Noordegraaf & Valk 1996, 231.
598 Summary taken from Rutte & Abrahamse 2014, 110-113.
599 Dijkstra & Endeman 2011, 36.
600 Esser, Beerenhout & Kootker 2011, 177.
601 Dijkstra 2011, 327.
602 Van der Meer, Vermeeren & den Ouden 2011, 268.
603 Dijkstra 2011, 331.
604 Van der Meer, Vermeeren & den Ouden 2011, 264.
605 Corver 2016, 76.
606 Meijer 2018, 72.
607 Dijkstra & Ter Steege 2017, 34.

Fig. 8.56 Leiden in 1545 by Van Deventer (97 ha). The town is enclosed by channels, the river Rhine splits into two courses. Many open spaces are depicted. The urban fringe is mainly portrayed as pastureland, in the north some orchards are portrayed, in the south arable fields are visible on both sides of the wall.

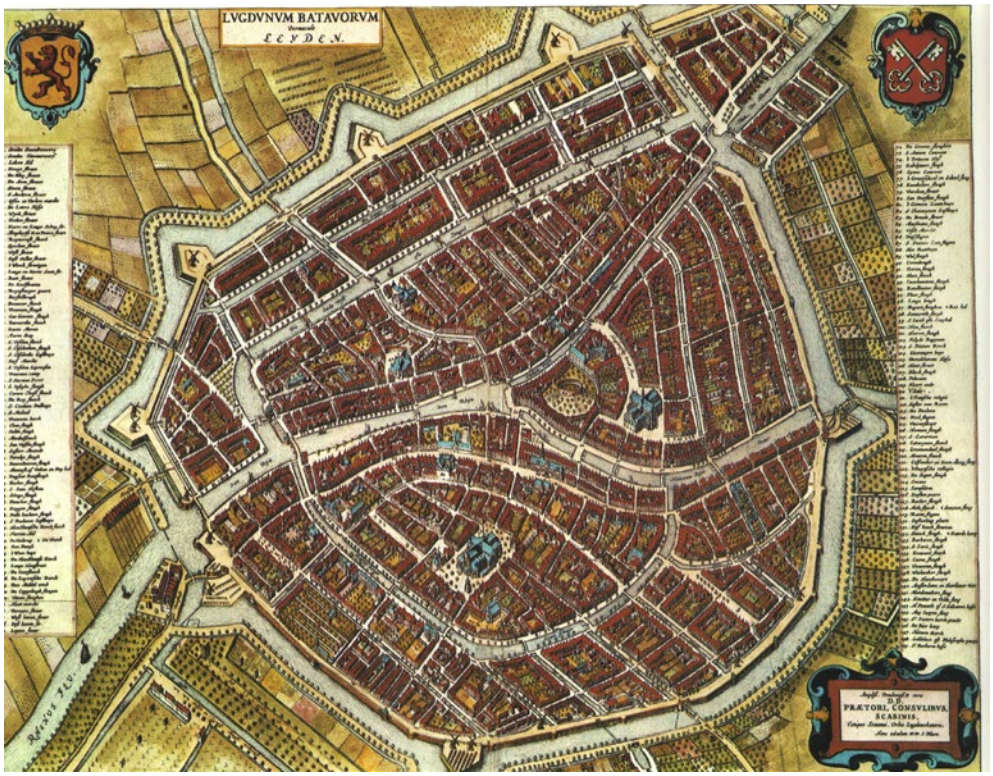


Fig. 8.57 Leiden in 1649 by Blaeu showing fortifications and a densely built-up area (135 ha). The open spaces seen on the 1545 map have been built-up. At this date Leiden was almost at its historic peak. Fields for horticulture and orchards are clearly depicted in the urban fringe.

Fig. 8.58 Leiden. The distribution of sites plotted on the Van Deventer map. Most sites are located inside the old centre. The spectrum is mixed, however animal husbandry is best represented.

Table 8.23 Scored themes in selected research locations in Leiden.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Roomburg	2096250100	-	-	1	-	-	-
2	Aalmarkt 8-9	2157413100	2	9	2	4	15	-
3	Nobel locatie	2390589100	-	3	1	-	2	-
4	Boshuizerkade, noordelijke sportvelden	2453785100	1	2	1	1	6	-
5	Breestraat 46-48 (Boommarkt -Rijnlandblok)	2469783100	1	2	-	-	3	-
6	Kaarsenmakerstraat	3985269100	-	-	-	5	2	-
7	Hooglandse Kerkgracht	3998334100	-	-	-	1	-	-

Vlaardingen

The first documentary reference to a church in Vlaardingen dates from the early eighth century. The pre-urban settlement was located where the river Vlaarding joins the Meuse. Just after the turn of the first millennium, the settlement was bestowed with a count's court and castle.[608] Vlaardingen became an administrative centre, its power increased after the successful defeat of the German imperial army at Vlaardingen in 1018, in the Battle of Vlaardingen. The counts minted coins and built a stone church in the twelfth century. Prosperity decreased after a great flood (Sint-Thomasvloed 1163). In 1273 Vlaardingen was officially granted town rights. However, urban growth stopped and no attempts were made to construct town walls, or to dig moats. At the beginning of the fifteenth century, Vlaardingen was one of the smallest towns of Holland, with a focus on fishing (herring) (Fig. 8.59). In the absence of any defensive structures, the town suffered from enemy action in the Eighties Years War. In the seventeenth century, the herring fleet grew to become the largest in the world. The economy was entirely dependent on sea fishing. The town

608 Hoek 1973, 119 -125.

Fig. 8.59 Vlaardingen in 1560 by Van Deventer. The town borders the river Meuse. There are no defences. The settlement takes the form of a strip village. The urban fringe is portrayed as pastureland.

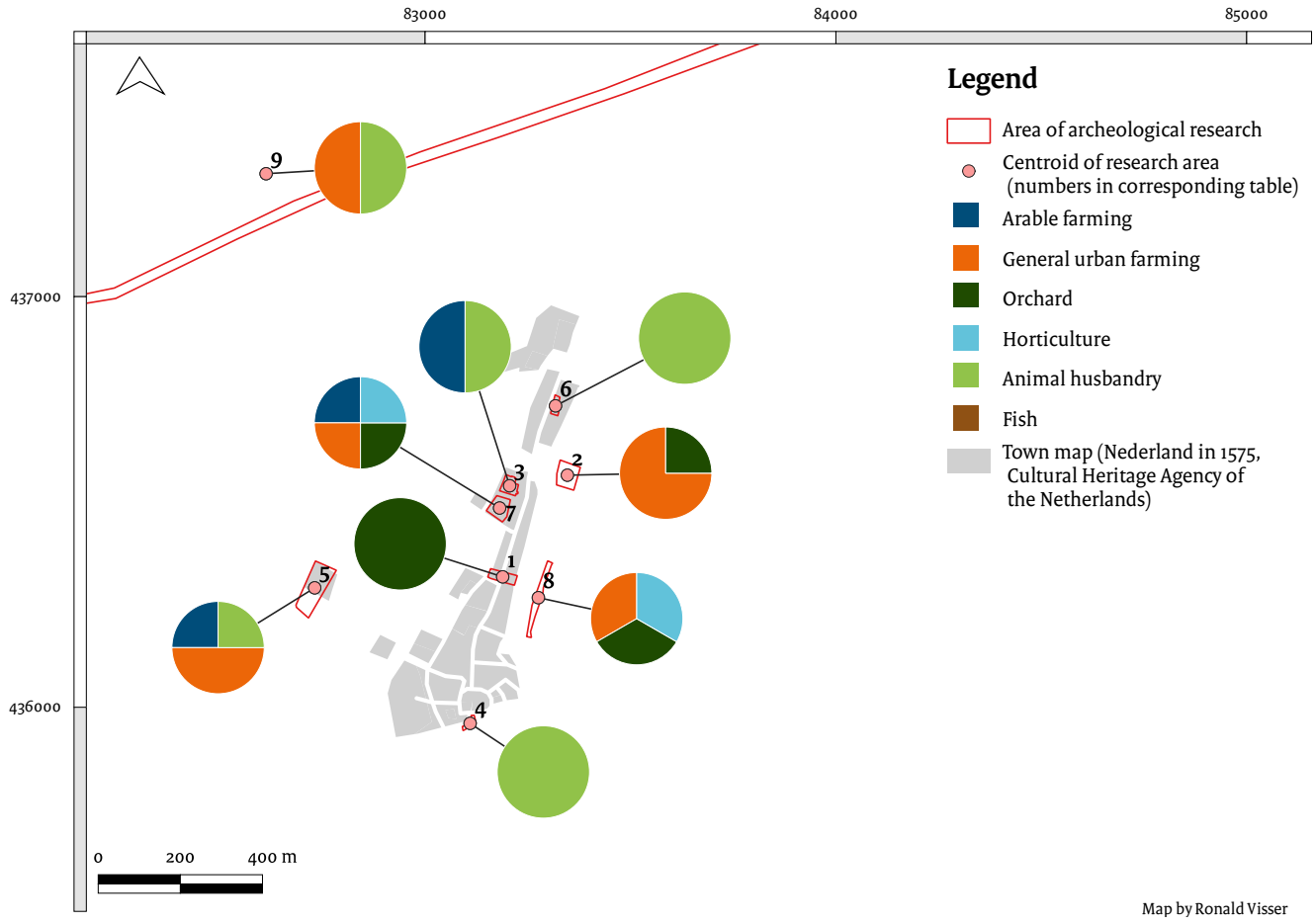


Fig. 8.60 Vlaardingen. The distribution of sites plotted on the Van Deventer map. Most sites are located inside the old centre. The spectrum is mixed.

Table 8.24 Scored themes in selected research locations in Vlaardingen.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	De Vlijt / Korte Hoogstraat	2013119100	-	-	1	-	-	-
2	Het Hof	2052859100	-	3	1	-	-	-
3	Johannes de Doperkerk	2085615100	1	-	-	-	1	-
4	Gat in de Markt 1.101	2100348100	-	-	-	-	1	-
5	Ex Libris	2148106100	1	2	-	-	1	-
6	Dammes Erve	2164906100	-	-	-	-	1	-
7	Afrol/Gedempte Biersloot	2383477100	1	1	1	1	-	-
8	Hoflaan	2419870100	-	1	1	1	-	-
9	Leiding over noord (LOT) 2	2423077100	-	1	-	-	1	-

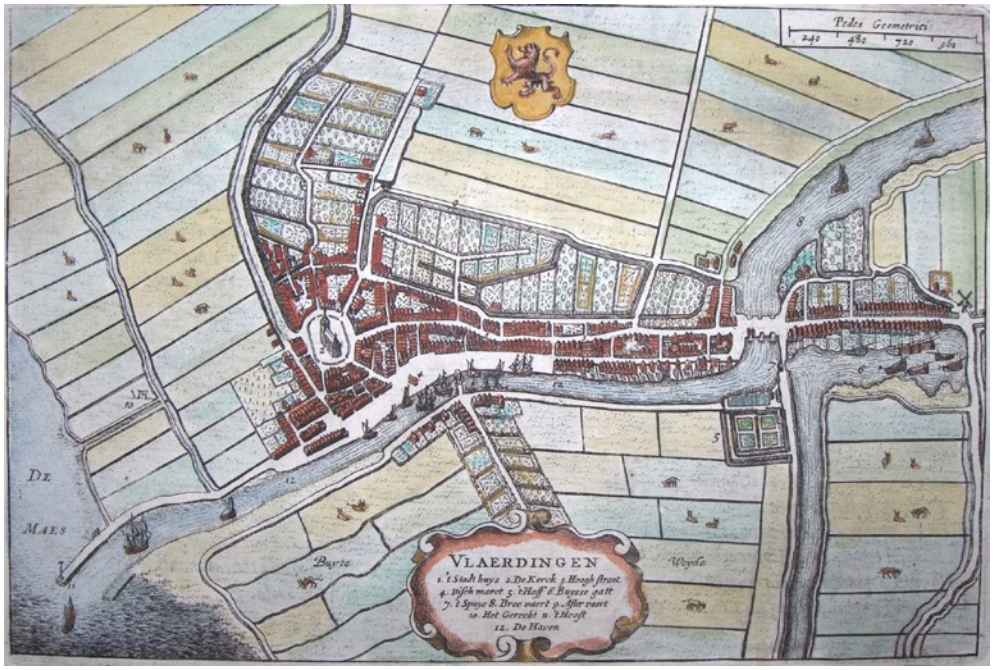


Fig. 8.61 Vlaardingen in 1649 by Blaeu. The map is rotated towards the east. The town consists of a few streets, church and port. Orchards (plots of land for horticulture) to the west (here pointing north) and some to the east (here pointing south) are clearly depicted. The pastures in the urban fringe are divided into small plots of land.

suffered from outbreaks of the plague in 1602, 1665 and 1666.[609]

Vlaardingen is represented in the database by nine research locations (Fig. 8.60, Table 8.24).

- Afrol Gedempte Biersloot (2383477100);
- Dammes Erve (2164906100);
- Ex Libris (2148106100);
- Gat in de Markt 1.101 (2100348100);
- Het Hof (2052859100);
- Hoflaan (2419870100);
- Johannes de Doperkerk (2085615100);
- Leiding over noord (LOT) 2 (2423077100);
- De Vlijt Korte Hoogstraat (2013119100).

Most sites are located inside the old centre. The spectrum is mixed. The town consists of a few streets, a church and port. Blaeu's map shows some orchards (plots of land for horticulture) to the west (here pointing north) and others in the east (here pointing south). The pastures in the urban fringe are divided into small plots of land (Fig. 8.61).

The oldest archaeological features in Vlaardingen date from the tenth century at the site 'Gat in the Markt'. Here a large eleventh century dung pit was found, but there was no evidence of accompanying buildings. More dung pits were documented at Ex Libris. These dated from the fourteenth or fifteenth centuries. Pollen analysis pointed to the presence of pasture meadows, hay meadows, and arable fields in the late medieval and modern period. A moated site and farmsteads were also investigated (1600-1900).[610] At Dammes Erve a raised platform made of dung and straw was found dating to the fourteenth century. A site at the Johannes de Doperkerk produced various dung pits and straw from the early modern period. A farmstead from c. 1560 has been recorded at Hoflaan.

8.5.6 Brabant

The history of the Duchy of Brabant is intertwined with that of Neder-Lotharingen and Limburg. In the period between 1100-1400, Brabant was part of a larger political entity and was never truly independent.[611] Territorial politics and the power of ancestral dynasties marked much of the twelfth century, leaving a complicated patchwork of territories behind as well as various timber and earthwork and castles belonging to various counts. One of these motte and bailey castles may be seen close to Eindhoven.[612] Some areas remained under the

609 Noordegraaf & Valk 1996, 231.
610 Van der Mark, Franzen & Van Genabeek 2008, 30.
611 Avonds, 1982, 452.
612 Rutte & Abrahamse 2014, 62.

authority of local lords, such as Breda and later Bergen op Zoom. Leuven and later Brussels served as main administrative centres. The domain Orthen in the north was a relative remote area. Here 's-Hertogenbosch was founded in the twelfth century in the basin of the rivers Dommel and Aa. The infertile sandy soils on its heathlands were used for the production of wool. Because of the constant territorial battles in the north, 's-Hertogenbosch became an important strategic centre.

Bergen op Zoom, 's-Hertogenbosch and Eindhoven will be discussed below. All of these towns were founded by lords, as part of their urban politics.

Bergen op Zoom

Until 1213 Bergen op Zoom belonged to the 'Free Towns' founded by the lord of Breda. In 1287 the Land of Bergen op Zoom became a separate seigniory, at which time the town became the main town and the administrative centre. The oldest part of this town is situated at the current Korenmarkt, Steenbergsestraat/ Fortuinstraat, the Wouwsestraat/Zuivelstraat and the Korte Bosstraat/Hoogstraat. Between 1198 and 1212 Bergen op Zoom was granted town rights. In the fourteenth century Bergen op Zoom had an international significance due to the annual markets and gradually grew in prosperity. The Grand Place and the streets leading to it formed the trade centre, with a more or less rectangular street pattern. Recent archaeological research has shown that the oldest town wall dates back to the years 1250-1300. The wall followed a circular circuit which can still be seen in the course of the current Westersingel, Noordsingel, Van de Rijstraat, St.-Josephstraat, Kloosterstraat, and Koepelstraat. There were four gateways in the

Fig. 8.62 Bergen op Zoom in 1575 by Van Deventer (67 ha). Housing blocks account for (40.5%), and trees and gardens (44% and 7%).

Fig. 8.63 Bergen op Zoom in 1588 drawn by Braun and Hogenberg. The extensive use of urban space as gardens and orchards is even more visible on this map.

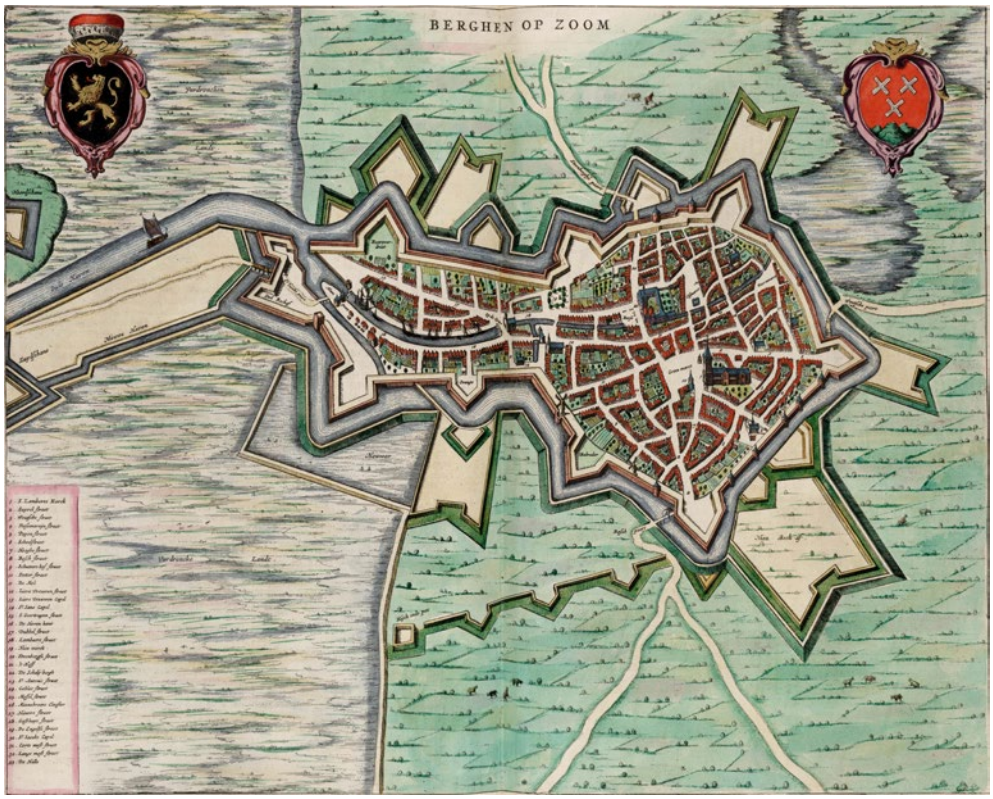


Fig. 8.64 Bergen op Zoom door by Blaeu in 1652 (67 ha) with new fortification. The urban fringe is depicted as fields.

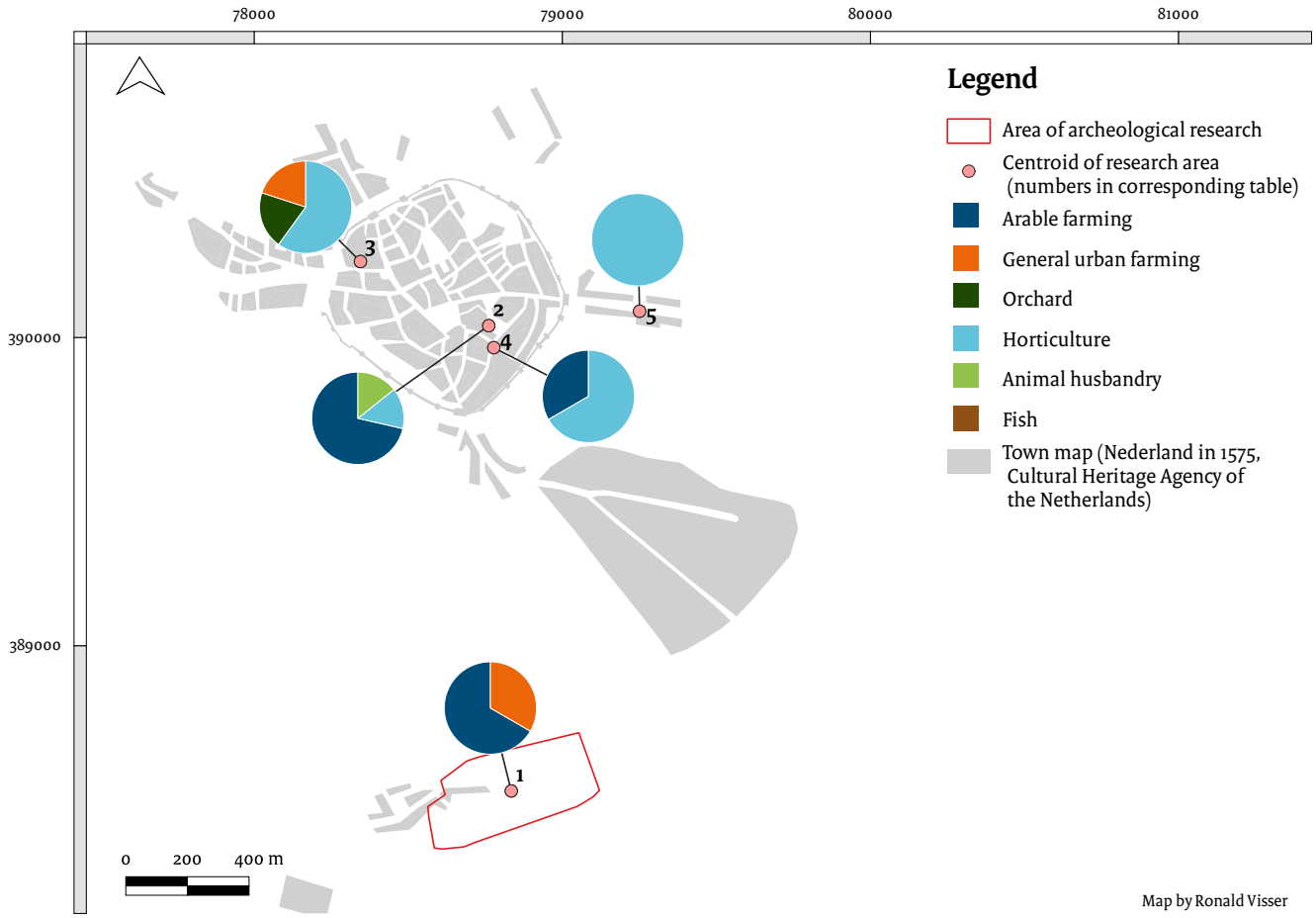


Fig. 8.65 Bergen op Zoom. The distribution of sites plotted on the Van Deventer map. The oldest traces of arable farming and animal husbandry date to the pre-urban period and are situated close to the oldest core of the town. Gardens and orchards existed from medieval times through to the early modern period. Arable farming and horticultural activities developed in later periods outside the town.

Table 8.25 Scored themes in selected research locations in Bergen op Zoom.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Augustapolder	2066450100	4	2	-	-	-	-
2	Parade	2068857100	5	-	-	1	1	-
3	Moeregrebstraat 18	2185601100	-	1	1	3	-	-
4	Huijbergsestraat/ Schoolstraat	2315744100	1	-	-	2	-	-
5	Station Fietshelling	2453688100	-	-	-	1	-	-

wall which provided access to the town at the Steenbergsepoort, the Bospoort, the Wouwsepoort and the Gevangenpoort town. From the thirteenth century onwards suburbs developed just outside of the walled town, to the north-east and south-east of the town gates (also seen on the Jacob van Deventer map, Fig. 8.62, and on the map drawn by Braun & Hogenberg, Fig. 8.63). The eastern part of the town was home to the cloth weavers and cloth makers. Monasteries were found close to the town wall. In the first half of the fifteenth century, the lord of Mons founded Zoom up the Markiezenhof, a court. The Beursplein was constructed opposite the Hof. The expansion of Antwerp reduced the importance of Bergen op Zoom's annual markets and put an end to the prosperity of the town. Because of the wars with France and Gelderland the Havenkwartier had to be enclosed by the rampart.[613] The harbour provided space for urban pottery to be established. Over the course of the sixteenth century the town fell into an economic decline which affected the entire inner town. The Eighty Years' War exacerbated this economic decline. In 1622, the fortifications were transformed and between 1588 and 1640 much restoration and renovation of buildings took place. The town's role as a strategic fortress was strengthened by the construction of an entirely new defence system (Fig. 8.64). In 1747 French troops conquered Bergen op Zoom, destroying the south-eastern part of the town. The demolition of the ramparts took place later, starting in 1869. Many gardeners were active in and around Bergen op Zoom in the nineteenth and twentieth centuries. These were mostly small farmers, who cultivated a diverse range of fruit and vegetables to meet the needs of the town.

In this research five sites have relevant information concerning urban farming (Fig. 8.65, Table 8.25). These are:

- Augustapolder (2066450100);
- Huijbergsestraat Schoolstraat (2315744100);
- Moeregrebstraat (2185601100);
- Parade (2068857100);
- Station Fietshelling (2453688100).

The different sites show arable farming and some animal husbandry in parts of the medieval town. These traces date to the pre-urban period or shortly thereafter. The use of arable land stops in the thirteenth century at the sites at Huijbergsestraat Schoolstraat[614] and Parade.[615] These activities probably moved towards the outer areas and the urban fringe in the later phases. Arable farming and general urban farming activities were noted at a site in the Augustapolder.[616] Evidence for professional horticulture close to the town has been recovered from a site town at the Station Fietshelling.[617] Garden beds were identified there, probably dating from the sixteenth century. Numerous gardens are visible within the town walls on historic maps. Research at a site on Moeregrebstraat confirmed the existence of vegetable gardens and orchards in this undeveloped part of town in the medieval and early modern periods.[618]

's-Hertogenbosch

A sandy ridge across a delta provided a crossing point for the Dommel and Aa rivers. The sandy ridge sustained a tract of ancient forest which was partially cleared in the late twelfth century, when the duke decided to found a settlement. Although small, this settlement was granted town rights and stone walls were immediately erected (9.5 ha). It seems that this walled circuit was erected too soon, as many later houses and even the town's cathedral of St. John had to be built outside the walls. The town expanded in the fourteenth century to include these extensions (103 ha). Later on, a few small extensions were added, taking the area of the town up to 116 ha. Due to frequent flooding it was decided to raise the height of the town by two to three metres using sand. The small rivers with their side branches were enclosed within the walls (Binnendieze) at this time. 's-Hertogenbosch served both as a regional market as well as hub for long distance trading. In this respect, the town was successful. It has been estimated that the town's population was around c. 14,500 in the fifteenth century (Fig. 8.66). In the early seventeenth century a defended citadel was built to resist the Spanish, and the town took on a strategic military importance (Fig. 8.67). Economic stagnation set in around 1660.[619] After this date the population decreased slowly, although this decline was nothing in comparison to the decline that had taken place in Holland.

613 Vermunt 1999, 165-195.
614 Vermunt & Van der Kallen 2013, 39.
615 Vermunt *et al.* 2009, 74.
616 Vermunt & Van der Kallen 2009, 51, 71-73.
617 Depuydt 2014, 37.
618 Vermunt & Van der Kallen 2010, 7-9.
619 Rutte & Abrahamse 2014, 98-99.

Fig. 8.66 's-Hertogenbosch in 1560 by Van Deventer. The town lies in the basin of the rivers Dommel and the Aa. Many open spaces are depicted within the walls (116 ha), c. 79% is built-on, 19% is labelled as garden. The urban fringe is portrayed as pastureland.

Fig. 8.67 's-Hertogenbosch in 1649 by Blaeu showing fortifications. Many open spaces could be seen on the map of 1560 and these are still there. Some orchards, and plots of land for horticulture inside the walls are clearly depicted. There are meadows visible outside the walls.

Fig. 8.68 's-Hertogenbosch. The distribution of sites plotted on the Van Deventer map. The two sites are located inside the old centre. The spectrum is mixed, however horticulture is best represented.

Table 8.26 Scored themes in selected research locations in 's-Hertogenbosch.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Hinthamerstraat 163 and Mgr. Prinsenstraat 1A-C.	2046970100	1	-	-	2	1	-
2	Postkantoor / Kerkstraat	2265240100	3	2	-	7	2	-

's-Hertogenbosch is represented in the database by two research locations (Fig. 8.68, Table 8.26):

- Hinthamerstraat 163 and Mgr. Prinsenstraat 1A-C. (2046970100);
- Kerkstraat (2265240100).

A (possible) barn from the thirteenth century was found during archaeological investigations at Hinthamerstraat 163 and Mgr. Prinsenstraat 1A-C.[620] A block of houses found during the excavation of Kerkstraat (1200-1325) were located just outside the town wall.[621] The backyards were open spaces and botanical research has shown that a vegetable garden in which various vegetables and herbs were grown was present including beetroot (*Beta vulgaris*), celery (*Apium graveolens*), hyssop (*Hyssopus officinalis*), dill (*Anethum graveolens*), catnip (*Nepeta cataria*) and savory (*Satureja hortensis*). In addition, there were indications that rye had been threshed on the site, and may also have been cultivated nearby.[622]

620 Cleijne 2007, 13-16.
621 Cleijne 2013, 109.
622 Cleijne 2013, 110.

Eindhoven

Eindhoven was founded at the crossing of trade routes and the rivers Dommel and Gender. These routes connected Antwerp to Germany and Liege to 's-Hertogenbosch. The pre-urban settlement was located west of the timber and earth motte-and-bailey castle. The town plan was structured by a main road and cross roads which created a grid pattern. The regular street pattern, which is still largely intact, bears witness to its planned foundation. Town rights were issued in 1232, but town walls were not erected until much later in 1389. Eindhoven had a local function as market town in an agrarian region. There were sizable agricultural fields within its walls (Fig. 8.69). Because of its location close to the borders with Guelders, the town suffered from destruction in multiple wars. The walls were torn down by the Spanish during the Eighty Years' War. However, economic stagnation is absent. The town industrialised in the late nineteenth century but only extended in the twentieth century.[623]

Eindhoven is represented by seven research locations in the database (Fig. 8.70, Table 8.27):

- Heilige Geeststraat (2476595100);
- Hoogstraat (2232321100);
- Hoogstraat 122 (2327043100);
- Luciferfabriek (4022527100);
- Stratumseind (2130067100);
- Vijksteeg (2025059100);
- Vrijstraat 12-14 (2451151100).

Three sites are located inside the old centre showing traces of arable farming and animal husbandry. Horticulture is found in the urban fringe.

Skeletal remains of a calf and an unborn bovine foetus were found at Stratumseind,

[623] Summary taken from Rutte & Abrahamse 2014, 62-63.

Fig. 8.69 Eindhoven in 1560 by Van Deventer. The town borders the river Meuse. Many open spaces are depicted, c. 78% is built-up. The urban fringe is portrayed as pastureland.

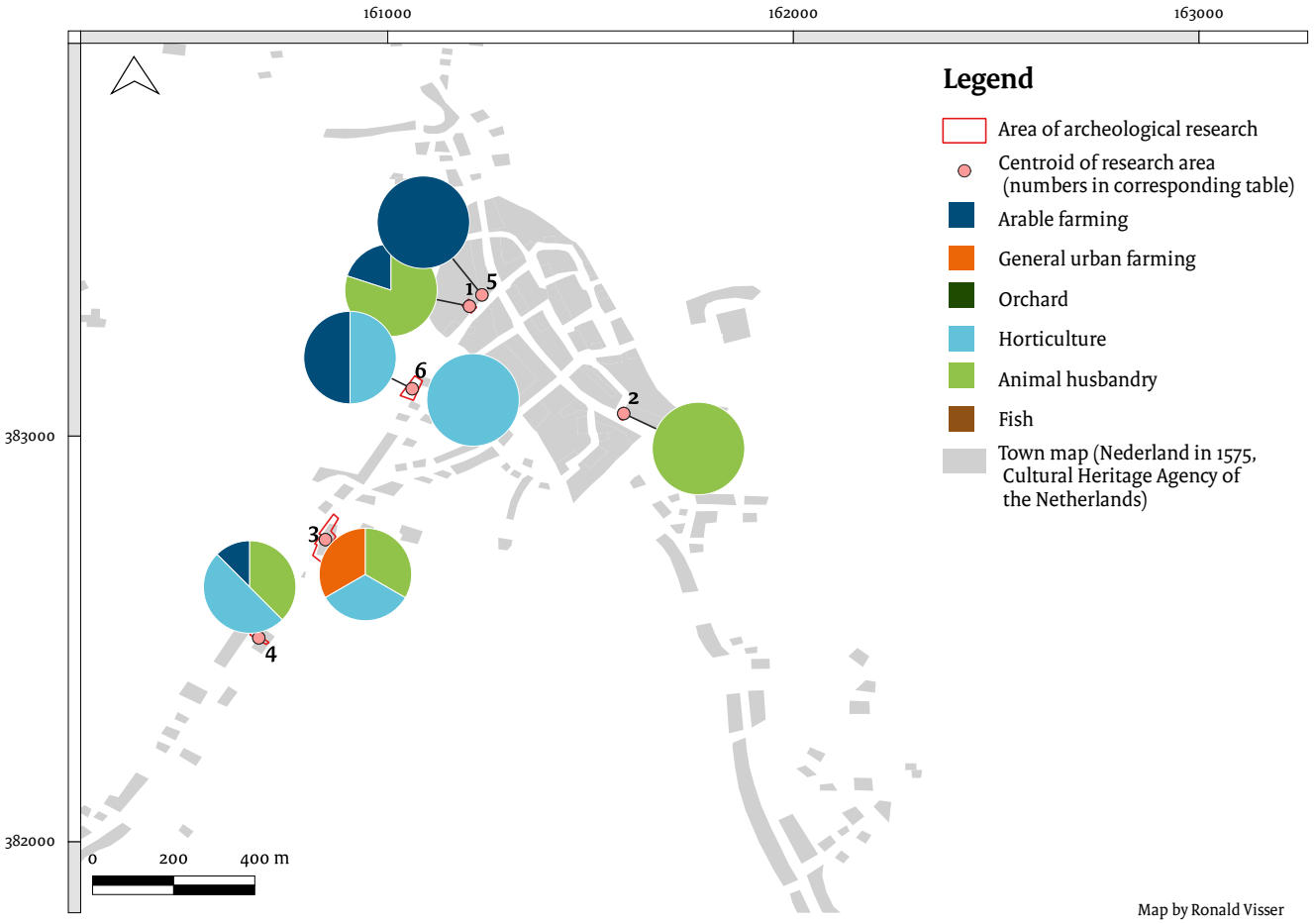


Fig. 8.70 Eindhoven. The distribution of sites plotted on the Van Deventer map. Three sites are located inside the old centre showing traces of arable farming and animal husbandry. Horticulture is found in the urban fringe.

Table 8.27 Scored themes in selected research locations in Eindhoven.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Vijksteeg	2025059100	1	-	-	-	4	-
2	Stratumseind	2130067100	-	-	-	-	2	-
3	Hoogstraat	2232321100	-	1	-	1	1	-
4	Hoogstraat 122	2327043100	1	-	-	4	3	-
5	Vrijstraat 12	2451151100	1	-	-	-	-	-
6	Heilige Geeststraat 49	2476595100	1	-	-	1	-	-
7	Luciferfabriek	4022527100	-	-	-	1	-	-

dating to the modern period. A bovine burial was also recorded at a location on Vijksteeg. This example probably dated from around 1700. Additional evidence was found which showed that the remains of press cake of rapeseed and the remains of hay and threshing remains were fed to stock.[624] A raised and humus rich layer (ophogingslaag) containing urban waste and shovel marks was also documented. It was concluded that the site was used as an urban arable field from the thirteenth to the fifteenth centuries.[625]

624 De Jong, Louvenberg & De Vos 2011, 22.
625 De Jong, Louvenberg & De Vos 2011, 63.

The oldest indication of a herb garden recovered by this was found at the location on Hoogstraat (1000-1050).[626] Here numerous species of medicinal plants were recovered from in a well, including hemp (Cannabis sativa), white nettle (*Lamium album*), flixweed (*Descurainia sophia*), henbane (*Hyoscyamus niger*), poison hemlock (*Conium maculatum*), hedge mustard (*Sisymbrium officinale*) and common vervain (*Verbena officinalis*). Several vegetable garden beds, which were placed in informal rows, were found at this location (1300-1800).[627]

8.5.7 Zeeland

Many areas in Zeeland were reclaimed from the eleventh century onwards. The many smaller islands have gradually grown together into larger peninsulas. Abbeys and monasteries played an important role in the economic life in Zeeland in the eleventh century, advancing agriculture, especially keeping sheep and trading wool. In the late Middle Ages, the Counts of Flanders and Holland fought almost continuously for power over Zeeland. This led to the Battle of Baarland in 1295, in which the Zeeland nobility sided with the count of Holland.

In the sixteenth and seventeenth centuries Zeeland, like Holland, grew considerably. A number of towns in Zeeland were important ports at that time and played an important role internationally. Examples of this are Middelburg, Veere, Vlissingen and Zierikzee. In the sixteenth century, Middelburg was the largest trading town in the Northern Netherlands. Halfway through the seventeenth century, Middelburg was the country's fifth largest town. At that time, Middelburg was larger than The Hague and Utrecht. At the end of the seventeenth century, Middelburg was the second largest port in the Netherlands after Amsterdam. The VOC was also based in Middelburg. Zeeland's prosperity declined in the eighteenth century, and the nineteenth century industrialisation did not have much impact on the province.

For the province of Zeeland, the town of Vlissingen will be discussed. The town grew and prospered during the thirteenth and fourteenth century due to coastal trading networks. The towns show traces of urban farming both inside and outside the town walls. Horticulture and arable farming were dominant, while animal husbandry seemed to have been less important.

Vlissingen

The oldest part of Vlissingen is located near the Badhuisstraat and the Koudekerkseweg and dates from around 1235. At that time the settlement was no more than a village. On Floris V's initiative, a harbour was built on Walcheren around 1296 and the Voorhaven, the Koopmanshaven (the present Bellamypark) and the Achterhaven (the present Spuistraat) were dug.[628] In 1315 the town received limited town rights and a larger settlement grew up around the harbour. A thriving trade developed between Flanders and England, in which Vlissingen became an important transit port.[629] During this period in the fourteenth century Vlissingen flourished through trade with England, France and the Baltic Sea region. As a result, the town rights were also extended. Around 1450, the port was expanded and the area now known as the Vissershaven was added. Political struggles in the fifteenth century necessitated the construction of the first town rampart in 1489. This rampart can still be seen on the Walstraat and on the sea side of the Gevangentoren where some remains still exist. During the sixteenth century the trade restrictions were lifted and a new extension to the port was approved by the Prince of Orange in 1572 (Fig. 8.71).[630] After this, a new period of prosperity began for the town. This boom lasted until the beginning of the seventeenth century. New town districts were built to the east and north-east of the medieval town. Another new port expansion was necessitated due to an increase in the scale of trade between 1604 and 1609. In the seventeenth century, a new fortification was built around the town, doubling its surface area compared to the medieval town (see also Fig. 8.72). From the eighteenth century onwards, economic decline was fuelled by political struggles and the loss of trade networks. However, with the arrival of the naval dockyard in 1815, the economy picked up again.

In the seventeenth century, the layout of the town is slightly different in comparison to the map of Jacob van Deventer (compare Fig. 8.71 and 8.72). On this map we can still recognize some gardens in the town, but most of the gardens are now outside the town walls in an almost continuous belt.

626 Verbruggen 2013a, 67.
627 Benerink 2013, 30.
628 De Ridder 2004, 5, 10.
629 De Ridder 2004, 3-4, 6-9.
630 De Ridder 2004, 15-17.

Fig. 8.71 Vlissingen on the map of Jacob van Deventer. The drawing from 1550 shows the original and fully-grown village and as such provides an unique view of Vlissingen. The outline of the town has probably remained unchanged since the thirteenth century. In the sixteenth century there were still quite a few gardens within the town walls.

Fig. 8.72 Vlissingen expanded a second time in the course of the seventeenth century and was surrounded by a fortress, as can be seen on the map of Blaeu from 1640. A lot of gardens and orchards can be seen around the town in this period.

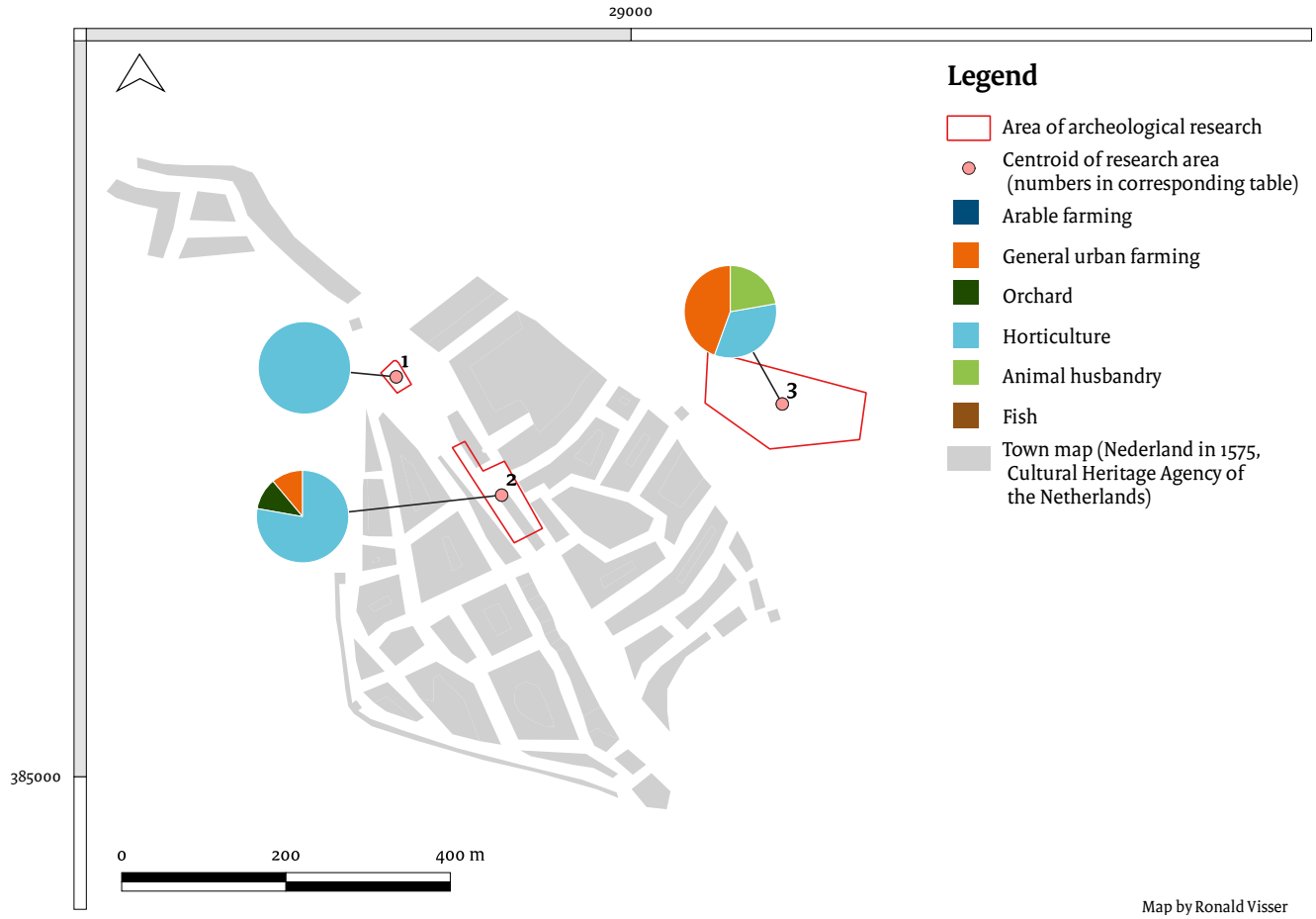


Fig. 8.73 Vlissingen. The distribution of sites plotted on the Van Deventer map. It seems that in the newly built district which arose in the seventeenth century, activities were more diverse. The sites inside the walls are dominated by horticulture but do not coincide with large green areas of the map, so was probably undertaken in smaller private gardens.

Table 8.28 Scored themes in selected research locations in Vlissingen.

Site number	Toponym	Case identification number	Arable Farming	General urban farming	Orchard	Horticulture	Animal husbandry	Fish
1	Alhambra	2011004100	-	-	-	1	-	-
2	Spuistraat; Lange Zelke	2087616100	-	1	1	7	-	-
3	Dokkershaven, Zuidzijde	2176846100	-	4	-	3	2	-

In this research three sites have relevant information concerning urban farming (Fig. 8.73, Table 8.28). These are:

- Alhambra (2011004100);
- Dokkershaven, Zuidzijde (2176846100);
- Spuistraat/Lange Zelke (2087616100).

The oldest finds relating to urban farming from Vlissingen are traces of horticulture, and the remains of a probable vegetable garden and/or an orchard within the town at the site Spuistraat/Lange Zelke[631] dating between 1250 and 1500. All other traces are more recent and date from 1500 onwards. Various activities were carried out in the district of Dokkershaven (Dokkershaven, zuidzijde), which was built from 1572 onwards.[632] Cattle was kept locally and vegetables were grown. No spatial patterning or zoning can be recognized.

631 De Boer, Vanden Borre & Gerrets 2010, 241.
632 Claeys, Jaspers & Ostkamp 2010, 109-112.

8.6 Concluding remarks

The above descriptions of towns illustrate that on the scale of individual towns, it is very hard to draw firm conclusions. Periods and archaeological features vary, in duration and intensity. By aggregating data within the overarching themes of animal husbandry, arable farming, horticulture and orchards it is, however possible to gain some useful insights. At the outset it is clear, that urban farming has been traced archaeologically in each of these themes. The best reference for analysis here is cartographic evidence. In many cases archaeological research serves to corroborate what can be seen on historic maps. However, archaeological work has also provided its own evidence in the form of structural, artefactual and ecofactual remains recovered by excavations. The material histories and narratives generated by commercial archaeological work is highly localized and site specific. It is therefore important to undertake synthetic reviews, as is the case in this research, which allow wider temporal, spatial, and behavioural patterns to be brought into focus. It is nevertheless clear that much more interdisciplinary research is needed to progress the study of historic Dutch towns. The data that has been assembled and synthesized in this study also needs to be integrated with earlier research.

New insights have been gained at this stage by making comparisons between the evidence from different towns and provinces. The core of old towns often provide a mixture of activities. Regional differences certainly exist and geomorphology is important. The fenlands of Holland offered better conditions for animal farming in the urban fringe, while Guelders and het Oversticht show an emphasis on arable farming. Some towns stand out, for instance Utrecht for horticulture.

The chronological distribution shows increased urban farming activities during ruralisation phases. However, the timing and impact of ruralisation differs greatly between different regions. Decline was felt strongest in Enkhuizen, Leiden and Hoorn, also. Vlaardingen peaked early and remained a very small centre for quite some time.

9 Synthesis and recommendations

A.D. Fischer and H. van Londen

9.1 Introduction

The previous sections have yielded various insights into urban farming. First, the subject has been described by theme (Chapters 5, 6 and 7), second, in terms of spatial and temporal distributions, and third by setting towns within their regional framework (Chapter 8). These strands of information will now be interwoven to answer the research questions which were presented in the first chapter. Our discussion will be divided into three parts, i.e. questions related to urban farming (A), ruralisation (B) and a comparison to evidence from historical geography (C). This chapter concludes with recommendations for future archaeological research on urban farming.

9.2 Urban farming (A)

9.2.1 Archaeological correlates of urban farming

Question A1: What are the archaeological (including bio-archaeological) manifestations of urban agriculture? Examples are tillage, fertilization, dung storage, pollen, primary processing waste, storage, livestock housing, tree planting.

A wide variety of indicators for urban agriculture have been found by this study. There is a problem, however, in that not all traces can be unequivocally linked to urban agriculture activities, especially if the evidence has been recovered from a small scale excavation. A fence line, for example, can function as a property boundary or as a barrier for a cattle enclosure. In such circumstances the presence of cattle could be proven by the recovery of hoof imprints in excavated contexts within an enclosure or droveway. So, the *combination of evidence and features* may provide the key.

General traces of urban farming can be found in the form of ditches, ramparts, fences, hedges, walls that enclose pastures, hay land, fields, garden plots, orchards or farmsteads. It is, nevertheless often difficult to reconstruct farmsteads barns, haystacks, watering holes, sheds (for tools or storage of fodder or harvest) in continuously and intensively used urban spaces. This is also the case for traces in backyards, such as kitchen gardens, orchards, and arable cultivation.

The indicators for *arable farming* or *horticulture* are layers of former fields, soils of sods (in Dutch *plaggenbodems*), plough marks, tillage, traces of spade digging, fertilization, garden soil, flowerpots, traces of hot- or gardening beds and planting holes of (fruit)trees.

The keeping of livestock and horticulture overlap in the fact that *dung* will be associated with both of these activities either as a by-product or as fertilizer/ component of hotbeds. As traces of dung have been found to be one of the most common and useful agricultural indicators in this study the necessity and importance of this find category must be underlined. Dung and dung pits alone make up 10% of the data within our database.

The *zooarchaeological and archaeobotanical evidence* from Dutch towns is quite diverse and fragmented. The problem here is often the scale of the research, which is often site-specific and too small to gain an overview of activities. More problems arise due to the way that samples are selected and collected for analysis. Finds of complete animals' skeletons, and the bones of very old or very young (foetal and neonate) animals in urban context are a good indicator for local *animal husbandry*. Assuming that cows and goats in urban contexts were probably kept for milk rather than meat, this use might also be visible in the age distribution or kill-off pattern of an urban bone assemblages.
Archaeobotanical research can provide further insight into which *crops* were cultivated. If cereal crops were produced locally this can be traced through the remains of the by-products of harvesting and crop processing, such as threshing waste. Any attempt to reconstruct which plants were grown in a garden is hampered, however, by the fact that a lot of vegetables are harvested before they set seed. Nevertheless, sowing plants directly into the soil will probably result in the presence of seed remains from seeds which did not germinate. The recovery of seeds of vegetables[633] or herbs[634] in archaeological deposits provides reliable evidence for local *horticulture*. Evidence from pollen analysis can also indicate cultivation or threshing activities, or land use in the vicinity of a site.

[633] It must be noted that there are plants that remain difficult to interpret because the vegetative parts as well as the seeds are consumed, like fennel.
[634] This is only true if the vegetative parts of the herb is used, not the seed like anise.

Tools and other associated finds such as pitchforks, rakes, shovels, ploughs, flails, hoes, flowerpots, troughs, fish-traps and cages all point to urban farming activities.

9.2.2 Open space in towns

Question A2: How much open space was there in towns and to what extent, and how, was it used for food production?

This question relating to the available amount of open space and its use for urban farming cannot be answered solely on the basis of the collected archaeological data. Historic cartographical sources offer the greatest insights, and may be combined with information from archaeology. In this study, we have chosen to make use of the maps of Jacob van Deventer (1550-1575), calculating open spaces and making note of various urban spatial functions. The later sixteenth century can be seen as a juncture before the urban expansion in the coastal regions on the one hand and population decline in the inland towns on the other. Town size, lay-out and population densities were not stable and changed over time. Urban population densities peaked in the late sixteenth century (Chapter 8, Fig. 8.10). Before and after this period, on average, more open space was available within towns either because of a decrease in population, or the expansion of town walls, or a combination of both.

The spread of urban functions was analysed for a group of 20 towns (period: 1545-1575) (Chapter 8, Table 8.6).The analysis shows that in this period towns on average had 70 to 75% of their area built-up, although some have more (c. 81 to 83%), and some less (c. 58 to 60%). On average, gardens made up about 15 to 16% of a town plan in this period, some have more (up to 24%), some less. Towns in Holland show the highest percentage of built-up area. A few of the so-called *failed* towns deviate considerably from this ratio. The less successful towns do not have larger garden areas, but have rather large parks, probably relating to their founding histories and their closeness to castles. The founding history of towns may also be a relevant parameter for the range of farming activities (see Question A3).

Evidence for both small- and large-scale farming has been found. Small-scale urban farming at household level has frequently been encountered during this research, in all parts of towns. Traces of keeping livestock on a very small scale, such as an individual pig, or a brood of chickens must have been common practice, along with the growing of vegetables in kitchen gardens in backyards. However, it remains uncertain for many periods what proportion of fresh produce was home grown as opposed to being imported from outside the town. Larger or more intensive examples of urban farming generally took place in the outskirts of towns. Sometimes open spaces inside the town or close to the wall were also used. Activities connected to animal husbandry are frequently found, more sheds and barns, small pastures but also arable land are visible in this research. From the fifteenth century onwards the outskirts of a lot of towns were increasingly used by professional gardeners for horticulture.

9.2.3 Range of farming activities

Question A3: What forms of urban agriculture were practised?

The types of agriculture connected to urban farming can be divided by theme, scale and the level of commitment and professionalism that has been invested. Most data is related to animal husbandry (31%), closely followed by horticulture (27%) and more general or unspecified rural activities (21%). Arable farming is less represented in the data (16%). Orchards and fish farming are very rarely found.

The scale of urban agriculture varied through time (see Chapters 4, 5, 6, and 7). While all activities declined between 1375 and 1500, arable farming became less important in comparison to horticulture, which started to flourish in several Dutch towns after 1500. Animal husbandry revived in this period as well. We assume that cattle were mostly kept in towns for dairy products, due to their perishable nature. Keeping pigs or poultry in an urban space was probably a more efficient way to maintain a seasonal supply of meat. Arable farming, due to scale, became more difficult around larger and developing towns. However, depending on the regional and local development of a town, examples have been found where arable farming was practised in the urban fringe from the medieval period all

the way through to the modern period. Horticulture is a form of urban farming that can fit very well in the framework of a town. While providing a source of food, this type of urban farming has less impact in terms of pollution compared to animal husbandry. Horticulture and orchards became very important and professionalized from the fifteenth century onwards. Large orchards and vegetable gardens were established by the seventeenth century around the towns of Leiden and Utrecht, providing their citizens with fresh produce. Nevertheless, urban farming on household level is the most common occurring form. This practice provides a certain level of self-sufficiency or supplementing the food-supply. It seems to have been a very common (post-) medieval household strategy to maintain a certain degree of independence and autonomy in terms of subsistence practices. Such a practice was important in unstable times, or when faced with unreliable supply chains, or trading networks disrupted by warfare, or plague. A level of self-sufficiency was also necessary as markets were held less frequently and were limited by the observance of religious festivals and by holidays. The tradition of urban vegetable gardening remained in widespread existence until the seventeenth century. In some towns this tradition merged into the allotment-tradition (*volkstuinen*) like Groningen, Leeuwarden and Zwolle. Another aspect is shelf life and delicacy of a lot of products, like green leaves vegetables, a lot of fruit or certain dairy products. Put simply, as many varieties of fruit and vegetables are not suitable for long distance transport without the luxury of modern cooling and storage facilities, cultivation in and around the town was the most efficient way to achieve this.

9.2.4 Spatial organisation

Question A4: How was urban agriculture organised spatially, both inside and just outside the walls?

Urban farming took place on different scales. As stated above, small-scale urban farming in backyards and gardens at a household level to maintain a certain level of self-sufficiency was the most common form of urban farming. In the historic centres of the oldest towns evidence of mixed agrarian practice are frequently found. This practice is not limited to the pre-urban phase of towns but occurs more often in the early stages of town development. In some towns larger scale urban farming was concentrated at the edges of the town, on both inside and immediately outside the town walls. Land use planning and zoning was also clearly present in some towns such as Tiel and Enkhuizen (Boerenhoek), both of which had farming quarters. Utrecht stands out for its horticulture.

Urban commons, where livestock could be grazed, were often situated just outside town walls. Often horticulture was also mostly clustered along the outskirts of towns. This is certainly true after the expansions of the seventeenth century in Holland and the earlier decline in inland towns. Newly incorporated areas within the walls were not filled because of de-population. A moderate population development for the inland towns has been observed from the mid-sixteenth century onwards (Chapter 8, Fig. 8.6). The town expansions of – for instance – Groningen, Deventer, Nijmegen and Zutphen were depicted as urban farming areas by Blaeu in the 1650s (Chapter 8, Table 8.3). In contrast, the coastal towns had growing populations until the mid-seventeenth century. An abrupt decline set commenced in the early eighteenth century. Towns like Leiden and Alkmaar were blooming in Blaeu's time. Leiden, in particular, was filled with blocks of houses.

Regional differences have emerged in the urban fringe, relating to regional geomorphological characteristics. In the western part of the Netherlands and the coastal towns the emphasis lay on animal husbandry. Inland towns focused more on arable farming and horticulture.

9.2.5 Social groups

Question A5: Which social groups were involved in urban agriculture?

This question cannot be answered by archaeology alone. The range of activities from medieval times to the pre-modern period is very diverse. Also, the variation in scale considerably varies. The sheer range of activities that were

carried out at household level, from vegetable gardens, pigsties and chicken coops, to professional horticulture just outside the urban centre underline the complexity of this subject. Documentary sources can add significant information, but also have their limitations. Historical sources tell us about professions of urban dwellers, trades, taxes and the rental or ownership of arable land, orchards or vegetable plots in or around the town. Unfortunately, these sources are often severely limited account from the medieval to pre-modern periods. They also neglect the non-professional activities of single households and the mundane quotidian aspects of everyday life. The extent to which the cultivation of vegetables, fruits or herbs was undertaken to sustain or add to the daily food supply is seldom mentioned in detail in historical sources. From the fifteenth century onwards there are accounts of individuals growing vegetables professionally in town registers. They are sometimes already specialized in growing a particular vegetable, such as cabbages. A great variation of vegetables and fruit were grown in urban centres. The richer the town, the more diverse its food. The rise of a wealthy middle-class in the sixteenth and seventeenth centuries created a greater demand for variety in food. However, delicate vegetables were often expensive, and with the trend to eat more diversely some households who could not afford to buy produce from markets grew their own produce. For this reason, even thriving towns with a dense population still engaged in urban farming. Urban farming can be profitable and attractive for instance to the poor. Producing food could also supplement household incomes where products could be exchanged by barter.

9.2.6 Economic significance

Question A6: What was the economic significance of urban agriculture?

The economic significance of urban farming is difficult to determine, based on the scope of this research. The archaeological data is too fragmented and calculating the proportion of food that was self-produced is difficult, for the reasons stated above. Even when this data is combined with evidence from documentary sources uncertainties and blind spots remain. Small-scale urban farming in backyards and gardens was a very common phenomenon in (post-) medieval and later towns. The main reasons for engaging in urban farming were probably maintaining a certain level of self-sufficiency and independence to protect the household from food-shortage and rising food-prices. Prices for cereals for example could rise extremely, especially before the new harvest arrived or in years of crop failure. Historic sources describe the promotion of pig farming inside towns to secure meat supply in emergencies.[635] Self-sufficiency is encouraged by town councils to prepare for these dire situations. The important role of farming settlements and activities in the urban fringe (*voorstad*, *Vorstadt*) to provide for the town has been found time and again in this research.

9.2.7 Specialisation

Question A7: To what extent was there (full-time) specialisation?

The data collected in this research are archaeological, historical, cadastral and pictorial in nature. Based on archaeological data alone (full-time) specialisation is very difficult to establish. As previously discussed in Chapter 7, there are several factors that come into play concerning urban farming. In the transition from pre-urban settlement to town, farming started to become less important. Activities often shifted towards the urban fringe, making use of land in less populated areas as a stable and efficient supply of food remained important. In most towns a certain level of food production and thus self-sufficiency remained and was encouraged by town councils. Newly founded towns needed provisioning and farmers in the region were encouraged to become citizens (buitenpoorters). So-called Ackerbürgerstädte are another phenomenon. An agricultural settlement can grow into a small town, where crafts and trade exist alongside a rural lifestyle. The citizens can be part-time farmers, but also practise a craft. Political instability and war can lead to strategic residential choices, too. Farmers sometimes also moved into a walled town or town for protection.

The extent of urban farming is difficult to estimate, as the scale can vary greatly. Activities on

[635] Isenmann 2014, 978.

household level, like keeping a pig, some chickens or growing herbs and vegetables in a kitchen garden in the backyard is the most frequent and persisting form of urban farming. Due to the small-scale and mostly continuous use of these inner urban spaces, these activities are difficult to reconstruct. Nevertheless, these activities are the foundation on which bigger communal gardens and the *commons* were exploited. Larger plots of land in the urban fringe of towns were owned or rented by citizens to grow crops for their own consumption and probably barter trade. At the same time, the first professional gardeners cultivated bigger plots in the vicinity of towns. From the fifteenth century onwards some even specialized in certain crops. The reconstruction of specialized forms of horticulture can be made by combining evidence from documentary, cadastral and pictorial sources, which can be and sometimes compared with archaeological finds (see also Chapters 6 and 7).

9.2.8 Comparing towns and regions

Question A8. What are the differences between towns and areas in terms of 1 to 7, and what are the backgrounds of these differences?

The following circumstances are relevant to understand the urban farming patterns that have been found in this study:

- the different development of coastal and inland towns in terms of economy and population density;
- the presence of a pre-urban settlement phase;
- seigniorial urban politics;
- the presence of monasteries or nunneries.

Archaeological correlates

Similar archaeological correlates have been found by this research (Section 4.1.2). However, keywords were not equally represented in the database (Chapter 4, Table 4.3). Holland has the best data, followed by Guelders and Sticht Utrecht (Nedersticht). Friese Landen, Limburg and Zeeland are the least represented (Chapter 8, Table 8.1). Differences in preservation conditions will have influenced the collection of data, along with other factors. As the archaeological data is derived from commercially funded research, the information is conditional upon present day spatial developments in town centres, local research agendas and the actual recognition and documentation of the material record left by urban farming activities.

One general concern is a possible bias towards the dealing of archaeological resources from the modern period, in comparison with the dealing of urban deposits from medieval or earlier periods in archaeological heritage management. The collected data should also not be interpreted as a direct reflection of a towns' past. The data has its weaknesses, especially when it comes to the statistical representation of some regions. The patterns that have been brought to light by this research are therefore probably best interpreted as working hypotheses, rather than hard evidence.

Open spaces

The towns of Holland have the highest percentage of built-up area and the least open spaces. The lowest densities of building are found in the towns founded by lordly urban politics. This analysis is based on cartographic sources in the period 1550-1575, just before the great expansion of urban population in Holland and the decline of the inland towns.

The range of farming activities

The main urban farming activities – in all provinces and regardless of chronology – relate to animal husbandry, horticulture and arable farming (Chapter 8, Fig. 8.2). Guelders, Brabant and Sticht Utrecht (Nedersticht) show a comparable spread of activities (24 to 34% horticulture, c.26 to 30% animal husbandry and 19 to 20% arable farming). However, Holland deviates with a relative high percentage of animal husbandry (c. 42%) and a low percentage of arable farming (c. 10%) (Chapter 8, Table 8.2). This pattern may be related to the high proportion of built-up areas in these towns. The landscapes in the urban fringe of the coastal towns were also better suited for animal husbandry, producing dairy, meat and other secondary products. The sandy soils with the raised fertilised fields (esdekken) and river deposits provided good arable farming conditions. The maps of Jacob van Deventer (c. 1550-1575) and Blaeu (1660) substantiate this regional differentiation, depicting respectively pastures in coastal towns and arable plots in

inland towns especially in the development of the urban fringes. Limburg and Friese Landen have a high percentage of orchards, however, this may be due to lack of other data. A different spread is represented by the manorial towns (heerlijkheden) where the majority of activities relate to animal husbandry (c. 67%). Towns with pre-urban roots show a mixed range of urban farming activities in the old centres, as opposed to new planned towns that had been founded (for instance Doetinchem) and the above mentioned manorial towns. Monasteries and horticulture go hand in hand. Utrecht stands out with a strong emphasis on gardening.

Spatial organisation

As stated above (range of farming activities), regional differences emerge when urban fringes are studied. In the western part of the Netherlands and in the coastal towns the emphasis lay on animal husbandry. Inland towns focused more on arable farming and horticulture.

Social groups

Social groups were not researched in this study. The nature of the collected archaeological data does not allow such an analysis. Having said that, the difference in economy and population development will no doubt point to a rift between coastal and inland towns (Chapter 8, Fig. 8.6). In the fourteenth and fifteenth century, many farmers moved to the towns of Holland because of the agricultural crisis in the countryside. This movement introduced experienced farmers to urban environments (see Section 9.3.6).

Economic significance

In general, it can be stated that the economic significance of urban farming increased when the importance of industry and services decreased. Chapter 8, Fig. 8.3b offers an overview of time periods with increase and decrease of urban farming activities (see Section 9.3.1). As we noted, the regional distribution of urban farming varied. These regional trends need to be included in future research to gain more detailed insights. The patterns themselves also need further substantiation. Van Zanden points to great regional differences in agricultural infrastructure in the nineteenth century that find their basis in the period 1500-1800. (Rural) farming in Holland is far more intensified than in other regions.[636] He does not elaborate on urban farming, but specialisation in the countryside is well-described. Holland produced butter, cheese, meat, beer and turf for export. Beer was produced in towns, relying on the cultivation of hop and the import of grain. The Oversticht focused on the ox-trade and butter, in Brabant sheep were kept for the wool industry.[637] Whether the regional rural variation can be matched to the urban farming ranges is uncertain, but may well serve as a hypothesis for future research. In terms of rural productivity, the northern provinces were net producers, exporting more than they imported.[638]

Specialisation

Fulltime urban farming specialisation may be found in towns that:

- were less urbanised than others such as Eindhoven, or some of the so-called *failed* towns;
- had designated farmers quarters such as Tiel and Enkhuizen;
- had less trade, industry and services, such as the inland towns after the fifteenth and sixteenth centuries. In Holland the urban economy was more specialised: Vlaardingen and Hoorn specialised in fishing (herring); Gouda, Haarlem and Delft in beer; Leiden, Naarden and Haarlem in cloth; Dordrecht and Amsterdam in shipping. In these towns part-time urban farming is more likely;
- had favourable urban regulations for urban farming, for example in Kampen.

9.3 Ruralisation (B)

9.3.1 Time and place

Question B1: Where and when did ruralisation occur?

As ruralisation is defined as the opposite of urbanisation, it occurs when population numbers dwindle. Moreover, the townscape itself will turn from urban towards rural, transforming the built-up area (housing) and economy of industry and services to one based on horticulture, market gardening and farming, or even extensive animal husbandry (see Chapter 2, Table 2.1 for the various stages). The de-population of towns in the late seventeenth, eighteenth and nineteenth century

636 Van Zanden 1985, 30-32.
637 Van der Wee 1978, 19.
638 Weststrate 2008.

is historically well documented (see Section 8.3). This study has gathered and synthesized archaeological evidence, showing an increase in the scale and diversity in urban farming activities during this time (Chapter 8, Fig. 8.3b). Most towns faced stagnation, but de-population was felt hardest in Holland. The demolition of housing and their replacement by cultivation layers – containing building debris – has been established archaeologically in Enkhuizen (Section 8.5.5). Of course, Enkhuizen, like Hoorn and Leiden, are well-known examples of sudden and dramatic de-population, and of slums and poverty in the eighteenth and nineteenth centuries. Regarding the scales of ruralisation, activities can be placed under stages two (agriculture) – but mostly – three (horticulture and market gardening), but do not go further back.

9.3.2 Economic shifts in the rural component

Question B2: What shifts took place in the rural component of the urban economies?

While arable farming and animal husbandry were at their peak during the early growth of towns, the arable farming decreased significantly in later town development. Animal husbandry however, remained widely practised (Chapter 8, Fig. 8.3a). Arable farming was present in the (wider) urban fringe and rural areas of inland towns as illustrated by Deventer. The towns in Holland needed to import grain because the draining of fenlands hampered crop cultivation. Their urban fringes were widely used as pastures. During the time of de-population (1700-1850), the upcoming urban farming activities focused on horticulture for vegetables, herbs and medicinal plants, and the cultivation of orchards for fruits and nuts. Especially towns with monasteries show an emphasis on horticulture, as is the case in Utrecht.

9.3.3 Spatial structure

Question B3: How did ruralisation influence the spatial structure of a town?

As already noted, Tiel and Enkhuizen both had designated farmers quarters. Other towns may have had some sort of zoning as well. As was in Chapter 2, many streets today are named after urban farming activities, such as the cattle track towards the market (*Koestraat*). On the basis of the maps of Van Deventer and Blaeu, some general observations can be made on spatial structure and rural development. A common pattern seems to have been the use of backyards in combination with the urban fringes on both sides of the walls. Moreover, when the new urban expansions of the late sixteenth and seventeenth century were not filled with residential blocks, the areas were used for farming. Good examples of this are found in Groningen, Nijmegen and Zutphen. Towns like Eindhoven and Vlaardingen were never fully urbanised. Here, the residential blocks were ordered by just a few streets in the midst of many open fields. The decay that was witnessed in some of the major towns in Holland led to demolition of buildings, transforming built-up areas into farmland (Enkhuizen and Hoorn).[639]

9.3.4 Relation to broader changes in the urban economics

Question B4: To what extent did ruralisation relate to changes in the economic basis of a town and/or changing trade networks?

The economy and population development of coastal and inland towns differed (Section 8.3). The river-based trading of the inland towns was caught up by sea trade. Guelders lost its dominance to Holland in the sixteenth century, because of the silting up of the IJssel river blocking the passage to the Zuiderzee, but also due to the waning importance of the Hanseatic League and wars. The economy in Utrecht Oversticht and Guelders became mainly directed at local and regional markets. However, Deventer remained an important commercial centre in the east of the Netherlands. In the selected towns of Utrecht Oversticht and Guelders, there are clear cartographic and archaeological indications for increased urban farming in the seventeenth century urban expansions (Groningen, Nijmegen and Zutphen). In Holland, the exodus of people to the countryside in the eighteenth century meant a shift in economy from trade and services to farming (Section 8.3). The textile industry of

[639] Vermeer & Koeman 2018.

Leiden, the herring trade of Vlaardingen and Enkhuizen, even the long-distance trade to the West and East Indies collapsed. Urban farming indicators from this study combined over time, show a peak during the growth of urbanisation (thirteenth and fourteenth century) as well as urban decline (late seventeenth until late nineteenth century) (Chapter 8, Fig. 8.3b). There is strong correlation between economic, population density and urban farming activities.

9.3.5 Ruralisation and demography

Question B5. To what extent can ruralisation be linked to demographic change?

Rural development is linked to demographic change (Fig. 8.10 and 8.11). A relation exists between urban farming, population density and urban economy. However, more factors have to be taken into account, for instance the cultivation of fruits and vegetables for barter. In this context, urban farming is related to poverty and can also be found in situations where there was population growth and overpopulation.

9.3.6 Rural development, landscape and infrastructure

Question B6. To what extent can ruralisation be linked to changes in the landscape and infrastructure of a town?

This question relates to the interconnectivity of town and countryside during urbanisation and ruralisation. Important changes in the landscape occurred in the fourteenth century in Holland. The drainage of the fenlands led to land subsidence and drowning of crops. The rural economy suffered because of it and the population headed for town. Cheap labour became available in the towns of Holland for fishing, industry and commercial capitalism based on sea trade.[640] The new town folk with a basis in farming kept practicing to some degree but now in an urban context. A network of inland waterways was developed, connecting towns like Alkmaar, Leiden and Gouda to wider trade networks. Their economic success led to an increase of trade and services. In this study this has been found to correlate with a low amount of urban farming indicators for the fifteenth century, implying an increase of import of produce from out of town (Chapter 8, Fig. 8.11). Centuries later, the de-population of towns in Holland was the result of people leaving for the countryside, especially towards the eastern and southern regions of the Dutch Republic. There, farming activities increased in the late seventeenth and eighteenth centuries due to a prosperous rural industry and agrarian world economy, while urban industry and trade networks stagnated.[641] This process impacted the landscape and infrastructure (roads and later railways).[642] As a whole, economic activity based on trade and services shifted towards agriculture, also within the town walls.[643] Other changes in the landscape included the soil improvements which were made in the sandy areas in the east and south of The Netherlands. In these areas soils were raised with dung and town waste (esdekken). Spek convincingly argues that these open fields were predominantly developed in the seventeenth century because of agricultural intensification.[644] Deventer illustrates the role of urban administration in the exploitation of these open fields.

9.3.7 Comparing towns and regions

Question 7. What are the differences between towns and regions in terms of questions 1 to 6, and what are the reasons for these differences?

The following circumstances were found to be relevant to the process of ruralisation in this study:

- the different development of coastal and inland towns in terms of economy and population density;
- the amount of open space within a town;
- the degree of urbanisation during formation; the use of the urban fringe.

Time and place

Ruralisation is evidenced by the increase of urban farming activities which occurred during the de-population of towns in the late seventeenth century until the nineteenth century. As already noted, the inland towns faced stagnation earlier than the coastal towns, but with less drastic consequences.

640 Van der Zanden 1985, 31-32.
641 Van der Wee 1978, 433.
642 Rutte & Abrahamse 2014, 10-153.
643 Van Zanden 1985, 363-365.
644 Spek 2004, Chapter 6.

A shift in the rural component of the urban economy

While arable farming and animal husbandry were at their peak during the early growth of towns (urbanisation), the first decreases significantly in later town development. Animal husbandry however, remains widely practised (Chapter 8, Fig. 3a). Horticulture and the cultivation of fruits show an increase in the modern period. Regarding the scales of ruralisation, activities can be placed under stage 3 (horticulture and market gardening).

Spatial structure

Our study has been able to make the following observations about the spatial structure of urban farming.

- Backyards were in common use in combination with the urban fringes on either side of the town walls.
- The new urban expansions of the late sixteenth and seventeenth century were not filled with residential blocks, the areas were used for farming.
- Some towns had designated farmers quarters, but not enough to identify regional patterns.
- Some towns like Eindhoven and Vlaardingen were never fully urbanised. Here, the residential blocks were ordered by just a few streets in the midst of many open fields.

Urban economics and demography

There is strong correlation between economic activities, population density and urban farming activities. Data from different regions have been clustered to come up with a general outline. More data is necessary for a regional analysis. Both urbanisation (population rise) and de-urbanisation (population decline) phases show an increase in urban farming indicators.

- The urbanisation phase up to the fifteenth century related to a moderate urban population growth. Arable farming and animal husbandry were the dominant farming activities. The urban economy was based on industries for the production of beer and textiles and operated through local markets or river-based trading networks.
- The coastal towns, with economies based on services, industry and (long-distance) trade had a high population density and overall part-time urban farming practice until the mid-seventeenth century.
- The large proportion of animal husbandry that was found in these towns may be related to lack of space for more extensive forms of agriculture.
- During the de-urbanisation of towns (late seventeenth to early nineteenth centuries) the urban economy became increasingly dependent on agriculture. Animal husbandry and horticulture were the dominant forms of urban farming at this time.

Landscape and infrastructure

This study has detected a direct relationship between landscape, infrastructure and urban farming.

- The infrastructure in Holland changed substantially in the fourteenth century due the drainage of fenlands. Relatively few areas in the direct vicinity of towns were suitable for growing crops. The region therefore became known for its dairy products, beer, textiles and turf. Holland has the largest percentage of urban animal husbandry of all regions (42.4%). Pastures were widely depicted in the urban fringes by both Van Deventer (c. 1550) and Blaeu (c. 1650).
- The soil improvements in the sandy areas in the east and south of The Netherlands (*esdekken*) played a role in the seventeenth century agricultural intensification. Towns exercised a dominant position in the exploitation of these open fields. The urban fringes in the maps were depicted as arable fields, and orchards and fields for horticulture.

9.4 Comparing archaeology, historical geography and historical architecture (C)

Question C1. How does the archaeological evidence for urban farming and ruralisation relate to the available historical-geographical and historical architectural data?

The focus of this research project has been to trace evidence for urban farming in commercially commissioned archaeological investigations in Dutch towns. We have incorporated data from documentary and cartographic sources, but have not used information from historic geography as the

integration of historic geographic data falls outside the scope of this study. This study has, however, made use of a conceptual framework (Chapter 2) based on definitions developed by historical geographers using models of urbanization and ruralisation. During this research, archaeological evidence for urban farming varied from small scale to large scale. The conceptual framework from historic geography had a better fit with the analysis of larger scale farming activities than evidence at a household level.

9.5 Recommendations

In this section the evidence presented in Chapters 4 to 8 is reconsidered and recommendations are made for future research. Our findings are based on data from the selected and analysed reports in which archaeological fieldwork has been carried out in accordance with a programme of requirements (*PvE*). In turn this has been guided by questions in the National Archaeological Research Agenda (*NOaA*) and local municipal policy. Question 88 of the NOaA focuses on the nature, appearance, scale and context of urban farming. Our recommendations provide a new impulse to study urban farming within the context of urban archaeological investigations and suggest ways in which the NOaA may be updated.

9.5.1 General recommendations

Data

In terms of data quality, it should be noted that the availability of reports can be improved. A considerable amount of data was simply not retrievable. There were no archived reports available for 30.4% of ARCHIS case-identification numbers (published by commercial firms or municipalities) leading to a possible bias in the collected data. Furthermore, the reports differed a lot. It is important for this type of research to include and publish the specialist reports. Reports that published all specialists' contributions are more useful in this study because of the archaeozoological and archaeobotanical component of this research.[645] Archaeological reports should therefore include the original reports of all specialists. It is also striking that few reports discuss the theme of urban faming as an integral part of the reporting. The indicators of urban agriculture are often mentioned, but are seldom coherently discussed and interpreted. The reports that provided the most valuable information for this study clearly included the subject in their research agenda and also focused upon it. Because the data on this subject is very fragmented, pre-Malta research should also be included in the future in order to obtain more reliable results. Furthermore, the integration of archaeological and historical geographical, historical architectural and archival data (including map analysis) would be a valuable scope for future research.

Terminology

Our use of text mining and keywords related to urban farming showed that evidence for urban farming in many reports results had not been described accurately enough to contribute to this study. General phrases like 'traces of rural activities' 'layers of garden soil' or 'outhouses' should be avoided. The presence of arable fields was also frequently noted but not further described, dated or analysed. In cases where these traces could not be dated, they were often simply ascribed to pre-urban phases of the settlement, which may not have been the case.

Assumptions

To move forward and advance research we need to inculcate a different mindset in urban archaeology. Historic towns were not only urban spaces. Modern appearances and perceptions of towns and towns lacking rural activities influence the way in which research into historic towns and towns is conducted. A change in attitude is necessary to recognize the potential but also the pitfalls of this type of research. Urban farming has always been part of the activities carried out within towns. Farming activities were definitely not restricted to pre-urban phases of settlements. The assumption that rural activities did not take place in inner-town areas can mean that archaeologists fail to search for possible indicators, which in turn leads to an absence of data, and circular reasoning.

[645] A full integration of specialist reports is now mandatory under the Dutch Quality Standards.

9.5.2 Regional analysis

Gaps in data

The regional analysis of collected data shows gaps. Some towns have more data on urban farming than other whole provinces. This unbalanced distribution of data complicates a comparison on a broader level. More data is particularly needed from Friesland, Groningen, Drenthe, Limburg, Brabant and Zeeland.

Patterns as hypothesis

Patterns described under Sections 9.2.8 and 9.3.7 may serve as hypothesis for further research.

Comparing urban and rural farming ranges

The regional differentiation in urban farming, relating to the spectrum of economic activities, seems plausible. This is certainly true for rural farming (see Section 9.2.8). A comparison of rural distribution patterns with that of the towns in each region is, however, so far lacking.

9.5.3 Methods

Urban farming manifests itself in different ways. Therefore, it is necessary to connect structures and finds in R (see Chapter 3), and to apply more interdisciplinary (specialist) research methods on materials and the biological evidence contained within soil samples.

The reconstruction of urban farming requires a strategic approach, and the implementation of a detailed sampling strategy. Traces of agricultural activities are often hidden in very common and unspectacular archaeological contexts in the form of improved soils, ditches, pits, small outhouses and the stockpiling of dung. These features are often not selected for sampling as they may be regarded as having a low cultural significance; the evidence which they hold is also highly localized and site specific. In order to fully comprehend evidence for urban farming both intra and extra mural contexts need to be systematically sampled. Furthermore, while it is imperative that more effort is made to connect evidence from archaeological features and finds, it is also important that bio-archaeological sampling practices are more firmly embedded in commercial archaeological investigations. The information gained by such specialist's reporting will have a multiscalar use, revealing local patterns, and thereby prompting new research questions to be pursued in individual towns, but also encouraging the temporal and spatial analysis of urban farming activities between towns and regions.

This research has shown that the spatial distribution of urban farming ranges from private, small backyards to big vegetable garden plots and orchards in the outskirts of town. Backyards and garden spaces were often used for a multitude of purposes. To reconstruct not only urban farming, but also activities connected to housekeeping, manufacturing, storage or seasonal activities these contexts require a research strategy that include a lot of specialist research of contexts, soil and finds. To broaden the scope into an interdisciplinary approach it needs combining this archaeological analysis with that of historical geography, historical architecture and archival research, including maps.

The zone close to the town walls tended to be less densely build then the centre, favouring more agrarian practices. These zones deserve more attention in future research and should not be written off as being of low archaeological potential when archaeological sampling strategies are being devised. As we have seen, a transition from urban farming to professional horticulture often took place in the urban fringe. This process could also be more fully documented and understood by targeted archaeological investigations in the future.

9.5.4 Archaeozoology

As noted in the NOaA, due to the lack of sampling strategies and sieving for animal bones the data of zooarchaeological research carried out in urban contexts is fragmented. The development of a new approach to finds, and greater awareness of the indicators for keeping livestock in towns is essential for future research.

The value of finds of whole animal skeletons and peri-mortem remains as proof of local animal husbandry is not only undervalued by excavators, but also by zooarchaeological specialists. If foetal or neonate remains are encountered during an excavation. The ongoing field research should focus on the possibility that the animals were kept locally and the context of their discovery should be carefully described and linked where possible to structures and or other features at the site. In the past, excavators have all too often simply bagged up faunal remains and sent them for analysis to specialists who have reported on the material some weeks or months after site investigations were completed.

More reflexive thinking and flexibility is therefore needed in the design and implementation of urban archaeological investigations.

Hand-in-hand with this there needs to be a greater commitment to investigating the unknown, rather than simply focusing on gathering archaeological data on structural features that are already known or suspected to have been present on site from documentary or cartographic sources. In essence, this will mean placing more effort on the investigation of what might be termed the spaces between the places. This will have implications for site work, as well as post excavation reporting. In practical terms such an approach would mean that soil samples for chemical and bio-archaeological analysis are taken from a wide range of cut features and soil layers, and not only from cesspits, which are most often targeted as they are artefact rich contexts. The long-standing problem that faunal samples are biased, in as much as excavators tend to recover larger bones by hand, also needs to be addressed. In this instance consideration should also be given to the sieving of at least part of a selection of stratigraphically secure contexts to generate more representative faunal assemblages.

Another way to investigate the wider spectrum of archaeozoological material that may be present on site would be to integrate isotope analysis into urban archaeological research.

The presence of dung has been identified as one of the most important indicators for local animal husbandry. The analysis of dung, including its constituents, such as animal hair, parasites, fodder and possibly straw, should also be targeted by archaeobotanical analysis. Linking the results of archaeobotanical with archaeozoological analysis is key to reconstructing the presence of locally kept livestock.

The absence of data concerning fish farming from our database is striking. Evidence has been recovered for the trapping of fish trapping in rivers canals, and moats in some towns and towns, but overall, this activity has left few archaeological traces. In this respect we would once again urge that better sampling strategies including sieving of soil samples becomes standard practice in order to retrieve more fish remains.

9.5.5 Archaeobotany

In order to reconstruct local vegetable plots in backyards or elsewhere, the sampling of features like pits, plots, layers and ditches is essential. We have noted above that the practice of taking archaeobotanical samples exclusively from cesspits creates a bias in the data of urban sites. Locally grown crops are less likely to be present in cesspits than in other features like pits. The presence of dung as fertilizer or component of hotbeds forms an indicator for urban farming. The significance of dung has already been discussed at length, but its importance to horticulture cannot be stressed enough. Evidence for horticulture may also be found in the form of specialized ceramic containers and flowerpots. New research is needed to establish a typology of flowerpots. Size and shape of pots could be connected to certain plants or horticultural practices, which has yet to be studied. This is also the case for soil contents of excavated flowerpots, which have seldom been analysed archaeobotanically.

Research into the use of arable land by urban communities also needs more work. Questions such as how the soil was worked and maintained, and which crops were grown, have been neglected by most research. On the evidence that we have assembled the taking of strategic samples to analyse for pollen, micromorphology, or phosphates, is rarely undertaken in Dutch urban archaeology. Finds of straw or other by-products of crop

processing have been identified at several sites, but the potential to analyse arable fields themselves should also be incorporated in future research.

We have noted that orchards are underrepresented, appearing in only 5% of the data, even though most towns were surrounded by large orchards and vegetable plots. Strategies to detect this missing theme should be implemented in future research using the approaches and methods already set out above. It must be acknowledged that orchards may be difficult to trace archaeologically, but there are clear indicators that can be found. Where excavated areas are large enough, it will be possible to trace the (regular) presence and special distribution of planting holes. The land within an orchard may also have been prepared and drained by means of specially constructed drainage trenches, or ceramic pipes. Fruit trees may also have been trained to grow up walls by means of wires and metal fasteners in walled gardens.

Consideration should also be given to evidence from pollen samples (though limited by range and low taxonomic resolution) and wood or charcoal. The analysis of charcoal, but also wood, has yielded some evidence for fruit trees in this study. But the key to reconstructing more orchards may lie in archaeologically targeting sites on historic maps where bigger orchards are clearly depicted. It may be that several techniques need to be tested at excavations of former orchards to establish guidelines for future fieldwork.

9.5.6 A new theme for the National Research Agenda (NOaA 2.0)

In many cases urban farming was small-scale. And as noted in this study, backyards were frequently used for this purpose and have been under investigated archaeologically. We therefore propose that urban backyards should be investigated for multi-purpose uses by means of multidisciplinary research methods. This must be done by sampling contexts without coherent function/interpretation for further specialist analysis. Unlocking the potential of this kind of research needs new guidelines to establish an archaeology of urban backyards.

To reiterate another of our key findings, the zones both inside and outside of town walls deserve far more archaeological attention to recover possible traces of urban farming. The development of the urban fringe and its land use throughout all periods also deserves more attention, only for the development of professional horticulture in the early modern period, but also for its use in medieval periods.

The potential of dung as a source of information about almost all aspects of urban farming must also be underlined. It can provide information about:

- which animals were kept;
- which cereals were grown (if straw is present);
- which vegetables were cultivated (if associated with garden plots/hotbeds).

For these reasons the recovery of dung samples should be prioritized and integrated into future sampling strategies.

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Appendices

I List of all available reports sorted by town (or failed town) in alphabetical order

II List of 273 keywords

III List of availability of reports sorted by towns and failed towns.

IV Reports in ranking A, B, C, D or E sorted by town

V List of keywords used in text mining and that were assessed. Of some keywords a variant has been evaluated. Other keywords were not assessed, such as species names.

VI Overview of the ABR codes, meanings and translations.

Appendix I

List of all available reports sorted by town (or failed town) in alphabetical order

Town or failed town	Filename: ARCHIS case-identification code _ town _ topo-nym (or project)
Alkmaar	2181098100_Alkmaar_Ritsevoort 60
Alkmaar	2071659100_Alkmaar_Paardenmarkt
Alkmaar	2251421100_Alkmaar_Lauwershof
Alkmaar	2256428100_Alkmaar_Paardenmarkt
Alkmaar	2341097100_Alkmaar_Gedempte Nieuwesloot 46 Doelenveld
Alkmaar	2248790100_Alkmaar_Doelenstraat 2
Alkmaar	2428172100_Alkmaar_Schoutenstraat
Alkmaar	2134644100_Alkmaar_Ritsevoort
Alkmaar	2279854100_Alkmaar_Doelenveld
Alkmaar	2114597100_Alkmaar_Bloemstraat 26-32
Alkmaar	2372582100_Alkmaar_Gedempte Nieuwesloot
Alkmaar	2124138100_Alkmaar_Wageweg
Alkmaar	2094339100_Alkmaar_Schelphoek
Alkmaar	2181081100_Alkmaar_Spanjaardstraat
Alkmaar	2132887100_Alkmaar_Schelphoek
Alkmaar	2287970100_Alkmaar_Paardenmarkt
Alkmaar	2349310100_Alkmaar_Laat 208-212
Alkmaar	2070192100_Alkmaar_Plan Voordam ; Voordam 13-15 ; Zijdam 4
Alkmaar	2315541100_Alkmaar_Doelenstraat St. Jorisstraat
Alkmaar	2323974100_Alkmaar_Boterstraat 4-6-8
Alkmaar	2099572100_Alkmaar_Oudegracht 182
Alkmaar	2321332100_Alkmaar_Hofstraat 15
Alkmaar	2047926100_Alkmaar_Laat * Houtmarkt *
Alkmaar	2069245100_Alkmaar_Gasthuisstraat
Alkmaar	2069286100_Alkmaar_Waag en Waagplein
Ameide	2171337100_Ameide_Nieuwstraat-Peperstraat
Ameide	2170381100_Ameide_Huys Herlaar
Ameide	2314586100_Ameide_Ameide Peperstraat
Amersfoort	2461925100_Amersfoort_Koppelweg
Amersfoort	3986192100_Amersfoort_Stationsstraat 10
Amersfoort	2321049100_Amersfoort_Van Randwijcklaan - Lemairestraat
Amersfoort	2064230100_Amersfoort_Zocherplantsoen noordkant
Amersfoort	2146235100_Amersfoort_de Arnhemse Poortwal 123
Amersfoort	2222172100_Amersfoort_Koestraat 14-16
Amersfoort	2183917100_Amersfoort_Westsingel – Hellestraat
Amersfoort	2173913100_Amersfoort_Groenmarkt
Amersfoort	2213319100_Amersfoort_Havik
Amersfoort	2266204100_Amersfoort_Koesteeg 13
Amersfoort	2214259100_Amersfoort_Grote Koppel 5 en 6
Amersfoort	2314197100_Amersfoort_Pothstraat

Town or failed town	Filename: ARCHIS case-identification code _ town _ topo-nym (or project)
Amersfoort	2317980100_Amersfoort_Lieve Vrouwestraat - Langegracht
Amersfoort	2342888100_Amersfoort_Elleboogkerk
Amersfoort	2359696100_Amersfoort_Pieters en Bloklandgasthuis
Amersfoort	2346379100_Amersfoort_Windsteeg
Amersfoort	2381395100_Amersfoort_Utrechtsestraat 30-32
Amersfoort	2344678100_Amersfoort_Varkensmarkt
Amersfoort	2013832100_Amersfoort_Kreupelstraat; Achter de Kamp
Amersfoort	2437130100_Amersfoort_Achter de Arnhemse Poortwal
Amersfoort	2399823100_Amersfoort_Appelmarkt
Amersfoort	4029778100_Amersfoort_Kortenaerstraat
Amersfoort	2044004100_Amersfoort_hoek Korte Bergstraat-Vlasakkerweg
Amersfoort	2451427100_Amersfoort_Armen de Poth
Amersfoort	2366604100_Amersfoort_Kleine Haag
Amersfoort	2095870100_Amersfoort_Smallepad
Amersfoort	2045999100_Amersfoort_Achter de Kamp 32
Amsterdam	2211967100_Amsterdam_Oudezijds Armsteeg
Amsterdam	2319713100_Amsterdam_Spuistraat 3a
Amsterdam	2071359100_Amsterdam_Oudezijdsvoorburgwal 260-266
Amsterdam	2305821100_Amsterdam_Nieuwe Doelenstraat aar_74
Amsterdam	2387519100_Amsterdam_Oudezijds Armsteeg 9-33
Amsterdam	2334900100_Amsterdam_Nieuwmarkt 4
Amsterdam	2167530100_Amsterdam_Oudezijds Voorburgwal 28
Amsterdam	2052931100_Amsterdam_Paardenstraat
Amsterdam	2055012100_Amsterdam_Oude Turfmarkt 129-139
Amsterdam	2054843100_Amsterdam_Vijzelstraat 121-131
Amsterdam	2092468100_Amsterdam_Martelaarsgracht
Amsterdam	2085818100_Amsterdam_Grasweg
Amsterdam	2255391100_Amsterdam_Beerput Keizersgracht
Amsterdam	2174764100_Amsterdam_Spuistraat 256-258
Amsterdam	2445693100_Amsterdam_OZ Voorburgwal 38-40, Heintje Hoeksteeg 33
Amsterdam	2192892100_Amsterdam_Kalverstraat 151
Amsterdam	2244545100_Amsterdam_Spuistraat 30
Amsterdam	2249981100_Amsterdam_Rembrandtplein
Amsterdam	2421879100_Amsterdam_Kloveniersburgwal to 135-143
Amsterdam	2180799100_Amsterdam_Maatschap Dam 2-4
Amsterdam	2331417100_Amsterdam_Valkenburgerstraat 130-146
Amsterdam	2259441100_Amsterdam_Oudeschans 73-77
Amsterdam	2279927100_Amsterdam_Portugese Synagoge-Mr. Visserplein 3
Amsterdam	2386360100_Amsterdam_kattenburgerstraat
Amsterdam	2353530100_Amsterdam_Heiligeweg 32

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Amsterdam	2241937100_Amsterdam_Rozenstraat 68 76, Rozengracht 69 75 aar_61
Amsterdam	2372996100_Amsterdam_Lange Niezel 16
Amsterdam	2334488100_Amsterdam_Warmoesstraat 15
Amsterdam	2392613100_Amsterdam_Nieuwe Passeerdersstraat
Amsterdam	2375044100_Amsterdam_Nes 116-118
Amsterdam	2465149100_Amsterdam_Oudezijds Voorburgwal thv 206-222
Amsterdam	4034831100_Amsterdam_div begeleidingen gebundeld
Amsterdam	2121732100_Amsterdam_Rapenburg 46-54
Amsterdam	2103864100_Amsterdam_Oudeschans 5-11
Amsterdam	2289533100_Amsterdam_Elandssteeg aar_67
Amsterdam	2294174100_Amsterdam_Herengracht 74 78 aar_70
Amsterdam	2419935100_Amsterdam_Waag
Amsterdam	4564686100_Amsterdam_vestingwerken Amsterdam
Amsterdam	2045017100_Amsterdam_Kalverstraat 58
Amsterdam	2052104100_Amsterdam_Oudezijds Voorburgwal 229
Amsterdam	2107088100_Amsterdam_Amstelstraat 24-32a
Amsterdam	2107096100_Amsterdam_Nieuwezijds Kolk
Amsterdam	2025301100_Amsterdam_Westerstraat 220 230
Amsterdam	2152780100_Amsterdam_Nieuwe Jonkerstraat 4 Nieuwe Ridderstraat 5
Amsterdam	2161099100_Amsterdam_Nieuwmarkt 4
Amsterdam	2036789100_Amsterdam_Konijnenstraat
Amsterdam	2063023100_Amsterdam_Enge Kapelsteeg Nieuwe Zijds Kapel
Amsterdam	2119635100_Amsterdam_Jonas Daniel Meijerplein 4
Arnhem	2031125100_Arnhem_Op de Beek (Musiskwartier)
Arnhem	2223922100_Arnhem_Koningstraat Klarestraat
Arnhem	2242569100_Arnhem_Vijzelstraat 19
Arnhem	2315639100_Arnhem_Spijkerstraat
Arnhem	2336926100_Arnhem_Oude Oeverstraat (noord) Nieuwe Oeverstraat (zuid) Kortestraat (oost)
Arnhem	2344256100_Arnhem_Hoogstedelaan Klingelbeekseweg
Arnhem	2458289100_Arnhem_Roermondsplein
Arnhem	2463497100_Arnhem_Spijkerbroek AB
Arnhem	4554358100_Arnhem_Sabelspoort naar John Frostbrug
Arnhem	4556391100_Arnhem_Station Velperpoort
Arnhem	4573288100_Arnhem_Eusebiuskerk
Arnhem	2277789100_Arnhem_Kenniskluster
Arnhem	2329474100_Arnhem_Hoogstede-Klingelbeek
Arnhem	2352729100_Arnhem_VGGM rietgrachtstraat 74
Arnhem	2381168100_Arnhem_Ruitenberglaan
Arnhem	2382861100_Arnhem_Oude Oeverstraat Verbindingstunnel
Arnhem	2398827100_Arnhem_Vossenstraat - Kortestraat
Arnhem	2404844100_Arnhem_Meinerswijk Stadsblokken deelgebied D
Arnhem	2407703100_Arnhem_Arnhem Centraal
Arnhem	2416135100_Arnhem_Fluvium Noord Gasfabriek
Arnhem	2419538100_Arnhem_Boulevard heuvelink - Johan de Wittlaan

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Arnhem	2447329100_Arnhem_Huis der Provincie
Arnhem	2454595100_Arnhem_Driekoningendwarsstraat 83
Arnhem	2455956100_Arnhem_De Praets 33
Arnhem	2458012100_Arnhem_Korenmarkt 14-15, Molenstraat 12
Arnhem	2458037100_Arnhem_Amsterdamseweg
Arnhem	2458150100_Arnhem_Westervoortsedijk
Arnhem	2458175100_Arnhem_Nieuwe Kade
Arnhem	3990525100_Arnhem_Kerkplein
Asperen	3985252100_Asperen_Kasteel Waddestein
Asperen	2467547100_Asperen_Leerdamseweg 39
Batenburg	2402908100_Batenburg_Parallelweg/Kruisstraat/'t Straatje
Batenburg	2352153100_Batenburg_Parallelweg Kruisstraat
Bergen op Zoom	2453688100_Bergen op Zoom_Station Fietshelling
Bergen op Zoom	2367455100_Bergen op Zoom_Lunet paravicini
Bergen op Zoom	2349798100_Bergen op Zoom_Smitsvest; binnenstad
Bergen op Zoom	2330218100_Bergen op Zoom_Gemeentewerf
Bergen op Zoom	2327124100_Bergen op Zoom_Wilhelminaveld gebouw T
Bergen op Zoom	2324143100_Bergen op Zoom_Oude stationsweg
Bergen op Zoom	2315744100_Bergen op Zoom_Huijbergsestraat Schoolstraat
Bergen op Zoom	2297139100_Bergen op Zoom_Wouwsestraatweg
Bergen op Zoom	2286917100_Bergen op Zoom_Zuidmolenstraat 30
Bergen op Zoom	2270619100_Bergen op Zoom_Wilhelminaveld gebouw T
Bergen op Zoom	2270602100_Bergen op Zoom_Binnenstad: Fortuinstraat
Bergen op Zoom	2254224100_Bergen op Zoom_Grote Markt 29
Bergen op Zoom	2185601100_Bergen op Zoom_Moeregrebstraat 18
Bergen op Zoom	2163253100_Bergen op Zoom_Kerkstraat
Bergen op Zoom	2149387100_Bergen op Zoom_Binnenstad; Grote Markt; Lakenhal
Bergen op Zoom	2113421100_Bergen op Zoom_Binnenstad ; Potterstraat 7
Bergen op Zoom	2070451100_Bergen op Zoom_Gertrudishof
Bergen op Zoom	2068857100_Bergen op Zoom_Parade
Bergen op Zoom	2066459100_Bergen op Zoom_Geweldingerstraat
Bergen op Zoom	2066450100_Bergen op Zoom_Augustapolder
Bergen op Zoom	2047480100_Bergen op Zoom_Goudenbloemstraat 7
Bergen op Zoom	2359541100_Bergen op Zoom_Kijk in de pot Noord
Bolsward	2304833100_Bolsward_Laag Bolwerk
Breda	2124324100_Breda_St. Jansstraat
Breda	2031158100_Breda_De Beyerd
Breda	2288342100_Breda_Markendaalseweg
Breda	2102624100_Breda_Beyerd
Breda	2360545100_Breda_Achter de Lange Stallen
Breda	2185034100_Breda_Oranjeboom Drie Hoefijzers
Breda	2210702100_Breda_Haagdijk
Breda	2045025100_Breda_Muren in de Mark
Breda	2193791100_Breda_Leuvenaarstraat
Breda	2051449100_Breda_Donkvaart
Breda	2157957100_Breda_Markendaalseweg
Breda	4573011100_Breda_Markendaalseweg Waterstraat

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Breda	2400023100_Breda_Lutherse kerk
Breda	2065932100_Breda_Drie Hoefijzers
Breda	2065949100_Breda_Haven ; Nieuwe Mark
Breda	2072769100_Breda_St. Jansstraat 12
Breda	2137982100_Breda_Nassausingel
Breda	2182483100_Breda_Halstraat
Breda	2323722100_Breda_Baronesgarage
Breda	2382853100_Breda_Begijnhof tuin
Breda	2464785100_Breda_Kennedylaan
Breda	3993522100_Breda_Kennedylaan 36 38
Breda	2037006100_Breda_Westflank - Laurentius
Breda	2207877100_Breda_Haagdijk 145-Pelmolenstraat 4
Breda	2227105100_Breda_Kasteelplein
Breda	2231941100_Breda_Begijnhof
Breda	2244107100_Breda_Haagdijk 158
Breda	2074356100_Breda_Menno van Coehoornstraat
Breda	2217678100_Breda_Achter de Lange Stallen St Joostkapel
Breda	2260145100_Breda_stationszone
Breda	2359736100_Breda_Tramsingel
Breda	2348833100_Breda_Haagdijk 151-187
Breda	2222220100_Breda_Begijnhof huis 75
Breda	2378203100_Breda_Grote Markt 4
Breda	2353060100_Breda_Korte Boschstraat
Breda	2345399100_Breda_Nassausingel
Breda	2371237100_Breda_Nassaustraat - Nieuwe Boschstraat
Breda	2388029100_Breda_Seeligsingel
Breda	2420899100_Breda_Korte Boschstraat
Breda	2409689100_Breda_Stationsplein
Breda	2352891100_Breda_Stationslaan
Breda	2333345100_Breda_Haagdijk 151-185
Breda	2195119100_Breda_Haagdijk Leuvenaarstraat
Breda	2412588100_Breda_Trambrugsingel
Breda	3988177100_Breda_Academiesingel 48-48a
Breda	2196520100_Breda_Nieuwstraat
Breda	2399978100_Breda_KMA parade standbeeld
Breda	2436880100_Breda_Mauritssingel 4
Breda	2475322100_Breda_Nieuwstraat 21-31
Breda	2478709100_Breda_Gasthuiscomplex
Bredevoort	2413170100_Bredevoort_'t Zand 21A
Bredevoort	2299650100_Bredevoort_Landstraat 21-23
Bredevoort	2338562100_Bredevoort_Landstraat 21-23
Bredevoort	2241767100_Bredevoort_'t Zand
Bredevoort	2119668100_Bredevoort_Officiersstraat 1
Bredevoort	2402608100_Bredevoort_Koppelstraat
Buren	2395643100_Buren_Maurikse Wetering
Buren	2376584100_Buren_Maurikse Wetering
Buren	2084343100_Buren_Het Plantsoen
Coevorden	2369959100_Coevorden_Weeshuisstraat

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Coevorden	2195102100_Coevorden_binnenhavens
Coevorden	2209383100_Coevorden_Weeshuisstraat
Coevorden	2293120100_Coevorden_Kasteel Coevorden
Coevorden	2430861100_Coevorden_Parallelweg
Coevorden	2455623100_Coevorden_Coevorden Singels AB
Coevorden	2154157100_Coevorden_Bogasterrein bolwerk Zeeland
Coevorden	2275163100_Coevorden_Lord Nelson
Coevorden	2229600100_Coevorden_Koesteeg
Coevorden	3295950100_Coevorden_Parallelweg
Coevorden	2314691100_Coevorden_brandweerkazerne
Coevorden	2324751100_Coevorden_DE Vlijt
Coevorden	2093383100_Coevorden_Bogasterrein
Coevorden	2279010100_Coevorden_pakhuis De Vlijt
Coevorden	2321462100_Coevorden_Oostersingel 7
Coevorden	2353790100_Coevorden_Brandweerkazerne en De Haven
Coevorden	2141942100_Coevorden_Bogas-terrein
Coevorden	2171694100_Coevorden_Centrum Coevorden
Coevorden	2061217100_Coevorden_Bentheimerstraat Oostersingel
Culemborg	2011101100_Culemborg_Caetshage
Culemborg	2043405100_Culemborg_Stadsgrachten
Culemborg	2131193100_Culemborg_Theater De Fransche School
Culemborg	2264803100_Culemborg_Stadhuis Culemborg
Culemborg	2313281100_Culemborg_t Buitenhof
Culemborg	2320499100_Culemborg_Stadhuis AB
Culemborg	2353230100_Culemborg_r.k. Josefschool
Culemborg	2374307100_Culemborg_Afvalcontainers binnenstad Culemborg
Culemborg	2399401100_Culemborg_De Kapel
Culemborg	2420517100_Culemborg_Westerwal
Culemborg	2420728100_Culemborg_Leilinden
Culemborg	2423903100_Culemborg_Lange Havendijk de Loentjes
Culemborg	2429160100_Culemborg_Leilinden fase 2
Culemborg	4042112100_Culemborg_Zandstraat 95
Delden	2272944100_Delden_Langestraat 33
Delft	2065049100_Delft_Voldersgracht 21
Delft	2354527100_Delft_Poppesteeg
Delft	2368938100_Delft_Scheepmakerij 8-12
Delft	2373505100_Delft_Scheepmakerij
Delft	2382261100_Delft_Scheepmakerij 9
Delft	2399289100_Delft_Zuidwal
Delft	2409453100_Delft_Scheepmakerij 12
Delft	2417618100_Delft_Kapelsbrug
Delft	2468073100_Delft_Markt
Delft	2471491100_Delft_Paardenmarkt
Delft	3292012100_Delft_HNK fase 2
Delft	3294079100_Delft_Coendersparkstalling
Delft	4005671100_Delft_Spoorzone Delft III
Delft	4017384100_Delft_Rotterdamseweg 202

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Delft	4041716100_Delft_Nieuw Delft Veld 1
Delft	4042704100_Delft_Nieuw Delft veld 5
Delft	4544313100_Delft_Markt 85
Delft	4548120100_Delft_Nieuw Delft veld 3 en 8
Den Bosch	2128383100_Den Bosch_Oliemolensingel
Den Bosch	2475769100_Den Bosch_Herman Moerkerkplein, Waterpoort
Den Bosch	2128448100_Den Bosch_Bank van Lening
Den Bosch	2128456100_Den Bosch_St. Jansingel Westwal
Den Bosch	2323917100_Den Bosch_Bastion BasElaar
Den Bosch	2356544100_Den Bosch_Heuvel Marktveld
Den Bosch	2108279100_Den Bosch_De stadsmuur aan de Spinhuiswal en Zuidwal
Den Bosch	2087308100_Den Bosch_Westwal; Sint Janssingel
Den Bosch	2046970100_Den Bosch_Hinthamerstraat 163 en Mgr. Prinsenstraat 1A-C
Den Bosch	2131639100_Den Bosch_Muntelbolwerk
Den Bosch	2265240100_Den Bosch_Postkantoor Kerkstraat
Den Bosch	2285101100_Den Bosch_Hekellaan
Den Bosch	2306429100_Den Bosch_Bastion Baselaar
Den Bosch	2347553100_Den Bosch_Bastion Baselaar
Den Bosch	2421773100_Den Bosch_Schapenmarkt 17-19
Den Bosch	2229511100_Den Bosch_Kleine Hofstad 2
Den Bosch	2326558100_Den Bosch_Hoge steenweg 25 Achter de Tolbrug 26-28
Den Bosch	2224335100_Den Bosch_Dode Nieuwstraat Minderbroedersklooster
Den Bosch	2343349100_Den Bosch_Baseldonk
Den Bosch	2171564100_Den Bosch_Jeroen Boschplein, Hinthamerstraat, Mgr. Prinssenstraat
Den Bosch	2217920100_Den Bosch_Beurdsestraat
Den Bosch	2274434100_Den Bosch_Hinthamerpoort, De Bossche Pad, Aawal, Muntelwal
Den Bosch	2279416100_Den Bosch_Vught Stadhouderspark
Den Bosch	2294230100_Den Bosch_Van Berckelstraat
Den Bosch	2330120100_Den Bosch_Plein de Parade
Den Bosch	2332649100_Den Bosch_Putgang
Den Bosch	2337266100_Den Bosch_Sint Jansbolwerk
Den Bosch	2354657100_Den Bosch_Vonk en Vlam
Den Bosch	2356455100_Den Bosch_Zevensteensebrug
Den Bosch	2369172100_Den Bosch_Heetmanplein
Den Bosch	2401360100_Den Bosch_Schapenmarkt 1
Den Bosch	2407355100_Den Bosch_Heetmanplein
Den Bosch	2407525100_Den Bosch_Bartenbrug
Den Bosch	2408943100_Den Bosch_Zuid Willemsvaart 588
Den Bosch	2412011100_Den Bosch_'s-Hertogenbosch, Sint Jorisstraat 32
Den Bosch	2423628100_Den Bosch_Visstraat
Den Bosch	2429355100_Den Bosch_Taalstraat 88, Spreeuwenburg
Den Bosch	2439691100_Den Bosch_Isabellaveld
Den Bosch	2441326100_Den Bosch_Afvalcontainers Schapenmarkt 3

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Den Bosch	2453477100_Den Bosch_Waterstraat
Den Bosch	2458483100_Den Bosch_Mariabrug
Den Bosch	2473784100_Den Bosch_Sint-Jansstraat
Den Bosch	3975419100_Den Bosch_Riolering Barten Zuid
Den Bosch	3978295100_Den Bosch_Kerkstraat 16a
Den Bosch	4001556100_Den Bosch_Theater aan de Parade
Den Bosch	2161844100_Den Bosch_Nieuwstraat 77
Den Bosch	2128431100_Den Bosch_Muntelbolwerk (Halve Maan)
Den Haag	2155786100_Den Haag_Grote kerk
Den Haag	2334536100_Den Haag_Grote Marktstraat 44-46
Den Haag	2071537100_Den Haag_Hoogstraat 30
Den Haag	2068313100_Den Haag_Parkstraat
Den Haag	2085656100_Den Haag_Voldersgracht-Spuimarkt
Den Haag	2460953100_Den Haag_Tournooiveld
Den Haag	2433259100_Den Haag_Tournooiveld
Den Haag	2108310100_Den Haag_Achterraamstraat
Den Haag	2247356100_Den Haag_Prinsestraat-Nobelstraat, korzotheater
Den Haag	2377734100_Den Haag_La Ciguena
Den Haag	2362505100_Den Haag_Korte Vijverberg
Den Haag	2068021100_Den Haag_Malieveld
Den Haag	2346849100_Den Haag_Grote Markt, Uriliften
Den Haag	2253585100_Den Haag_Spui Lamgroen
Den Haag	2330275100_Den Haag_Kabels en leidingen 1e Haagpoort
Den Haag	2388101100_Den Haag_Spui 24-28
Den Haag	2223241100_Den Haag_Smidswater 10-12
Den Haag	2326314100_Den Haag_Noordwal Veenkade
Den Haag	2283677100_Den Haag_Grote Kerk
Den Haag	2352850100_Den Haag_Nieuwe Molstraat 2A
Den Haag	2355094100_Den Haag_Zuidwal 1 Paviljoensgracht 139
Den Haag	2180344100_Den Haag_Lange Voorhout
Den Haag	2359169100_Den Haag_Mauritshuis
Den Haag	2335362100_Den Haag_Zieken 185-189
Den Haag	2022815100_Den Haag_Bierstraat
Den Haag	2082278100_Den Haag_Achterom
Den Haag	2074956100_Den Haag_Hoge Nieuwstraat
Den Haag	2042433100_Den Haag_Grote Markt ongenummerd
Den Haag	2043187100_Den Haag_Riviervismarkt 3- 5
Den Haag	2050703100_Den Haag_Vijverhof
Den Haag	2049157100_Den Haag_Kerkplein
Deventer	2004825100_Deventer_Ossenwaard
Deventer	2048233100_Deventer_Emmaplein-Kazernestraat
Deventer	2683290100_Deventer_Nieuwbouw Stadhuiskwartier
Deventer	2083363100_Deventer_vikingwal
Deventer	2446292100_Deventer_Stationsplein
Deventer	3298915100_Deventer_Oranjelaan 19
Deventer	2090929100_Deventer_Achter de Muren Zandpoort
Deventer	2254792100_Deventer_Bolwerksweide

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Deventer	2222189100_Deventer_Boreelkazerne
Deventer	2023739100_Deventer_Bruynssteeg 6-10
Deventer	2167011100_Deventer_Burgerweeshuis
Deventer	2132449100_Deventer_Burseplein Stadskantoor
Deventer	2224084100_Deventer_Grote Kerkhof
Deventer	2364985100_Deventer_Grote Kerkhof
Deventer	2412360100_Deventer_Grote Kerkhof
Deventer	2247526100_Deventer_Hoornwerk
Deventer	2061160100_Deventer_Houtmarkt
Deventer	2225348100_Deventer_Houtmarkt
Deventer	2217767100_Deventer_Keizerstraat
Deventer	2390848100_Deventer_Kelder Geert Groote Huis
Deventer	2224092100_Deventer_Kleine Poot
Deventer	2468292100_Deventer_Lamme van Dieseplein
Deventer	2389609100_Deventer_Lange Bisschopsstraat 24-26
Deventer	2278355100_Deventer_Lange Bisschopstraat 1
Deventer	2065202100_Deventer_Molenbelt
Deventer	2063259100_Deventer_Muggeplein
Deventer	2411437100_Deventer_Muggeplein
Deventer	2254816100_Deventer_Ossenwaard
Deventer	2254824100_Deventer_Ossenwaard
Deventer	2254832100_Deventer_Ossenwaard
Deventer	2484670100_Deventer_Ossenwaard
Deventer	2241904100_Deventer_Pothoofd
Deventer	2324079100_Deventer_Ruimte voor de rivier, vindplaats 5
Deventer	2008438100_Deventer_Striksteeg 0-3
Deventer	2279198100_Deventer_Striksteeg 1-3
Deventer	2392638100_Deventer_T&D terrein
Doesburg	2165076100_Doesburg_Korte Koepoortstraat
Doesburg	2464485100_Doesburg_Gasthuiskerk
Doesburg	2375547100_Doesburg_doesburg centrum
Doesburg	2682950100_Doesburg_Meester Frits Plein
Doesburg	2282234100_Doesburg_Molenveld-Noord
Doesburg	3973953100_Doesburg_Gasthuisstraat 23 29
Doesburg	2429339100_Doesburg_Koepooortwal 7
Doesburg	2381249100_Doesburg_Gasthuiskerk
Doesburg	2448260100_Doesburg_Kloosterstraat
Doesburg	4569919100_Doesburg_Kloostertuin
Doesburg	3981697100_Doesburg_Commanderij
Doesburg	2110181100_Doesburg_Hessengracht
Doesburg	2152691100_Doesburg_Ooipoortstraat Mauritsveld
Doetinchem	2127857100_Doetinchem_Terborgseweg
Doetinchem	2453711100_Doetinchem_Terborgseweg 63
Doetinchem	2216421100_Doetinchem_Simonsplein
Doetinchem	2423530100_Doetinchem_Terborgseweg achter nr. 63 te Doetinchem
Doetinchem	2405962100_Doetinchem_Hamburgerstraat 46
Doetinchem	3988760100_Doetinchem_Plantsoen

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Doetinchem	2300361100_Doetinchem_Dominee van Dijkweg en de Hofstraat
Doetinchem	2115041100_Doetinchem_Alevietenterrein
Doetinchem	2374518100_Doetinchem_Willem Rodalaan
Doetinchem	2072825100_Doetinchem_Perlstein
Doetinchem	2479049100_Doetinchem_Nieuwstad
Doetinchem	2407744100_Doetinchem_Omdraai, Simonsplein
Doetinchem	2297188100_Doetinchem_Holterhoek 2
Doetinchem	2221402100_Doetinchem_Veemarkt
Doetinchem	2481349100_Doetinchem_Meestersstraat
Doetinchem	2308195100_Doetinchem_Holterhoek 2
Doetinchem	2362879100_Doetinchem_Tollenstraat 18-24
Doetinchem	2374031100_Doetinchem_Europaweg
Doetinchem	2203583100_Doetinchem_Veemarktterrein
Doetinchem	2257173100_Doetinchem_Huberroos
Doetinchem	2408076100_Doetinchem_Randweg-Oost (vindplaats 1)
Doetinchem	2301999100_Doetinchem_Keppelseweg 80
Dordrecht	2234890100_Dordrecht_Houttuinen 36
Dordrecht	2062570100_Dordrecht_Grote Markt
Dordrecht	2230159100_Dordrecht_Hofkwartier Dordrechts Museum
Dordrecht	2325245100_Dordrecht_Wolwevershaven 4
Dordrecht	2202910100_Dordrecht_Hofkwartier-Kloostertuin
Dordrecht	2340327100_Dordrecht_Weeshuisstraat 6, trafohuisje
Dordrecht	3985390100_Dordrecht_Kuipershaven
Dordrecht	2066118100_Dordrecht_Tiën
Dordrecht	2360253100_Dordrecht_Hof 10-12 Augustijnenklooster
Dordrecht	2321210100_Dordrecht_Nieuwstraat 60-62
Dordrecht	2404941100_Dordrecht_hoek Boomstraat-Taankade
Dordrecht	2406472100_Dordrecht_hoek nieuwstraat-augustijnenkamp, tuin the movies
Dordrecht	2409331100_Dordrecht_kabeltrace Scheffersplein
Dordrecht	2204409100_Dordrecht_grafelijke herberg Mijnsherenherberg
Dordrecht	2420769100_Dordrecht_Vriesestraat t.h.v. nrs. 130-168
Dordrecht	2440013100_Dordrecht_Van der Kooghplaats 1
Dordrecht	2120777100_Dordrecht_Tiën
Dordrecht	4012012100_Dordrecht_Lindelaan
Dordrecht	2466883100_Dordrecht_Vest 94
Dordrecht	2470810100_Dordrecht_Bagijnhof 14
Dordrecht	3978887100_Dordrecht_Nieuwstraat - Korte Nieuwstraat
Dordrecht	3973961100_Dordrecht_Torenstraat
Dordrecht	4002900100_Dordrecht_Grote Spuistraat 25
Dordrecht	4017295100_Dordrecht_rioolvervanging Elfhuizen
Dordrecht	2420055100_Dordrecht_Korte Kalkstraat en Binnen Walevest
Dordrecht	2250247100_Dordrecht_Huis Roodenburch 't Schaeck, Wijnstraat 153
Dordrecht	4035925100_Dordrecht_Hoek Stek- schoolstraat
Dordrecht	2190250100_Dordrecht_Botermarkt
Dordrecht	2237782100_Dordrecht_Damiatebolwerk

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Dordrecht	2204003100_Dordrecht_Wilgenbosch-Draai
Dordrecht	2192981100_Dordrecht_Grotekerkstuin
Dordrecht	2196180100_Dordrecht_Doelstraat 31
Dordrecht	2199478100_Dordrecht_Nieuwstraat 12-24, de Berckepoort
Dordrecht	2066483100_Dordrecht_Elfhuizen
Dordrecht	2228678100_Dordrecht_Boomstraat 37
Dordrecht	2215766100_Dordrecht_Grotekerksebuurt
Edam	2279384100_Edam_Zeevangszeedijk 14
Edam	3999639100_Edam_Jonkerlaantje
Edam	2469678100_Edam_Nieuwvaartje 6
Edam	2176619100_Edam_Oorgat tussen 46a en 48
Edam	3975776100_Edam_Nieuwvaartje
Edam	2116192100_Edam_Matthijs Tinxgracht 16
Edam	2396915100_Edam_Achterhaven
Edam	2109478100_Edam_Oorgat 20a b
Eindhoven	2025059100_Eindhoven_Vijksteeg
Eindhoven	2086588100_Eindhoven_Joriskerk
Eindhoven	4024925100_Eindhoven_hoogstraat 185
Eindhoven	2442233100_Eindhoven_Oude Torenstraat
Eindhoven	2476595100_Eindhoven_Heilige Geeststraat 49
Eindhoven	2459066100_Eindhoven_Studentenhuisvesting
Eindhoven	2327043100_Eindhoven_Hoogstraat 122
Eindhoven	2232321100_Eindhoven_Eindhoven, Hoogstraat
Eindhoven	2121051100_Eindhoven_Oude Toren
Eindhoven	2064977100_Eindhoven_Strijp
Eindhoven	2336837100_Eindhoven_Dommel
Eindhoven	2449443100_Eindhoven_Bergstraat 3-5
Eindhoven	2223314100_Eindhoven_Hoogstraat 165
Eindhoven	2356325100_Eindhoven_Kleine Berg 11
Eindhoven	2266829100_Eindhoven_Rembrandt
Eindhoven	2315663100_Eindhoven_Genneperweg
Eindhoven	2323933100_Eindhoven_Gasthuisstraat
Eindhoven	2252661100_Eindhoven_Vrijstraat 28
Eindhoven	2332413100_Eindhoven_Wal 2
Eindhoven	2371675100_Eindhoven_Bubble (Kleine Blob)
Eindhoven	2451151100_Eindhoven_Vrijstraat 12 Eindhoven
Eindhoven	2134693100_Eindhoven_Kronehoef
Eindhoven	2130067100_Eindhoven_Stratumseind
Eindhoven	4022527100_Eindhoven_Luciferfabriek
Enkhuizen	2045836100_Enkhuizen_De Baan
Enkhuizen	2048177100_Enkhuizen_Paktuinen; Havenweg
Enkhuizen	2072452100_Enkhuizen_De Baan
Enkhuizen	2131469100_Enkhuizen_Zuiderhavendijk-Kalksteiger
Enkhuizen	2160450100_Enkhuizen_Breedstraat 52
Enkhuizen	2225112100_Enkhuizen_Torenstraat baansteeg
Enkhuizen	2269283100_Enkhuizen_Zuider Boerenvaart 43
Enkhuizen	2287840100_Enkhuizen_Kaasmarkt-Noorderhavendijk
Enkhuizen	2302184100_Enkhuizen_de Zesstedenweg 19

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Enkhuizen	2310227100_Enkhuizen_Oude postkantoor
Enkhuizen	2365332100_Enkhuizen_Hoek Davidstraat en Westerstraat
Enkhuizen	2367260100_Enkhuizen_winkelcentrum Streekhof, westelijke uitbreiding fase 1
Enkhuizen	2374072100_Enkhuizen_Wortelmarkt
Enkhuizen	2402624100_Enkhuizen_Westeinde 107, Incotec
Enkhuizen	2402835100_Enkhuizen_Drommedaris
Enkhuizen	2402851100_Enkhuizen_Oosterhavenstraat-Hennegat-Karseboomstraat
Enkhuizen	2410862100_Enkhuizen_Paktuinen
Enkhuizen	2419716100_Enkhuizen_Westeinde 62
Enkhuizen	2429469100_Enkhuizen_Westerstraat 188
Enkhuizen	2441253100_Enkhuizen_Davidstraat-Romeinstraat-Korte Davidstraat
Enkhuizen	2448463100_Enkhuizen_Molenweg 69
Enkhuizen	2460986100_Enkhuizen_Schootsveld
Enkhuizen	2462102100_Enkhuizen_Burgwal 30
Enkhuizen	2278200100_Enkhuizen_Noordenboerenvaart26
Enkhuizen	2286925100_Enkhuizen_Molenweg
Enkhuizen	2296037100_Enkhuizen_Vijzelstraat
Enkhuizen	2309248100_Enkhuizen_Waagstraat 6
Enkhuizen	3977152100_Enkhuizen_Stede Broec Hoofdstraat 23 Bovenkarspel
Enkhuizen	2466137100_Enkhuizen_Hoogstraat 7
Enkhuizen	3291324100_Enkhuizen_Havenweg 26
Enkhuizen	4011210100_Enkhuizen_Zuiderkerk
Franeker	4019328100_Franeker_Botniasteeg 16A
Franeker	2361914100_Franeker_Botniasteeg
Gennep	4036702100_Gennep_Genneperhuisweg en de Haspel
Gennep	2111591100_Gennep_Houtstraat
Gennep	2335654100_Gennep_Het Bolwerk te Gennep
Gennep	2422850100_Gennep_Gennep Zandpoort
Gennep	2116087100_Gennep_Houtstraat
Gennep	2329230100_Gennep_Martinushof
Goes	3990736100_Goes_Korte Kerkstraat
Goes	2066401100_Goes_Hotel de Ville
Goes	2361996100_Goes_Singelstraat Grote Kerk
Goes	2442939100_Goes_Wijngaardstraat 3; Bleekveld 9-15
Goes	2353596100_Goes_Slot Goes
Goes	4006181100_Goes_Westsingel
Goes	2473768100_Goes_Lange Vorststraat 76-82, Oostwal
Goes	3292272100_Goes_Slot Ostende
Goes	2407022100_Goes_Beestenmarkt
Goes	2293234100_Goes_Lange Kerkstraat 12
Goes	2180944100_Goes_Singelstraat -Zusterstraat
Goes	2339656100_Goes_Klokstraat
Goes	2331799100_Goes_Singel 5-5a
Goes	2468827100_Goes_Van Dusseldorpstraat 78
Goes	2300823100_Goes_Ringbaan West Troelstralaan
Goes	2480490100_Goes_Abel Tasmanstraat

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Goes	2380293100_Goes_Valckeslotlaan 159-251
Goes	3988599100_Goes_Jan van Riebeekstraat
Goes	2045593100_Goes_Ter Valcke
Goes	2167109100_Goes_Prins van Oranje
Goes	2055045100_Goes_Westwal 43
Goes	2063923100_Goes_Hollandiaplein M.A. de Ruyterlaan
Goor	2321032100_Goor_Bentickstraat-Korte Dijk
Goor	2389447100_Goor_Boven Regge
Goor	2336789100_Goor_Lintelerweg 5
Gorinchem	2262008100_Gorinchem_Keizerstraat 44
Gorinchem	2389900100_Gorinchem_Bastion II
Gorinchem	2222691100_Gorinchem_Nieuwstad 7a t m d
Gorinchem	2346573100_Gorinchem_Plangebied Bluebandhuis
Gorinchem	2141853100_Gorinchem_Kortendijk 67-69
Gorinchem	2283822100_Gorinchem_Groenmarkt
Gorinchem	2197574100_Gorinchem_achter de kerk Krijtstraat
Gorinchem	2010210100_Gorinchem_Krijtstraat
Gorinchem	2053239100_Gorinchem_Dalemwal
Gorinchem	2024938100_Gorinchem_W. de Vries Robbeweg
Gorinchem	2085980100_Gorinchem_Blauwe Torenstraat
Gorinchem	2085989100_Gorinchem_Vissersdijk
Gorinchem	2092873100_Gorinchem_Balensteeg 18-24
Gorinchem	2052097100_Gorinchem_Keizerstraat 2a
Gouda	2035695100_Gouda_Brandweerlocatie, Nieuwe haven 45
Gouda	2075003100_Gouda_Koningshof
Gouda	2089788100_Gouda_Nieuwehaven 46
Gouda	2090864100_Gouda_Moordrechtse Verlaat
Gouda	2100972100_Gouda_Koningshof
Gouda	2109826100_Gouda_Koningshof
Gouda	2113892100_Gouda_Koningshof
Gouda	2121327100_Gouda_Groeneweg en Geuzenstraat
Gouda	2143149100_Gouda_Jeruzalemkapel
Gouda	2180539100_Gouda_Bolwerk
Gouda	2219710100_Gouda_Achter de Vismarkt 88-90
Gouda	2229933100_Gouda_Oosthaven 8
Gouda	2258948100_Gouda_Wachtelstraat
Gouda	2316254100_Gouda_Pottersplein Bolwerk
Gouda	2358261100_Gouda_Begeleiding sanering riolering Bolwerk
Gouda	2358683100_Gouda_Rioleringen
Gouda	2363761100_Gouda_Kleiweg 27-31-Slapperdel
Gouda	2384579100_Gouda_Turfsingel
Gouda	2393278100_Gouda_Tiendewegspoort
Gouda	2400712100_Gouda_Binnenstad Gouda
Gouda	2401417100_Gouda_Vrouwetoren
Gouda	2414589100_Gouda_Wachtelstraat en Moordrechts Verlaat
Gouda	2422534100_Gouda_Bosweg
Gouda	2431266100_Gouda_Sint Janskerk
Gouda	2436191100_Gouda_Koningshof

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Gouda	2453209100_Gouda_Vrouwetoren
Gouda	3992720100_Gouda_Rondom Sint Janskerk
Gouda	4004237100_Gouda_Rondom de Sint Janskerk
Grave	2409129100_Grave_Koninginnedijk
Grave	2293186100_Grave_Natuurvriendelijke Oevers Maas
Grave	2441415100_Grave_Binnenhof
Grave	2380211100_Grave_Kleefse Veerstraat te Heumen
Groningen	2482450100_Groningen_Bloemstraat
Groningen	2044012100_Groningen_Herestraat
Groningen	2045390100_Groningen_Butjesstraat
Groningen	2059493100_Groningen_Herestraat
Groningen	2065470100_Groningen_stationsplein stadsbalkon
Groningen	2065819100_Groningen_Stalstraat
Groningen	2066175100_Groningen_Tehuis
Groningen	2072200100_Groningen_A-Kerkhof 12
Groningen	2074380100_Groningen_Boterdiep 33-36
Groningen	2085389100_Groningen_stationsplein
Groningen	2094517100_Groningen_Haddingestraat
Groningen	2096478100_Groningen_Jodenkamp
Groningen	2096737100_Groningen_Provinciehuis
Groningen	2100412100_Groningen_Broerstraat
Groningen	2106026100_Groningen_Ennam-terrein
Groningen	2130659100_Groningen_Boteringestraat 72
Groningen	2146738100_Groningen_Grote Appelstraat
Groningen	2169434100_Groningen_Gedempte Damsterdiep
Groningen	2183430100_Groningen_Damsterdiep Kademuur
Groningen	2184257100_Groningen_Grote Markt Oostzijde
Groningen	2197996100_Groningen_Vismarkt 10
Groningen	2233212100_Groningen_Boterdiep
Groningen	2238292100_Groningen_Brugstraat en A-Brug
Groningen	2239507100_Groningen_Grote Markt Oostzijde
Groningen	2247437100_Groningen_Bodenterrein
Groningen	2258186100_Groningen_Zuiderdiep 21
Groningen	2259839100_Groningen_Eerste Drift Spilsluizen 2
Groningen	2276605100_Groningen_Bloemsingel
Groningen	2278914100_Groningen_Pottebakkersrijge Lage der A
Groningen	2290367100_Groningen_Poelestraat 36
Groningen	2299026100_Groningen_de Bloemstraat noordzijde
Groningen	2300686100_Groningen_Martinikerkhof 23
Groningen	2305351100_Groningen_Bomen en planten begeleiding
Groningen	2314261100_Groningen_Boterdiep
Groningen	2332121100_Groningen_Kruitstraat Kruitgracht Kruitlaan Gymnasiumstraat Walstraat
Groningen	2333645100_Groningen_Martinikerkhof
Groningen	2348777100_Groningen_Grote Rozenstraat
Groningen	2352445100_Groningen_Plangebied Violenstraat 4
Groningen	2373287100_Groningen_Martinikerkhof 23
Groningen	2382359100_Groningen_Visserstraat 29-33

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Groningen	2401888100_Groningen_peperstraat
Groningen	2403175100_Groningen_Snikkevaardersgang
Groningen	2406148100_Groningen_Vismarkt 26
Groningen	2407322100_Groningen_Oude Boteringestraat
Groningen	2407922100_Groningen_Vismarkt
Groningen	2410505100_Groningen_Hoge der A, Visserbrug
Groningen	2418841100_Groningen_Kleine der Aa
Groningen	2419270100_Groningen_Rivierenbuurt
Groningen	2428220100_Groningen_Boterdiep
Groningen	2431736100_Groningen_Noorderbinnensingel
Groningen	2434482100_Groningen_Martinikerkhof, Sint Jansstraat
Groningen	2436467100_Groningen_Oude Kijk in het Jatstraat
Groningen	2438751100_Groningen_Gedempte Zuiderdiep 144
Groningen	2439278100_Groningen_Kleine der A 1
Groningen	2448941100_Groningen_Achterzijde Feithhuis
Groningen	2451265100_Groningen_Davidstraat
Groningen	2454805100_Groningen_Lutkenieuwstraat
Groningen	2467839100_Groningen_Boterdiep
Groningen	2475639100_Groningen_Oosterstraat
Groningen	4571708100_Groningen_Schuitendiep Kattenbrug
Groningen	4041684100_Groningen_Grote Markt Poelestraat containerlocatie
Groningen	3297043100_Groningen_Pijpstraat Wipstraat
Groningen	3985496100_Groningen_Hoge der A Visserbrug
Groningen	3985860100_Groningen_Hereweg
Groningen	"3993928100_Groningen_Oosterpoort oosterpoort, Palmslag en Veemarktstraat"
Groningen	3994868100_Groningen_Boterdiep
Groningen	4001004100_Groningen_Gedempte Zuiderdiep
Groningen	4003995100_Groningen_Praediniussingel 2
Groningen	4018486100_Groningen_Oosterweg
Groningen	4027574100_Groningen_Kuipersplaats Lutkenieuwstraat 24-28
Groningen	4040444100_Groningen_Hoge der A 14
Groningen	4550526100_Groningen_Nieuwe Boteringestraat 102
Groningen	4552721100_Groningen_Vismarkt 1
Groningen	4560457100_Groningen_Kijk in 't Jatstraat 103
Haarlem	2098738100_Haarlem_Jacobijnestraat 20 - 22
Haarlem	2283336100_Haarlem_Groot Heiligland 26
Haarlem	2297496100_Haarlem_Spaarne 90
Haarlem	2300386100_Haarlem_Jansweg stationsplein
Haarlem	2304630100_Haarlem_Gasthuisvest - Kampervest
Haarlem	2307069100_Haarlem_Raaks
Haarlem	2347131100_Haarlem_Binnenstad, afvalcontainers
Haarlem	2348939100_Haarlem_Wilsonplein
Haarlem	2355629100_Haarlem_Kruisweg
Haarlem	2370021100_Haarlem_Lange Herenvest 122
Haarlem	2386352100_Haarlem_Gasthuisstraat 17A
Haarlem	2386952100_Haarlem_Botermarkt, afvalcontainers

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Haarlem	2389211100_Haarlem_Grote Houtstraat 93
Haarlem	2396607100_Haarlem_Zomervaart - Schalkwijkerstraat
Haarlem	2397985100_Haarlem_Grote Houtstraat 99 Klein Heiligland 16
Haarlem	2402576100_Haarlem_Turfmartk e.o.
Haarlem	2410205100_Haarlem_Kleine Houtstraat 19-21 Haarlem
Haarlem	2420825100_Haarlem_Zijlstraat 20
Haarlem	2422250100_Haarlem_Scheepmakerskwartier
Haarlem	2423896100_Haarlem_Nassaulaan 27
Haarlem	2430375100_Haarlem_Wilhelminastraat 49
Haarlem	2430601100_Haarlem_Bakenessergracht 51
Haarlem	2430764100_Haarlem_Damstraat 23C
Haarlem	2431906100_Haarlem_Grote of Sint-Bavokerk
Haarlem	2436361100_Haarlem_Bakenessergracht
Haarlem	2440768100_Haarlem_Kennemerplein
Haarlem	2441756100_Haarlem_Kennemerplein
Haarlem	2460961100_Haarlem_Witteherenstraat 15
Haarlem	3295480100_Haarlem_Scheepmakersdijk
Haarlem	3995694100_Haarlem_Harmenjansweg 1 zwart
Hagestein	4542442100_Hagestein_Lange Dreef 17
Hagestein	3983819100_Hagestein_Hoef en Haag
Hagestein	2263775100_Hagestein_Biezenweg
Hagestein	2322937100_Hagestein_Achterweg
Hagestein	2325326100_Hagestein_Dorpsstraat 22
Hagestein	2476010100_Hagestein_Hoevenweg
Hagestein	2476002100_Hagestein_Berchmansweg
Hagestein	2178303100_Hagestein_Lange Dreef
Hardenberg	4546444100_Hardenberg_Slotgraven
Hardenberg	2353393100_Hardenberg_Radewijkerbeek
Hardenberg	2115171100_Hardenberg_Markt
Hardenberg	2093926100_Hardenberg_Stationsemplacement
Hardenberg	2349295100_Hardenberg_Molengoot
Harlingen	2322029100_Harlingen_Kleine Bredeplaats
Harlingen	2202740100_Harlingen_St. Michaelschool
Harlingen	2224424100_Harlingen_St. Michaelschool
Harlingen	2255423100_Harlingen_Willemskade
Harlingen	2335321100_Harlingen_Harlingen
Hattem	2351246100_Hattem_Sbu 08
Hattem	3291470100_Hattem_Uilennest
Hattem	2470738100_Hattem_Hessenweg 21
Hattem	2448341100_Hattem_Hvb14
Heukelum	2360448100_Heukelum_Achterweg 16
Hoorn	2437544100_Hoorn_Koepoortsweg Spoorsingel
Hoorn	2287410100_Hoorn_Vogelpoel, Westerdijk 13-17
Hoorn	2133242100_Hoorn_Achterstraat 19-21
Hoorn	2219946100_Hoorn_Koepoortsweg 73
Hoorn	2257821100_Hoorn_Kleine Havensteeg 7-9
Hoorn	2061639100_Hoorn_Westerdijk 49-53

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Hoorn	2126569100_Hoorn_Gouw 13-17
Hoorn	2243557100_Hoorn_Oostereiland
Hoorn	2338919100_Hoorn_CBZ-leiding tussen Hoorn en Purmerend
Hoorn	2446705100_Hoorn_Appelhaven 3
Hoorn	2225372100_Hoorn_Turfhaven 11
Hoorn	2352834100_Hoorn_Achter de Vest 54 en 56
Hoorn	2094047100_Hoorn_Perceel Dorpsstraat 66
Hoorn	2063964100_Hoorn_Draafsingel 57-59
Hoorn	2414329100_Hoorn_Stenen Hoofd
Hoorn	2024646100_Hoorn_Rode Steen
Hoorn	2007409100_Hoorn_Abc Karperkuil
Hoorn	2079970100_Hoorn_Westerpoort
Hoorn	2085761100_Hoorn_Grote Noord 2-6
IJsselstein	2275600100_IJsselstein_Schapenstraat
IJsselstein	4570136100_IJsselstein_Benschopperstraat 35
IJsselstein	2437690100_IJsselstein_Benschopperstraat 14-16
IJsselstein	2139764100_IJsselstein_Hofstraat
IJsselstein	2406245100_IJsselstein_Kloosterplantsoen (speelplaats)
IJsselstein	2262243100_IJsselstein_Benschopperstraat 28
IJsselstein	2022653100_IJsselstein_Touwlaan/Kasteellaan
IJsselstein	2075741100_IJsselstein_Hofstraat
IJsselstein	3994924100_IJsselstein_Touwlaan
IJsselstein	2420988100_IJsselstein_IJsselstein, Panoven
IJsselstein	2405265100_IJsselstein_Koningshof - Schuttersgracht - Molenstraat
IJsselstein	2238940100_IJsselstein_Lage Dijk-Noord; Lage Dijk-Zuid; Hoogland; Groene Dijk; Heemradenlaan
IJsselstein	2428261100_IJsselstein_Kloosterplantsoen
Kampen	2430464100_Kampen_4003my013
Kampen	2397069100_Kampen_4002 Mer 13
Kampen	2344604100_Kampen_Burgwal
Kampen	2330997100_Kampen_Burgwal
Kampen	2330704100_Kampen_Sint Nicolaasdijk 34
Kampen	2229309100_Kampen_Graafschap
Kampen	2193783100_Kampen_Hanzelijn Deeltrace Tunnel Drontermeer
Kampen	2102405100_Kampen_Berkpark
Leerdam	2107241100_Leerdam_Nieuwstraat 34-36
Leerdam	2422112100_Leerdam_noordwal-bergstraat
Leerdam	2247291100_Leerdam_Achter de Kerk 19-21
Leerdam	2681873100_Leerdam_Voogdplein
Leerdam	2478433100_Leerdam_Tiendweg
Leeuwarden	2006518100_Leeuwarden_Bollemanssteeg
Leeuwarden	2031596100_Leeuwarden_Stadhuis
Leeuwarden	2042052100_Leeuwarden_Grote Kerkstraat
Leeuwarden	2055580100_Leeuwarden_Oldehoofsterkerkhof
Leeuwarden	2062043100_Leeuwarden_Blokhuispoortbrug
Leeuwarden	2062635100_Leeuwarden_De Kelders
Leeuwarden	2064360100_Leeuwarden_achter de Hoven

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Leeuwarden	2066045100_Leeuwarden_Minnemastraat
Leeuwarden	2070273100_Leeuwarden_Minnemastraat
Leeuwarden	2074631100_Leeuwarden_De Schrans "Het Stenen Piepke"
Leeuwarden	2075433100_Leeuwarden_Eewal
Leeuwarden	2087276100_Leeuwarden_Grote Kerkstraat 228
Leeuwarden	2106845100_Leeuwarden_Vrouwenpoort
Leeuwarden	2211367100_Leeuwarden_Zaailand
Leeuwarden	2232921100_Leeuwarden_Provinciehuis
Leeuwarden	2323277100_Leeuwarden_Binnenstad
Leeuwarden	2376576100_Leeuwarden_Ged. Keizersgracht-Nieuwe Oosterstraat
Leeuwarden	2439650100_Leeuwarden_Groeneweg
Leeuwarden	2449792100_Leeuwarden_Harmoniekwartier
Leeuwarden	4014532100_Leeuwarden_Blokhuispoort biomassabunker
Leeuwarden	4025484100_Leeuwarden_Blokhuispoort
Leiden	2026388100_Leiden_Roomburg
Leiden	2085501100_Leiden_Stadhuisplein
Leiden	2096250100_Leiden_Roomburg
Leiden	2055215100_Leiden_Voormalig Van Gend & Loosterrein
Leiden	2100372100_Leiden_Haagweg- van Gend en Loosterrein
Leiden	2110879100_Leiden_De Meelfabriek
Leiden	2156790100_Leiden_Hooglandsekerkgracht 42
Leiden	2157413100_Leiden_Aalmarkt 8-9
Leiden	2249624100_Leiden_Sterrenwacht
Leiden	2251819100_Leiden_Kastanjelaan 6
Leiden	2274937100_Leiden_stadsgracht
Leiden	2278800100_Leiden_Kippenbrug
Leiden	2287338100_Leiden_Langegracht 145
Leiden	2292035100_Leiden_Nobellocatie
Leiden	2297163100_Leiden_Steenschuur 11
Leiden	2324395100_Leiden_Roomburg (fase 2 en 3)
Leiden	2330907100_Leiden_Kastanjelaan
Leiden	2347375100_Leiden_Kaiserstraat
Leiden	2355337100_Leiden_Garenmarkt
Leiden	2361493100_Leiden_Middelstegracht 34-36
Leiden	2371894100_Leiden_Zuidsingel 42
Leiden	2372322100_Leiden_Boommarkt
Leiden	2381354100_Leiden_Kastanjelaan 2 en 4
Leiden	2387681100_Leiden_Breestraat 76-80 Mandenmakerssteeg 8-12
Leiden	2390589100_Leiden_Nobel locatie
Leiden	2403215100_Leiden_Boshuizen
Leiden	2406423100_Leiden_Lammermarkt
Leiden	2406497100_Leiden_Schrijverspark
Leiden	2406683100_Leiden_Leeuwenhoekpark
Leiden	2436653100_Leiden_Steenschuur Langebrug
Leiden	2444153100_Leiden_Langegracht 70
Leiden	2453785100_Leiden_Boshuizerkade, noordelijke sportvelden

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Leiden	2459293100_Leiden_4377 Leiden
Leiden	2462087100_Leiden_Groene Lakenplein
Leiden	2467344100_Leiden_Kaarsenmakerstraat 2
Leiden	2469783100_Leiden_Breestraat 46-48 (Boommarkt - Rijnlandblok)
Leiden	3292483100_Leiden_Sterrenwachtlaan
Leiden	3985269100_Leiden_Kaarsenmakersstraat
Leiden	3998334100_Leiden_Hooglandse kerkgracht
Leiden	4005403100_Leiden_Barbarabrug
Leiden	4006165100_Leiden_Rapenburg 48 en Pieterskerkhof 4a
Leiden	4006927100_Leiden_Zeeheldenbuurt
Leiden	4037634100_Leiden_Nieuwe Beestenmarkt Lammermarkt
Maastricht	2296783100_Maastricht_Grote Staat 37-41 Sporenstraat 1-3
Maastricht	2041656100_Maastricht_Abtstraat
Maastricht	2069164100_Maastricht_Dominicaner kerk
Maastricht	4581566100_Maastricht_Noorderbrug
Maastricht	2204547100_Maastricht_Nutsbedrijventerrein
Maastricht	2267436100_Maastricht_St Servaasklooster 14
Maastricht	2079135100_Maastricht_Vrijthof
Maastricht	2288553100_Maastricht_Onze Lieve Vrouweplein
Maastricht	4023694100_Maastricht_Scharnerweg 110
Maastricht	2108870100_Maastricht_Stokstraat 35-37
Maastricht	2421749100_Maastricht_Sint Servaasbolwerk-Polvertorenstraat
Maastricht	2427046100_Maastricht_Charles Eyckpark
Maastricht	4563308100_Maastricht_Ravelijn
Maastricht	2189717100_Maastricht_Sphinx
Maastricht	2437390100_Maastricht_Parallelweg
Maastricht	2441942100_Maastricht_Sphinxhallen
Maastricht	4027777100_Maastricht_markt
Medemblik	2111315100_Medemblik_Kerksteeg 6
Medemblik	2356828100_Medemblik_Gedempt Achterom 45
Medemblik	2200261100_Medemblik_Veilingplein
Medemblik	2331409100_Medemblik_Achterom 14
Medemblik	2445296100_Medemblik_Bagijnhof 35-37
Megen	2114061100_Megen_Megen-Zuid
Megen	2315096100_Megen_Begraafplaats
Middelburg	2012488100_Middelburg_Hofje Onder de Toren
Middelburg	2015096100_Middelburg_Berghuijskazerne; Korte Noordstraat Zuidsingel
Middelburg	2041389100_Middelburg_Hof van Sint Pieter
Middelburg	2044029100_Middelburg_Abdijplein
Middelburg	2048582100_Middelburg_Abdijplein
Middelburg	2053441100_Middelburg_Markt; Tympaanplein
Middelburg	2064174100_Middelburg_Kanaalweg
Middelburg	2085786100_Middelburg_Tympaanplein
Middelburg	2150722100_Middelburg_Koningstraat 2-18
Middelburg	2199575100_Middelburg_Markt 55
Middelburg	2214956100_Middelburg_Herontwikkeling Sporthal 300301-03. Calsinastraat en Schuttershof

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Middelburg	2233318100_Middelburg_Schoolstraat
Middelburg	2238308100_Middelburg_Looierssingel 3 en Armeniaans Schuitvloot 1
Middelburg	2269980100_Middelburg_Markt 65
Middelburg	2269989100_Middelburg_Markt 57-59
Middelburg	2314318100_Middelburg_Walplein
Middelburg	2362027100_Middelburg_Bachtensteene 14-18
Middelburg	2363356100_Middelburg_Sprencklaan
Middelburg	4004456100_Middelburg_Het Groene Woud 3
Monickendam	3976407100_Monickendam_Havenstraat 20
Monickendam	2263637100_Monickendam_Rondeel
Monickendam	2335468100_Monickendam_hakvoort
Monickendam	2318806100_Monickendam_Noordeinde 4
Monickendam	3299069100_Monickendam_Kloosterdijk
Montfoort	2421149100_Montfoort_Kop IJsselveld
Montfoort	4002074100_Montfoort_Achterstraat
Montfoort	2238316100_Montfoort_Hoogstraat 9 en 11
Montfoort	2336845100_Montfoort_Achterstraat 1A
Montfoort	2432084100_Montfoort_Motfoort-Lieve Vrouwegracht
Montfoort	4564459100_Montfoort_Lieve Vrouwegracht
Montfoort	3298550100_Montfoort_Achterstraat 1a
Naarden	2341972100_Naarden_Kerkplein
Naarden	2289258100_Naarden_Bastion Katten
Naarden	2426074100_Naarden_Katrepel 1
Naarden	2390604100_Naarden_Bussummerstraat 16
Nieuwpoort	3292223100_Nieuwpoort_Langerak SLA Dijkversterking
Nieuwpoort	2340124100_Nieuwpoort_Hoogstraat 75
Nieuwpoort	2320100100_Nieuwpoort_Lekdijk 173a
Nijmegen	2249965100_Nijmegen_Voorstadslaan Sperwerstraat
Nijmegen	2221638100_Nijmegen_Hessenberg, Pijkestraat
Nijmegen	2265273100_Nijmegen_Wolfkuilseweg
Nijmegen	2461730100_Nijmegen_Lage Markt
Nijmegen	4024000100_Nijmegen_Nieuwe Markt panden
Nijmegen	2073384100_Nijmegen_Jozefhof
Nijmegen	2084068100_Nijmegen_Hunerberg
Nijmegen	2149905100_Nijmegen_Hunnerpark-Belvedere
Nijmegen	2166518100_Nijmegen_Graadt van Roggenstraat Traianusplein
Nijmegen	2166534100_Nijmegen_Koninginnelaan
Nijmegen	2173070100_Nijmegen_Hugo de Grootstraat 41
Nijmegen	2180466100_Nijmegen_Hunnerpark
Nijmegen	2180490100_Nijmegen_Biezendwarsstraat
Nijmegen	2188412100_Nijmegen_Hertogstraat en Hertogplein
Nijmegen	2206889100_Nijmegen_Schependomlaan 86-88
Nijmegen	2213205100_Nijmegen_In de Betouwstraat
Nijmegen	2230004100_Nijmegen_Koekoekstraat, Waterkwartier
Nijmegen	2235157100_Nijmegen_Derde Wal straat
Nijmegen	2257919100_Nijmegen_Hugo de Grootstraat; Hunerberg
Nijmegen	2264463100_Nijmegen_Marialaan 98-100

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Nijmegen	2266278100_Nijmegen_Centrum
Nijmegen	2268773100_Nijmegen_Waterkwartier, Nijmegen-West
Nijmegen	2275300100_Nijmegen_Hertoghof
Nijmegen	2307806100_Nijmegen_van Schaek Mathonsingel
Nijmegen	2310705100_Nijmegen_Hunnerpark, Voerweg
Nijmegen	2311686100_Nijmegen_Hertogplein, Bastionstraat
Nijmegen	2323163100_Nijmegen_Rioolbegeleiding Staringstraat
Nijmegen	2325967100_Nijmegen_Wintersoord
Nijmegen	2329288100_Nijmegen_Lange Baan
Nijmegen	2335638100_Nijmegen_Lange Baan Valkhofheuvel
Nijmegen	2340765100_Nijmegen_Korenmarkt
Nijmegen	2359347100_Nijmegen_Parkweg
Nijmegen	2386960100_Nijmegen_Molenstraat 48
Nijmegen	2398543100_Nijmegen_Molenstraat 48
Nijmegen	2403597100_Nijmegen_Van Goorstraat
Nijmegen	2403612100_Nijmegen_Lompenkramersgas
Nijmegen	2410019100_Nijmegen_Voetgangersbrug 't Meertje
Nijmegen	2421027100_Nijmegen_Van Beethovenstraat
Nijmegen	2421619100_Nijmegen_St. Bernhardstraat Waldeck Pyrmondsingel
Nijmegen	2429899100_Nijmegen_Meloenstraat
Nijmegen	2429906100_Nijmegen_Spoorstraat
Nijmegen	2431047100_Nijmegen_Voorstadslaan parkeerterrein Oude Stad
Nijmegen	2431274100_Nijmegen_Oscar Carrestraat
Nijmegen	2432481100_Nijmegen_Waalfront
Nijmegen	2440038100_Nijmegen_Hessenberg
Nijmegen	2447783100_Nijmegen_De Vereeniging
Nijmegen	2455420100_Nijmegen_Valkhofpark
Nijmegen	2470665100_Nijmegen_Osc3
Nijmegen	3985885100_Nijmegen_Spechtstraat 4
Nijmegen	3986143100_Nijmegen_Hugo de Grootstraat 41
Nijmegen	3999841100_Nijmegen_Franseplaats 218
Nijmegen	4547676100_Nijmegen_Nieuwe Marktstraat 60-70
Nijmegen	4551677100_Nijmegen_Derde Walstraat Bastionstraat
Oldenzaal	2021105100_Oldenzaal_Agnesklooster
Oldenzaal	2073116100_Oldenzaal_Ganzenmarkt
Oldenzaal	2163731100_Oldenzaal_Stadsbleek
Oldenzaal	2197533100_Oldenzaal_Ganzenmarkt
Oldenzaal	2242974100_Oldenzaal_Plechelmusplein
Oldenzaal	2339072100_Oldenzaal_Plechelmusplein
Oldenzaal	2357540100_Oldenzaal_Spoorstraat
Oldenzaal	3297279100_Oldenzaal_Hofmeijerstraat
Oldenzaal	4001272100_Oldenzaal_Wilhelminastraat
Oldenzaal	4029242100_Oldenzaal_Vijfhoek-Vestingstraat
Ommen	4563276100_Ommen_Varsenerstraat
Ommen	2327716100_Ommen_Slagenweg en N34
Oudewater	2049692100_Oudewater_Westerwal
Oudewater	2113608100_Oudewater_Markstraat 37

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Oudewater	2146365100_Oudewater_Rodezand 24
Oudewater	2174383100_Oudewater_Lange Burchwal 80
Oudewater	2267939100_Oudewater_Sint Jansstraat
Oudewater	2270335100_Oudewater_Lange Burchwal 102-104
Oudewater	2325334100_Oudewater_Zuid-Linschoterkade 1-2
Oudewater	2371553100_Oudewater_Molenwal
Oudewater	2388248100_Oudewater_Oudewater Wijngaardstraat 55
Oudewater	2394777100_Oudewater_Oudewater, Molenwal
Oudewater	2427151100_Oudewater_Mariaschool
Purmerend	2279765100_Purmerend_div. vuilcontainers in de stad
Purmerend	2403289100_Purmerend_Neckerdijk
Purmerend	2012714100_Purmerend_Westerstraat nr 55-57
Purmerend	2022629100_Purmerend_Kalversteeg
Purmerend	2023455100_Purmerend_Padjedijk 11
Purmerend	2231730100_Purmerend_Koemarkt
Purmerend	2249202100_Purmerend_Doelestallen
Purmerend	2279595100_Purmerend_zuidersteeg 2
Purmerend	2302621100_Purmerend_Kaasmarkt, hoek Achter de kerk
Purmerend	2303756100_Purmerend_Achterdijk 36-38
Purmerend	2306997100_Purmerend_Whereplantsoen
Purmerend	2328834100_Purmerend_Nieuwstraat 22-38
Purmerend	2427119100_Purmerend_Kanaaldijk
Purmerend	2457640100_Purmerend_Tramplein
Purmerend	4037497100_Purmerend_Oude Begraafplaats
Purmerend	4044251100_Purmerend_Gedempte Singelgracht 27
Purmerend	4551709100_Purmerend_Neckerstraat
Ravenstein	2074226100_Ravenstein_Molensingel 3
Ravenstein	4027541100_Ravenstein_veersingel
Ravenstein	2439586100_Ravenstein_Pollekespad
Ravenstein	2349132100_Ravenstein_Molensingel van Coothweg
Ravenstein	2433380100_Ravenstein_Ravensteijn
Rijssen	2300742100_Rijssen_Grotestraat
Rijssen	2114864100_Rijssen_Cobercoterrein
Rijssen	2376746100_Rijssen_Oranjestraat te Rijssen
Rijssen	2477129100_Rijssen_Tusveld
Roermond	2014975100_Roermond_Jesuietenstraat
Roermond	2014983100_Roermond_Bethlehemstraat
Roermond	2025067100_Roermond_Ezelspoort
Roermond	2036772100_Roermond_Rotonde Roersingel
Roermond	2040749100_Roermond_Wilhelminasingel 3
Roermond	2065138100_Roermond_Grotekerkstraat
Roermond	2066531100_Roermond_Roermond Markt
Roermond	2067600100_Roermond_Sint-Christoffelkathedraal
Roermond	2094233100_Roermond_Sint-Christoffelkathedraal
Roermond	2116881100_Roermond_Plan B Casimir
Roermond	2118282100_Roermond_Bredeweg & diverse locaties
Roermond	2130294100_Roermond_Bethlehemstraat Voogdijstraat
Roermond	2153241100_Roermond_Munsterplein

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Roermond	2169150100_Roermond_Cattentoren
Roermond	2184995100_Roermond_Munsterplein 5
Roermond	2244780100_Roermond_Steenweg 14
Roermond	2253982100_Roermond_Quartier Damianus
Roermond	2253990100_Roermond_Quartier Damianus
Roermond	2303642100_Roermond_Roerkade 6 Koolstraat
Roermond	2322345100_Roermond_Ondernemershuis
Roermond	2327165100_Roermond_Singelring
Roermond	2355701100_Roermond_Wilhelminasingel
Roermond	2423093100_Roermond_N280
Roermond	3294557100_Roermond_LOESBLEIK
Roermond	3297765100_Roermond_Hotel Roermond
Roermond	4011957100_Roermond_Loesbleijk
Rotterdam	2098551100_Rotterdam_Mariniershof
Rotterdam	2112409100_Rotterdam_Rotterdam Wijnhaven - De Punt
Rotterdam	2118882100_Rotterdam_De Hofdame
Rotterdam	2132343100_Rotterdam_Wijnhaven
Rotterdam	2147807100_Rotterdam_Laurenshof
Rotterdam	2149184100_Rotterdam_de Witte Keizer
Rotterdam	2208824100_Rotterdam_VOC-werf aan de Oostzeedijk
Rotterdam	2208873100_Rotterdam_Van Rotta tot Rotterdam
Rotterdam	2224108100_Rotterdam_Blaak 31, voorheen Cebeco-terrein
Rotterdam	2240219100_Rotterdam_Markthal
Rotterdam	2389188100_Rotterdam_Stadskantoor
Rotterdam	3994519100_Rotterdam_Oostzijde Laurenskerk
Rotterdam	4006384100_Rotterdam_Binnenrotte Dubbele sluis
Rotterdam	4016500100_Rotterdam_Grotekerkplein
Schiedam	2194414100_Schiedam_Gat van Bolmers
Schiedam	3299311100_Schiedam_Broersveld Herenpad Groenendal
Schiedam	2427873100_Schiedam_Broersvest 99; Broersveld 128-130
Schiedam	2241426100_Schiedam_Stadstimmerwerf
Schiedam	4011138100_Schiedam_Lange haven 65
Schiedam	3998975100_Schiedam_Westmolenkwartier
Sluis	2193142100_Sluis_Meerminnestraat 1-3
Sluis	2313662100_Sluis_Geldelooze Pad
Sluis	2402316100_Sluis_Groote Markt 1
Sluis	2453696100_Sluis_Dinsdagstraat
Sluis	2218585100_Sluis_Groote Markt
Sluis	2220933100_Sluis_Haven
Sluis	2255991100_Sluis_Sint Janstraat/Handboogstraat
Sluis	2464858100_Sluis_Groote Markt 17
Sluis	2429866100_Sluis_Nieuwstraat
Sluis	4023880100_Sluis_Nederherenweg
Sluis	2128618100_Sluis_van dalestraat - geweldigerstraat
Sneek	2396997100_Sneek_Julianastraat 11-17
Sneek	2332105100_Sneek_Spoorlijn
Staverden	2142282100_Staverden_Landgoed Staverden
Steenwijk	4565236100_Steenwijk_Holleboomlocatie

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Tiel	2123360100_Tiel_Plein 16
Tiel	2005740100_Tiel_Bleekveld
Tiel	2047383100_Tiel_Binnenhoek
Tiel	2049010100_Tiel_Plein 21-27
Tiel	2060237100_Tiel_Koornmarkt
Tiel	2050290100_Tiel_Koornmarkt 9-11
Tiel	2062935100_Tiel_Tiel-Binnenhoek
Tiel	2099597100_Tiel_Stationsplein
Tiel	2123441100_Tiel_Kerkstraat 23
Tiel	2131274100_Tiel_Agnietenstraat 5-7-9
Tiel	2188737100_Tiel_Stationsplein
Tiel	2214234100_Tiel_Dominicuskwartier
Tiel	2217823100_Tiel_afvalcontainers binnenstad
Tiel	2222504100_Tiel_Tussen Voorstad en Ruiterstraat
Tiel	2231447100_Tiel_Achterweg te Tiel
Tiel	2243598100_Tiel_Dominicuskwartier
Tiel	2253600100_Tiel_Burgemeester Hasselmanplein 2
Tiel	2274978100_Tiel_Kromme Elleboog - Binnenmolenstraat
Tiel	2290967100_Tiel_Dominicusparochie
Tiel	2292262100_Tiel_Hogestraat 83
Tiel	2300304100_Tiel_Westluidensepoort
Tiel	2316887100_Tiel_Tussen Voorstad en Ruiterstraat
Tiel	2321154100_Tiel_Modehuis Blijdesteijn
Tiel	2332738100_Tiel_Ambtmanstraat 22
Tiel	2351084100_Tiel_Hof van Arkel Oliemolenwal
Tiel	2381087100_Tiel_Molenhoek
Tiel	2388564100_Tiel_Voorstad 11-17
Tiel	2388694100_Tiel_Kavelaanvaardingswerken
Tiel	2418906100_Tiel_Prins Willem Alexanderschool
Tiel	2429760100_Tiel_Tiel-Vahstal
Tiel	2452180100_Tiel_Tiel, Wesltuidensepoort
Tiel	2456490100_Tiel_Binnenhoek
Tiel	2457665100_Tiel_Fabriekslaantje
Tiel	2462451100_Tiel_Hogendijkstraat
Tiel	3297051100_Tiel_Fabriekslaantje
Tiel	4004950100_Tiel_Eerste Achterstraat 8
Utrecht	2054284100_Utrecht_Wittevrouwenstraat 9-10
Utrecht	2070865100_Utrecht_Rotsoord
Utrecht	2106001100_Utrecht_Maliesingel 77
Utrecht	2153396100_Utrecht_Vredenburg
Utrecht	2423117100_Utrecht_Twijnstraat aan de Werf 1C
Utrecht	2294669100_Utrecht_Abrikoosstraat
Utrecht	2458045100_Utrecht_Mariaplaats Utrecht
Utrecht	2035451100_Utrecht_Visschersplein
Utrecht	2682050100_Utrecht_Domplein
Utrecht	2447645100_Utrecht_Lucasbolwerk
Utrecht	2159130100_Utrecht_Vredenburg
Utrecht	2373319100_Utrecht_Briljantlaan 5

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Utrecht	4009908100_Utrecht_Tolsteegpoort
Utrecht	2234906100_Utrecht_Tolsteeg
Utrecht	2136418100_Utrecht_Eligenstraat 66
Utrecht	"2279019100_Utrecht_Lauwerecht 30-38 Lauwerecht 30-38 Draaiweg 2"
Utrecht	2308965100_Utrecht_Ledig erf Gansstraat
Utrecht	2305408100_Utrecht_Stadskantoor-Minneursplein
Utrecht	2219857100_Utrecht_Oudegracht 74
Utrecht	2277683100_Utrecht_Rioolboring Ondiep
Utrecht	2225201100_Utrecht_Gansstraat 38-44
Utrecht	2266780100_Utrecht_Maliebaan
Utrecht	2284179100_Utrecht_Nieuwegracht 19-21
Utrecht	2286082100_Utrecht_Kromme Nieuwegracht, Achter Sint Pieter en Pausdam
Utrecht	2246935100_Utrecht_Catharijnesingel (Riolering Catharijnesingel Smakkelaarsveld-Gildenkwa
Utrecht	2296337100_Utrecht_Hoog Catharijne Stationsstraat
Utrecht	2249738100_Utrecht_Twijnstraat 65
Utrecht	2249479100_Utrecht_Smakkelaarsveld
Utrecht	2129469100_Utrecht_Anthoniedijk
Utrecht	2130731100_Utrecht_Wittevrouwenstraat
Utrecht	2477526100_Utrecht_Sint Jacobsstraat
Utrecht	2284827100_Utrecht_Vredenburgknoop
Utrecht	2469889100_Utrecht_Briljantlaan 5
Utrecht	4025516100_Utrecht_Adema van Scheltemabaan
Utrecht	2122842100_Utrecht_Pieterkerkhof
Utrecht	2063720100_Utrecht_Merelstraat
Utrecht	2307230100_Utrecht_Huis Loenersloot
Utrecht	2330875100_Utrecht_Domplein
Utrecht	2236397100_Utrecht_Gruttersdijk 27 28
Utrecht	2318693100_Utrecht_Gruttersdijk 24-25
Utrecht	2275503100_Utrecht_Stationsstraat
Utrecht	2214518100_Utrecht_Utrecht, Smakkelaarsveld
Utrecht	2210898100_Utrecht_Vredenburg Catharijnesingel
Utrecht	2367447100_Utrecht_Drift 27-31
Utrecht	2381719100_Utrecht_Oude Gracht Rak 15
Utrecht	2421627100_Utrecht_Steenweg 17
Utrecht	2172560100_Utrecht_Vredenburg
Utrecht	2257838100_Utrecht_Utrecht, Laan van Chartroise
Utrecht	2383306100_Utrecht_Vredenburg
Utrecht	2416095100_Utrecht_Ganzenmarkt
Utrecht	2453282100_Utrecht_Donkere Gaard
Utrecht	3297692100_Utrecht_Zandpad
Utrecht	2291396100_Utrecht_Lichtegaard 9
Utrecht	2307896100_Utrecht_Zijdebalen
Utrecht	2184970100_Utrecht_Kleine Wijk
Utrecht	4579411100_Utrecht_Mariaplaats
Utrecht	2441115100_Utrecht_Lauwerecht
Veere	2007060100_Veere_Oranjeplein

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Veere	2036561100_Veere_Valeriusschool
Veere	2053952100_Veere_Veere Oudestraat
Veere	2330980100_Veere_Wijngaardstraat 23
Veere	2261158100_Veere_Kapellestraat 9
Veere	2045600100_Veere_Veerseweg; Kanaalweg
Venlo	2123733100_Venlo_Maasboulevard
Venlo	2224651100_Venlo_Koninginneplein
Venlo	2271331100_Venlo_Bergstraat
Venlo	2329636100_Venlo_Keizerstraat 11-13
Venlo	2335776100_Venlo_Maaskaden cl 2 en 3
Venlo	2054616100_Venlo_Antoniuslaan 74
Venlo	2065454100_Venlo_Rutgerusgang 9
Venlo	2091114100_Venlo_Rutgerusgang
Venlo	2094274100_Venlo_Pontanusstraat
Venlo	2118363100_Venlo_Grote Kerkstraat 27-29
Venlo	2157770100_Venlo_Kloostercomplex Mariaweide
Venlo	2169394100_Venlo_Raaijweide
Venlo	2203648100_Venlo_Koninginneplein Burgemeester van Rijnsingel Enveloppe van der Duyn
Venlo	2207966100_Venlo_sloterbeekstraat
Venlo	2211691100_Venlo_Venlo Blerick Kazerne terrein
Venlo	2239280100_Venlo_Lichtenberg
Venlo	2321235100_Venlo_Kwartelenmarkt
Venlo	2383444100_Venlo_Mfc
Venlo	2383744100_Venlo_Kazerneterrein wegcunets, kabels & leidingen
Venlo	2461755100_Venlo_Garnizoensweg 3
Venlo	2470154100_Venlo_Maaswaard
Venlo	3294321100_Venlo_Lomstraat 13
Vianen	2424519100_Vianen_Plangebied Pontwaard en Mijnsherenwaard, weg en sluis
Vianen	2164744100_Vianen_Hofplein
Vianen	2288667100_Vianen_Weesdijk
Vianen	2464833100_Vianen_Pontwaard, voorm. havengeul Vianen
Vianen	2413381100_Vianen_Blauwpoort
Vianen	2424105100_Vianen_Ruimte voor de Lek; steenovenlocatie 1: het Oude werk
Vianen	2148260100_Vianen_A2 Trace Everdingen - Zijderveld
Vianen	2275803100_Vianen_Vakenswei
Vianen	2235287100_Vianen_Varkenswei
Vianen	3293099100_Vianen_Adviesdoc
Vlaardingen	2423077100_Vlaardingen_Leiding over noord (LOT) 2 Vlaardingen
Vlaardingen	2013119100_Vlaardingen_De Vlijt Korte Hoogstraat
Vlaardingen	2052859100_Vlaardingen_Het Hof
Vlaardingen	2085615100_Vlaardingen_Johannes de Doperkerk
Vlaardingen	2087462100_Vlaardingen_Buizengat
Vlaardingen	2100348100_Vlaardingen_Gat in de Markt 1.101
Vlaardingen	2114759100_Vlaardingen_Brederostraat,Schrijversbuurt
Vlaardingen	2148106100_Vlaardingen_Ex Libris

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Vlaardingen	2164906100_Vlaardingen_Dammes Erve
Vlaardingen	2237514100_Vlaardingen_Markt
Vlaardingen	2244683100_Vlaardingen_Hogelaan, Emmaplein, park bij Schiedamseweg
Vlaardingen	2249049100_Vlaardingen_Emaus, Molenzicht en Voorstraat
Vlaardingen	2261458100_Vlaardingen_Veerplein
Vlaardingen	2338740100_Vlaardingen_Dh. H. Bavinckschool
Vlaardingen	2353385100_Vlaardingen_Dh. H. Bavinckschool
Vlaardingen	2383477100_Vlaardingen_Afrol Gedempte Biersloot
Vlaardingen	2389382100_Vlaardingen_Veerplein
Vlaardingen	2419870100_Vlaardingen_Hoflaan
Vlaardingen	2433186100_Vlaardingen_westhavenkade 56
Vlaardingen	3985382100_Vlaardingen_Waalstraat Paterstraat
Vlissingen	2176846100_Vlissingen_Dokkershaven, zuidzijde
Vlissingen	2123571100_Vlissingen_Kleine Kerk
Vlissingen	2011004100_Vlissingen_Alhambra
Vlissingen	2044361100_Vlissingen_Spuistraat
Vlissingen	2087616100_Vlissingen_Spuistraat; Lange Zelke
Vollenhove	2470754100_Vollenhove_Voorpoort locatie Rabobank
Vollenhove	2307903100_Vollenhove_Haven 27-29 te Vollenhove
Vreeland	2385664100_Vreeland_Voorstraat 20
Vreeland	2351076100_Vreeland_Kleizuwe 105a
Wijk bij Duurstede	2055426100_Wijk bij Duurstede_Singel Zandweg
Wijk bij Duurstede	2082075100_Wijk bij Duurstede_Tuincentrum Jolice
Wijk bij Duurstede	2369220100_Wijk bij Duurstede_Steenstraat 15-85
Wijk bij Duurstede	2011597100_Wijk bij Duurstede_David van Bourgondieweg
Wijk bij Duurstede	2045609100_Wijk bij Duurstede_Jolice
Wijk bij Duurstede	2056309100_Wijk bij Duurstede_Frankenweg Zandweg
Wijk bij Duurstede	2067730100_Wijk bij Duurstede_Jacob van Ruisdaelstraat
Wijk bij Duurstede	2087251100_Wijk bij Duurstede_Veilingterrein
Wijk bij Duurstede	2118809100_Wijk bij Duurstede_Drukriolering Wijk bij Duurstede
Wijk bij Duurstede	2143651100_Wijk bij Duurstede_Veilingterrein
Wijk bij Duurstede	2274645100_Wijk bij Duurstede_Hoogstraat 75-85
Wijk bij Duurstede	2281773100_Wijk bij Duurstede_Steenstraat 14
Wijk bij Duurstede	2358731100_Wijk bij Duurstede_Kromme Rijn oevers
Wijk bij Duurstede	2372760100_Wijk bij Duurstede_Steenstraat
Wijk bij Duurstede	2401377100_Wijk bij Duurstede_De Engk, Wijk bij Duurstede
Wijk bij Duurstede	2405921100_Wijk bij Duurstede_De Engk
Wijk bij Duurstede	2455007100_Wijk bij Duurstede_Singel 49
Wijk bij Duurstede	2455526100_Wijk bij Duurstede_De Engk
Wijk bij Duurstede	2473776100_Wijk bij Duurstede_Rijnbandijk - locaties 21 en 22
Wijk bij Duurstede	2683022100_Wijk bij Duurstede_Markt Peperstraat
Wijk bij Duurstede	3991051100_Wijk bij Duurstede_Langs de Wal 2-4
Wijk bij Duurstede	4041368100_Wijk bij Duurstede_Gansfortstraat
Woerden	2151021100_Woerden_Kazernestraat
Woerden	4013033100_Woerden_afvalcontainers
Woerden	2186639100_Woerden_Plantsoen 9

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Woerden	2215603100_Woerden_Singel 81
Woerden	2378560100_Woerden_Defensie eiland
Woerden	2275325100_Woerden_Hoge Woerd
Woerden	2346168100_Woerden_Groenendaal 17
Woerden	2412709100_Woerden_Hogewoerd
Woerden	2354065100_Woerden_Castellum hogewoerd
Woerden	2416176100_Woerden_Zandwijksingel
Woerden	2321827100_Woerden_Oranjestraat
Woerden	2397109100_Woerden_Plantsoen
Woerden	2074218100_Woerden_Van Oudheusdenstraat
Woerden	2108108100_Woerden_Sint Nicolaasgang
Woerden	2224943100_Woerden_Park Oudeland 51
Woerden	2286317100_Woerden_Singelkwartier 66-69
Woerden	2363915100_Woerden_Defensie eiland
Woerden	2459966100_Woerden_Torenwal 6
Woerden	2116224100_Woerden_Voorstraat 72-Rijnstraat 99
Woudrichem	2367528100_Woudrichem_Vesting Loevestein, Blok D en Blok F+L, Wallen
Woudrichem	2463204100_Woudrichem_Slot Loevestein Voorgracht
Zaltbommel	2055312100_Zaltbommel_Wielewaal-terrein
Zaltbommel	2063153100_Zaltbommel_Waalkade 4
Zaltbommel	2182572100_Zaltbommel_Binnenstad Zaltbommel
Zaltbommel	2222148100_Zaltbommel_Agnietenstraat
Zaltbommel	2249292100_Zaltbommel_Wielewaal
Zaltbommel	2378625100_Zaltbommel_Afvalcontainers binnenstad
Zaltbommel	2393083100_Zaltbommel_Koningsstraat 10
Zaltbommel	2413219100_Zaltbommel_Waalkrib 934.465
Zaltbommel	2414475100_Zaltbommel_Gasfabriek Virieusingel
Zaltbommel	2415447100_Zaltbommel_Agnietenterrein
Zaltbommel	2457819100_Zaltbommel_Bolwerk de Kat
Zaltbommel	2682991100_Zaltbommel_Maasstraat 17
Zaltbommel	3291365100_Zaltbommel_Veerweg
Zierikzee	2341697100_Zierikzee_De Weverij; Kerkhof
Zierikzee	2334203100_Zierikzee_Karnemelksevaart
Zierikzee	2388094100_Zierikzee_Mosselboomgaard
Zierikzee	2369253100_Zierikzee_Maarstraat 4-12
Zierikzee	2294166100_Zierikzee_Regenboogstraat 38-56
Zierikzee	2015022100_Zierikzee_Meelstraat
Zierikzee	2085550100_Zierikzee_Zuidwellestraat
Zutphen	2024727100_Zutphen_Houtmarkt 56-58
Zutphen	2049602100_Zutphen_Houtmarkt 67-71
Zutphen	2050728100_Zutphen_Abersonplein
Zutphen	2068151100_Zutphen_Beukerstraat 64
Zutphen	2068168100_Zutphen_Gracht Martinetsingel
Zutphen	2070540100_Zutphen_Spittaalstraat 91
Zutphen	2071480100_Zutphen_Stationsplein
Zutphen	2098892100_Zutphen_Zutphen Centrum
Zutphen	2104341100_Zutphen_Spittaalstraat

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Zutphen	2110449100_Zutphen_Isendoornstraat 3
Zutphen	2118200100_Zutphen_Oude Wand
Zutphen	2118663100_Zutphen_Lange Hofstraat
Zutphen	2118671100_Zutphen_Onze Lievevrouwestraat - Dieserstraat
Zutphen	2118996100_Zutphen_Kolenstraat 7
Zutphen	2126714100_Zutphen_Kruittoren, Achterom
Zutphen	2126722100_Zutphen_Dieserstraat 110 - Isendoornstraat
Zutphen	2134133100_Zutphen_Apenstert
Zutphen	2139812100_Zutphen_Laarstraat 24
Zutphen	2145409100_Zutphen_Oude Wand 53
Zutphen	2146187100_Zutphen_Dieserstraat 74-106
Zutphen	2146195100_Zutphen_'s-Gravenhof
Zutphen	2147783100_Zutphen_Vaaltstraat 4
Zutphen	2154668100_Zutphen_Berkelsingel
Zutphen	2154684100_Zutphen_Zaadmarkt 91
Zutphen	2156603100_Zutphen_Kerkplein
Zutphen	2161171100_Zutphen_Barlheze
Zutphen	2161188100_Zutphen_Wanne-Lieveheersteeg
Zutphen	2161196100_Zutphen_Coehoornsingel 3
Zutphen	2187992100_Zutphen_Houtmarkt 63c
Zutphen	2198521100_Zutphen_NSC-terrein
Zutphen	2201460100_Zutphen_Henri Dunantweg, Hoornwerk (voormalig NSC-terrein)
Zutphen	2204069100_Zutphen_Warnsveld Bongerdspad Schoolstr. Molenstr. Tuinstr.
Zutphen	2213198100_Zutphen_Hoornwerk
Zutphen	2220528100_Zutphen_Het Kruittorenplein
Zutphen	2220658100_Zutphen_IJsselbrug
Zutphen	2240170100_Zutphen_Laarstraat
Zutphen	2259174100_Zutphen_Van Evekinkstraat
Zutphen	2282226100_Zutphen_Nieuwstad 57-61, Norenburgerstraat - Basseroord
Zutphen	2296045100_Zutphen_Mars
Zutphen	2309580100_Zutphen_Schupstoel Nieuwstad
Zutphen	2314578100_Zutphen_Rode Torenstraat 51
Zutphen	2314601100_Zutphen_Beukerstraat 15
Zutphen	2325829100_Zutphen_Transportsysteem Lochem-Zutphen
Zutphen	2339137100_Zutphen_Spittaalstraat 81
Zutphen	2350760100_Zutphen_Noorderhaven
Zutphen	2361039100_Zutphen_Halvemaanstraat - Melatensteeg
Zutphen	2369723100_Zutphen_Lochem Wolfelerenk
Zutphen	2370102100_Zutphen_Broederenkerkhof
Zutphen	2387324100_Zutphen_Rijkstraatweg 57
Zutphen	2390823100_Zutphen_Bornhovestraat 45
Zutphen	2395984100_Zutphen_Emmerikseweg Vredenbergerbrug
Zutphen	2398421100_Zutphen_Polsbroek
Zutphen	2398470100_Zutphen_Houtmarkt

Town or failed town	Filename: ARCHIS case-identification code _ town _ toponym (or project)
Zutphen	2413195100_Zutphen_Broederenkerkplein
Zutphen	2425515100_Zutphen_Spanjaardsveld Vogelpark
Zutphen	2429728100_Zutphen_Rozengracht 22
Zutphen	2434230100_Zutphen_Havenstraat
Zutphen	2463407100_Zutphen_Marstunnel
Zutphen	2470819100_Zutphen_Overwelving
Zutphen	2470835100_Zutphen_Groenmarkt-marspoortstraat
Zutphen	3297165100_Zutphen_Kruittorenplein
Zutphen	3297302100_Zutphen_Overwelving Nieuwstad Bornhovestraat Basseroord Pelikaanstraat
Zutphen	3980505100_Zutphen_'s-Gravenhof 4
Zutphen	3991254100_Zutphen_Berkelruine
Zutphen	3992097100_Zutphen_de Mars
Zutphen	4022495100_Zutphen_Veerstraat
Zutphen	2434239100_Zutphen_Mars Coehoorn en Coenens
Zutphen	4038047100_Zutphen_Statenbolwerk Kostverlorenrondeel
Zwolle	2036934100_Zwolle_Hogekampweg
Zwolle	2047520100_Zwolle_Roelenweg
Zwolle	2048258100_Zwolle_Melkmarkt
Zwolle	2050111100_Zwolle_Achter de Broeren
Zwolle	2063250100_Zwolle_Nieuwe Haven
Zwolle	2074501100_Zwolle_Schuurmanstraat
Zwolle	2095740100_Zwolle_Rodetorenplein
Zwolle	2138816100_Zwolle_Fenix Terrein
Zwolle	2148017100_Zwolle_Heiligeweg 3
Zwolle	2157640100_Zwolle_Diezerstraat Korte Smeden (Centrum)
Zwolle	2200042100_Zwolle_Kamperpoort
Zwolle	2226052100_Zwolle_Samuel Hischstraat nr. 2 en 4
Zwolle	2257870100_Zwolle_Pannekoekendijk Mussenhage
Zwolle	2271591100_Zwolle_Meeuwenlaan
Zwolle	2278541100_Zwolle_Blekerswegje
Zwolle	2282712100_Zwolle_Assiesplein Rap 69 -174 BDR 10
Zwolle	2299618100_Zwolle_Nieuwmarkt Vollenhove Bethlehemklooster
Zwolle	2304688100_Zwolle_Spinhuisbredehoek
Zwolle	2319721100_Zwolle_Dennenstraat
Zwolle	2340887100_Zwolle_Noorder eiland 04
Zwolle	2341194100_Zwolle_Grote Markt 03
Zwolle	2343940100_Zwolle_Groot Wezenland
Zwolle	2351157100_Zwolle_Kle 07 08
Zwolle	2353863100_Zwolle_Rode torenplein
Zwolle	2354251100_Zwolle_Hoo 11
Zwolle	2397409100_Zwolle_197 Kra 13
Zwolle	2419076100_Zwolle_194 Rtb 12
Zwolle	2449638100_Zwolle_Spinhuis
Zwolle	2458783100_Zwolle_203 Hof14
Zwolle	2474634100_Zwolle_209 Bds 15

Appendix II
List of 273 keywords

Word (dutch)	Keyword (English)	Thema 1 (Dutch)	Theme 1 (English)	Thema 2 (Dutch)	Theme 2 (English)	Thema 3 (Dutch)	Theme 3 (English)	Value
Achtertuin	backyard	algemeen	general urban farming	-	-	-	-	1
Achtertuinen	backyards	algemeen	general urban farming	-	-	-	-	1
Agrarisch	agrarian	algemeen	general urban farming	-	-	-	-	4
Agrarische	agrarian	algemeen	general urban farming	-	-	-	-	4
Akkerbouw	arable farming	akkerbouw	arable farming	-	-	-	-	4
Akkerlaag	layer of arable soil	akkerbouw	arable farming	-	-	-	-	4
Akkerlagen	layers of arable soil	akkerbouw	arable farming	-	-	-	-	4
Amaranthus	amaranthus	tuinbouw	horticulture	-	-	-	-	4
Anethum	anethum	tuinbouw	horticulture	-	-	-	-	4
Angelica	angelica	tuinbouw	horticulture	-	-	-	-	4
Anthemis	anthemis	tuinbouw	horticulture	-	-	-	-	4
Anthriscus	anthriscus	tuinbouw	horticulture	-	-	-	-	4
Apium	apium	tuinbouw	horticulture	-	-	-	-	4
Appelbomen	apple trees	boomgaard	orchards	-	-	-	-	4
Artemisia	artemisia	tuinbouw	horticulture	-	-	-	-	4
Atriplex	atriplex	tuinbouw	horticulture	-	-	-	-	4
Atropa	atropa	tuinbouw	horticulture	-	-	-	-	4
Begraasd	grazed	veeteelt	animal husbandry	-	-	-	-	4
Begrazing	grazing	veeteelt	animal husbandry	-	-	-	-	4
Bemest	fertilized	veeteelt	animal husbandry	akkerbouw	arable farming	tuinbouw	horticulture	4
Bemesten	fertilizing	veeteelt	animal husbandry	akkerbouw	arable farming	tuinbouw	horticulture	4
Bemesting	fertilization	veeteelt	animal husbandry	akkerbouw	arable farming	tuinbouw	horticulture	4
Beta	beta	tuinbouw	horticulture	-	-	-	-	4
Bijenkorf	beehive	veeteelt	animal husbandry	-	-	-	-	4
Bijenkorven	beehives	veeteelt	animal husbandry	-	-	-	-	4
Binnentuin	garden	algemeen	general urban farming	-	-	-	-	1
Binnentuinen	garden	algemeen	general urban farming	-	-	-	-	1
Bloempot	flowerpot	tuinbouw	horticulture	-	-	-	-	4
Bloempotten	flowerpots	tuinbouw	horticulture	-	-	-	-	4
Boerderij	farmstead	algemeen	general urban farming	-	-	-	-	4
Boerderijen	farmsteads	algemeen	general urban farming	-	-	-	-	4
Boerenbedrijf	farm	algemeen	general urban farming	-	-	-	-	4

Word (dutch)	Keyword (English)	Thema 1 (Dutch)	Theme 1 (English)	Thema 2 (Dutch)	Theme 2 (English)	Thema 3 (Dutch)	Theme 3 (English)	Value
Boerenbedrijven	farms	algemeen	general urban farming	-	-	-	-	4
Bogaard	orchard	boomgaard	orchards	-	-	-	-	4
Bommel	orchard	boomgaard	orchards	-	-	-	-	4
Bonenhof	bean garden plot	tuinbouw	horticulture	-	-	-	-	4
Bongerd	orchard	boomgaard	orchards	-	-	-	-	4
Boomaanplant	tree planting	boomgaard	orchards	-	-	-	-	4
Boomgaard	orchard	boomgaard	orchards	-	-	-	-	4
Boomgaarden	orchards	boomgaard	orchards	-	-	-	-	4
Braakliggend	fallow/ undeveloped	ruralisering	ruralisation	-	-	-	-	4
Braakliggende	fallow/ undeveloped	ruralisering	ruralisation	-	-	-	-	4
Brassica	brassica	tuinbouw	horticulture	-	-	-	-	4
Broeibed	hotbed	tuinbouw	horticulture	-	-	-	-	4
Broeibedden	hotbeds	tuinbouw	horticulture	-	-	-	-	4
Broeien	brewing	tuinbouw	horticulture	-	-	-	-	4
Brouwgraan	brewing cereals	algemeen	general urban farming	-	-	-	-	1
Cannabis	cannabis	tuinbouw	horticulture	-	-	-	-	4
Chenopodium	chenopodium	tuinbouw	horticulture	-	-	-	-	4
Coriandrum	corindrum	tuinbouw	horticulture	-	-	-	-	4
Corylus	corylus	tuinbouw	horticulture	-	-	-	-	4
Cucumis	cucumis	tuinbouw	horticulture	-	-	-	-	4
Cucurbita	curcubita	tuinbouw	horticulture	-	-	-	-	4
Daucus	daucus	tuinbouw	horticulture	-	-	-	-	4
Diergraf	animal grave	veeteelt	animal husbandry	-	-	-	-	4
Diergraven	animal graves	veeteelt	animal husbandry	-	-	-	-	4
Diervoeding	fodder	veeteelt	animal husbandry	-	-	-	-	4
Doodgeboren	stillborn	veeteelt	animal husbandry	-	-	-	-	4
Dorsvlegel	flail	akkerbouw	arable farming	-	-	-	-	4
Drenkplaats	watering place	veeteelt	animal husbandry	-	-	-	-	4
Drinkbak	drinking trough	veeteelt	animal husbandry	-	-	-	-	4
Druiventeelt	viticulture	boomgaard	orchards	-	-	-	-	4
Eendenkooi	duck pen	veeteelt	animal husbandry	-	-	-	-	4
Eergetouw	plough	akkerbouw	arable farming	-	-	-	-	4
Esdek	plaggen soil	algemeen	general urban farming	-	-	-	-	1
Foeniculum	foeniculum	tuinbouw	horticulture	-	-	-	-	4
Foetaal	fetal	veeteelt	animal husbandry	-	-	-	-	4
Foetale	fetal	veeteelt	animal husbandry	-	-	-	-	4
Foetus	fetus	veeteelt	animal husbandry	-	-	-	-	4
Fragaria	fragaria	tuinbouw	horticulture	-	-	-	-	4
Fruitboom	fruit tree	boomgaard	orchards	-	-	-	-	4
Fruitbomen	fruit trees	boomgaard	orchards	-	-	-	-	4

Word (dutch)	Keyword (English)	Thema 1 (Dutch)	Theme 1 (English)	Thema 2 (Dutch)	Theme 2 (English)	Thema 3 (Dutch)	Theme 3 (English)	Value
Fruitboomgaard	fruit orchard	boomgaard	orchards	-	-	-	-	4
Fruitteelt	fruit cultivation	boomgaard	orchards	-	-	-	-	4
Fuiken	fish trap	vis	fish farming	-	-	-	-	4
Gaard	orchard	boomgaard	orchards	-	-	-	-	4
Gaert	orchard	algemeen	general urban farming	-	-	-	-	4
Gaffel	pitchfork	akkerbouw	arable farming	-	-	-	-	4
Gekweekt	cultivated	tuinbouw	horticulture	-	-	-	-	4
Gieter	watering can	tuinbouw	horticulture	-	-	-	-	4
Graanopslag	grain storage	akkerbouw	arable farming	-	-	-	-	1
Groente	vegetable	tuinbouw	horticulture	-	-	-	-	4
Groenten	vegetables	tuinbouw	horticulture	-	-	-	-	4
Groenteteelt	vegetable cultivation	tuinbouw	horticulture	-	-	-	-	4
Groentetuin	vegetable garden	tuinbouw	horticulture	-	-	-	-	4
Groentetuinen	vegetable gardens	tuinbouw	horticulture	-	-	-	-	4
Grondbewerking	tillage	akkerbouw	arable farming	-	-	-	-	1
Haksporen	hoe marks	tuinbouw	horticulture	-	-	-	-	4
Hark	rake	tuinbouw	horticulture	-	-	-	-	4
Harken	rakes	tuinbouw	horticulture	-	-	-	-	4
Hazelaar	hazel	boomgaard	orchards	-	-	-	-	4
Hengel	fishing rod	vis	fish farming	-	-	-	-	4
Hoefafdruk	hoofprint	veeteelt	animal husbandry	-	-	-	-	4
Hoefafdrukken	hoofprints	veeteelt	animal husbandry	-	-	-	-	4
Hoefindruk	hoofprint	veeteelt	animal husbandry	-	-	-	-	4
Hoefindrukken	hoofprints	veeteelt	animal husbandry	-	-	-	-	4
Hooi	hay	veeteelt	animal husbandry	-	-	-	-	4
Hooiberg	haystack	veeteelt	animal husbandry	-	-	-	-	4
Hooibergen	haystacks	veeteelt	animal husbandry	-	-	-	-	4
Hooiland	hay field	veeteelt	animal husbandry	-	-	-	-	4
Hooilanden	hay fields	veeteelt	animal husbandry	-	-	-	-	4
Hooivork	pitchfork	veeteelt	animal husbandry	-	-	-	-	4
Hooivorken	pitchforks	veeteelt	animal husbandry	-	-	-	-	4
Hop	hop	tuinbouw	horticulture	-	-	-	-	4
Hoptuinen	hop gardens	tuinbouw	horticulture	-	-	-	-	4
Hopplant	hop plant	tuinbouw	horticulture	-	-	-	-	4
Hopplanten	hop plants	tuinbouw	horticulture	-	-	-	-	4
Humulus	humulus	tuinbouw	horticulture	-	-	-	-	4
Hyoscyamus	hyoscyamus	tuinbouw	horticulture	-	-	-	-	4
Hypericum	hypericum	tuinbouw	horticulture	-	-	-	-	4
Hyssopus	hyssopus	tuinbouw	horticulture	-	-	-	-	4
Inkuilen	ensilage	tuinbouw	horticulture	-	-	-	-	4

Word (dutch)	Keyword (English)	Thema 1 (Dutch)	Theme 1 (English)	Thema 2 (Dutch)	Theme 2 (English)	Thema 3 (Dutch)	Theme 3 (English)	Value
Juglans	juglans	tuinbouw	horticulture	-	-	-	-	4
Kassen	greenhouses	tuinbouw	horticulture	-	-	-	-	4
Kippenhok	chicken coop	veeteelt	animal husbandry	-	-	-	-	4
Kippenhokken	chicken coops	veeteelt	animal husbandry	-	-	-	-	4
Koehuis	cowshed	veeteelt	animal husbandry	-	-	-	-	4
Koeienstal	cowshed	veeteelt	animal husbandry	-	-	-	-	4
Kooi	cage	veeteelt	animal husbandry	-	-	-	-	4
Kooien	cages	veeteelt	animal husbandry	-	-	-	-	4
Kruidentuin	herb garden	tuinbouw	horticulture	-	-	-	-	4
Kruidentuinen	herb gardens	tuinbouw	horticulture	-	-	-	-	4
Kweekbedden	grow beds	tuinbouw	horticulture	-	-	-	-	4
Kweekvijver	fishing pond	vis	fish farming	-	-	-	-	4
Kweekvijvers	fishing ponds	vis	fish farming	-	-	-	-	4
Kwekerij	nursery	vis	fish farming	-	-	-	-	4
Kwekerijen	nurseries	vis	fish farming	-	-	-	-	4
Lactuca	lactuca	tuinbouw	horticulture	-	-	-	-	4
Landbouw	arable farming	algemeen	general urban farming	-	-	-	-	1
Landbouwareaal	agricultural area	algemeen	general urban farming	-	-	-	-	4
Landbouwgrond	arable land	algemeen	general urban farming	-	-	-	-	4
Landelijk	rural	algemeen	general urban farming	-	-	-	-	1
Laurus	laurus	tuinbouw	horticulture	-	-	-	-	4
Leonurus	leonurus	tuinbouw	horticulture	-	-	-	-	4
Lepidium	lepidium	tuinbouw	horticulture	-	-	-	-	4
Lusthof	pleasure garden	algemeen	general urban farming	-	-	-	-	1
Lusthoven	pleasure gardens	algemeen	general urban farming	-	-	-	-	1
Meent	common	veeteelt	animal husbandry	-	-	-	-	4
Mest	dung	veeteelt	animal husbandry	-	-	-	-	4
Mestbereidings-kuilen	dung (fermentation) pits	veeteelt	animal husbandry	tuinbouw	horticulture	-	-	4
Mestbochten	dung heaps	veeteelt	animal husbandry	tuinbouw	horticulture	-	-	4
Mestkuil	dung pit	veeteelt	animal husbandry	tuinbouw	horticulture	-	-	4
Mestkuilen	dung pits	veeteelt	animal husbandry	tuinbouw	horticulture	-	-	4
Mestopslag	dung storage	veeteelt	animal husbandry	-	-	-	-	4
Mestschimmel	dung fungus	veeteelt	animal husbandry	-	-	-	-	4
Mestschimmels	dung fungi	veeteelt	animal husbandry	-	-	-	-	4
Mestvaalt	dung heap	veeteelt	animal husbandry	tuinbouw	horticulture	-	-	4

Word (dutch)	Keyword (English)	Thema 1 (Dutch)	Theme 1 (English)	Thema 2 (Dutch)	Theme 2 (English)	Thema 3 (Dutch)	Theme 3 (English)	Value
Mient	common	veeteelt	animal husbandry	-	-	-	-	4
Moernerings-kuilen	peat pits for salt extraction	algemeen	general urban farming	-	-	-	-	4
Moesbed	vegetable patch	tuinbouw	horticulture	-	-	-	-	4
Moesbedden	vegetable patches	tuinbouw	horticulture	-	-	-	-	4
Moestuin	vegetable garden	tuinbouw	horticulture	-	-	-	-	4
Moestuinen	vegetable gardens	tuinbouw	horticulture	-	-	-	-	4
Moestuinbed	vegetable patch	tuinbouw	horticulture	-	-	-	-	4
Moestuinbedden	vegetable patches	tuinbouw	horticulture	-	-	-	-	4
Neonaat	neonate	veeteelt	animal husbandry	-	-	-	-	4
Neonaten	neonates	veeteelt	animal husbandry	-	-	-	-	4
Nepeta	nepeta	tuinbouw	horticulture	-	-	-	-	4
Nijverheids-gewassen	economic crops	tuinbouw	horticulture	akkerbouw	arable farming	-	-	4
Notenboom	nut tree	boomgaard	orchards	-	-	-	-	4
Oogstafval	harvest waste	akkerbouw	arable farming	tuinbouw	horticulture	boomgaard	orchards	4
Ophogingslaag	accumulated layer	algemeen	general urban farming	-	-	-	-	1
Ophogingslagen	accumulated layers	algemeen	general urban farming	-	-	-	-	1
Ophooglaag	accumulated layer	algemeen	general urban farming	-	-	-	-	1
Ophooglagen	accumulated layers	algemeen	general urban farming	-	-	-	-	1
Opslag	storage	algemeen	general urban farming	-	-	-	-	1
Opslaggebouw	storage building	algemeen	general urban farming	-	-	-	-	1
Oranjerie	orangery	boomgaard	orchards	tuinbouw	horticulture	-	-	4
Origanum	origanum	tuinbouw	horticulture	-	-	-	-	4
Paardenstal	stable	veeteelt	animal husbandry	-	-	-	-	1
Papaver	papaver	tuinbouw	horticulture	-	-	-	-	4
Park	park	algemeen	general urban farming	-	-	-	-	1
Pastinaca	pastinaca	tuinbouw	horticulture	-	-	-	-	4
Perenboom	pear tree	boomgaard	orchards	-	-	-	-	4
Perenbomen	pear trees	boomgaard	orchards	-	-	-	-	4
Petroselinum	petroselinum	tuinbouw	horticulture	-	-	-	-	4
Physalis	physalis	tuinbouw	horticulture	-	-	-	-	4
Pimpinella	pimpinella	tuinbouw	horticulture	-	-	-	-	4
Pisum	pisum	tuinbouw	horticulture	-	-	-	-	4
Plantage	plantation	boomgaard	orchards	-	-	-	-	4
Plantgat	planting hole	tuinbouw	horticulture	boomgaard	orchards	-	-	4
Plantgaten	planting holes	tuinbouw	horticulture	boomgaard	orchards	-	-	4
Ploeg	plough	akkerbouw	arable farming	-	-	-	-	4
Ploegen	ploughing	akkerbouw	arable farming	-	-	-	-	4
Ploegkras	plough mark	akkerbouw	arable farming	-	-	-	-	4
Ploegkrassen	plough marks	akkerbouw	arable farming	-	-	-	-	4

Word (dutch)	Keyword (English)	Thema 1 (Dutch)	Theme 1 (English)	Thema 2 (Dutch)	Theme 2 (English)	Thema 3 (Dutch)	Theme 3 (English)	Value
Ploegschoenen	plough shares	akkerbouw	arable farming	-	-	-	-	4
Ploegspoor	plough mark	akkerbouw	arable farming	-	-	-	-	4
Ploegsporen	plough marks	akkerbouw	arable farming	-	-	-	-	4
Portulaca	portulaca	tuinbouw	horticulture	-	-	-	-	4
Raapbrood	rapeseed press cake	akkerbouw	arable farming	-	-	-	-	4
Raapkoek	rapeseed press cake	akkerbouw	arable farming	-	-	-	-	4
Raapkoeken	rapeseed press cakes	akkerbouw	arable farming	-	-	-	-	4
Raphanus	raphanus	tuinbouw	horticulture	-	-	-	-	4
Roedenbergen	haystacks	veeteelt	animal husbandry	-	-	-	-	4
Rosmarinus	rosmarinus	tuinbouw	horticulture	-	-	-	-	4
Rundergraf	cattle grave	veeteelt	animal husbandry	-	-	-	-	4
Rundergraven	cattle graves	veeteelt	animal husbandry	-	-	-	-	4
Ruta	ruta	tuinbouw	horticulture	-	-	-	-	4
Satureja	satureja	tuinbouw	horticulture	-	-	-	-	4
Schaapskooi	sheepfold	veeteelt	animal husbandry	-	-	-	-	4
Schep	shovel	tuinbouw	horticulture	-	-	-	-	4
Schoffel	hoe	tuinbouw	horticulture	-	-	-	-	4
Siertuin	ornamental garden	algemeen	general urban farming	-	-	-	-	1
Siertuinen	ornamental gardens	algemeen	general urban farming	-	-	-	-	1
Silybum	silybum	tuinbouw	horticulture	-	-	-	-	4
Snoeiafval	trimmings	boomgaard	orchards	-	-	-	-	4
Spitspoor	spade mark	tuinbouw	horticulture	-	-	-	-	4
Spitsporen	spade marks	tuinbouw	horticulture	-	-	-	-	4
Stadsakker	urban arable field	akkerbouw	arable farming	-	-	-	-	4
Stadsboerderij	urban farmstead	algemeen	general urban farming	-	-	-	-	4
Stadsboerderijen	urban farmsteads	algemeen	general urban farming	-	-	-	-	4
Stadstuin	city garden	algemeen	general urban farming	-	-	-	-	4
Stadstuinen	city gardens	algemeen	general urban farming	-	-	-	-	4
Stadsweide	common	veeteelt	animal husbandry	-	-	-	-	4
Stadsweiden	commons	veeteelt	animal husbandry	-	-	-	-	4
Stalafval	barn/stable waste	veeteelt	animal husbandry	-	-	-	-	4
Stalfunctie	function as barn	veeteelt	animal husbandry	-	-	-	-	4
Stal	barn	veeteelt	animal husbandry	-	-	-	-	4
Stallen	barns	veeteelt	animal husbandry	-	-	-	-	4
Stalling	barn	veeteelt	animal husbandry	-	-	-	-	4
Stalmest	dung	veeteelt	animal husbandry	-	-	-	-	4

Word (dutch)	Keyword (English)	Thema 1 (Dutch)	Theme 1 (English)	Thema 2 (Dutch)	Theme 2 (English)	Thema 3 (Dutch)	Theme 3 (English)	Value
Stro	straw	akkerbouw	arable farming	veeteelt	animal husbandry	-	-	4
Symphytum	symphytum	tuinbouw	horticulture	-	-	-	-	4
Teelt	cultivation	algemeen	general urban farming	-	-	-	-	4
Telen	cultivate	algemeen	general urban farming	-	-	-	-	4
Thymus	thymus	tuinbouw	horticulture	-	-	-	-	4
Trog	trough	veeteelt	animal husbandry	-	-	-	-	4
Tuin	garden	algemeen	general urban farming	-	-	-	-	1
Tuinen	gardens	algemeen	general urban farming	-	-	-	-	1
Tuinaanleg	garden landscaping	algemeen	general urban farming	-	-	-	-	1
Tuinaarde	garden soil	algemeen	general urban farming	-	-	-	-	1
Tuinafval	garden waste	tuinbouw	horticulture	-	-	-	-	4
Tuinbouw	horticulture	tuinbouw	horticulture	-	-	-	-	4
Tuinbouw-producten	horticultural products	tuinbouw	horticulture	-	-	-	-	4
Tuinder	gardener	tuinbouw	horticulture	-	-	-	-	4
Tuingereedschap	garden tools	tuinbouw	horticulture	-	-	-	-	4
Tuinhuis	garden shed	tuinbouw	horticulture	-	-	-	-	4
Tuinhuizen	garden sheds	tuinbouw	horticulture	-	-	-	-	4
Tuinieren	gardening	tuinbouw	horticulture	-	-	-	-	4
Tuinman	gardener	tuinbouw	horticulture	-	-	-	-	1
Tuinmanshuisje	gardener's house	tuinbouw	horticulture	-	-	-	-	1
Tuinmuur	garden wall	algemeen	general urban farming	-	-	-	-	1
Tuinpot	garden pot	tuinbouw	horticulture	-	-	-	-	4
Tuinpotten	garden pots	tuinbouw	horticulture	-	-	-	-	4
Tuinslak	garden snail	tuinbouw	horticulture	-	-	-	-	4
Valeriana	valeriana	tuinbouw	horticulture	-	-	-	-	4
Valerianella	valerianella	tuinbouw	horticulture	-	-	-	-	4
Varkensstal	pigsty	veeteelt	animal husbandry	-	-	-	-	4
Varkensstallen	pigsties	veeteelt	animal husbandry	-	-	-	-	4
Vee	livestock	veeteelt	animal husbandry	-	-	-	-	1
Veehouderij	livestock farming	veeteelt	animal husbandry	-	-	-	-	4
Veekraal	corral	veeteelt	animal husbandry	-	-	-	-	4
Veekralen	corrals	veeteelt	animal husbandry	-	-	-	-	4
Veestalling	barn	veeteelt	animal husbandry	-	-	-	-	4
Veeteelt	animal husbandry	veeteelt	animal husbandry	-	-	-	-	4
Veeteeltgebieden	livestock farming areas	veeteelt	animal husbandry	-	-	-	-	4
Veevoer	fodder	veeteelt	animal husbandry	-	-	-	-	4
Verbena	verbena	tuinbouw	horticulture	-	-	-	-	4

Word (dutch)	Keyword (English)	Thema 1 (Dutch)	Theme 1 (English)	Thema 2 (Dutch)	Theme 2 (English)	Thema 3 (Dutch)	Theme 3 (English)	Value
Verwerkingsafval	processing waste	akkerbouw	arable farming	tuinbouw	horticulture	boomgaarden	orchards	1
Viburnum	viburnum	tuinbouw	horticulture	-	-	-	-	4
Vicia	vicia	tuinbouw	horticulture	-	-	-	-	4
Vijver	pond	vis	fish farming	-	-	-	-	1
Voedergewas	fodder crop	veeteelt	animal husbandry	-	-	-	-	4
Voer	fodder	veeteelt	animal husbandry	-	-	-	-	4
Vogelkooi	birdcage	veeteelt	animal husbandry	-	-	-	-	4
Vogelkooien	birdcages	veeteelt	animal husbandry	-	-	-	-	4
Walnootbomen	walnut trees	boomgaard	orchards	-	-	-	-	4
Weidegrond	grazing grounds	veeteelt	animal husbandry	-	-	-	-	4
Wijngaard	vineyard	tuinbouw	horticulture	boomgaard	orchards	-	-	4
Wijnrank	grapevine	tuinbouw	horticulture	boomgaard	orchards	-	-	4
Wijnproductie	winemaking	tuinbouw	horticulture	boomgaard	orchards	-	-	4
Wijnbouw	viticulture	tuinbouw	horticulture	boomgaard	orchards	-	-	4

Appendix III

List of availability of reports sorted by towns and failed towns.

Type of town	Town	N (case identification number)	N (reports available)	N (reports not available)	N (reports irrelevant)	Note
Towns	Alkmaar	53	25	12	16	-
	Amersfoort	79	27	42	10	-
	Amsterdam	84	48	23	13	-
	Arnhem	54	29	23	2	-
	Bergen op Zoom	32	22	8	2	-
	Bolsward	1	1	-	-	reports not suitable
	Breda	73	51	20	2	-
	Coevorden	35	19	13	3	-
	Culemborg	18	14	1	3	-
	Delft	25	18	7	-	-
	Den Bosch	86	47	34	5	-
	Den Haag	53	31	16	6	-
	Deventer	57	36	14	7	-
	Doesburg	14	13	1	-	-
	Doetinchem	32	22	10	-	-
	Dordrecht	46	36	6	4	-
	Edam	10	8	2	-	-
	Eindhoven	42	24	15	3	-
	Enkhuizen	51	31	18	2	-
	Franeker	2	2	-	-	reports not suitable
	Goes	30	22	8	-	-
	Gorinchem	32	14	17	1	-
	Gouda	55	28	19	8	-
	Groningen	150	74	35	41	-
	Haarlem	52	30	20	2	-
	Harlingen	9	5	4	-	reports not suitable
	Hoorn	22	19	3	-	-
	Kampen	9	8	1	-	-
	Leeuwarden	26	21	4	1	-
	Leiden	64	43	20	1	-
	Maastricht	40	17	22	1	-
	Medemblik	6	5	1	-	-
	Middelburg	24	19	5	-	-
	Monnickendam	9	5	3	1	-
	Naarden	7	4	3	-	-
	Nijmegen	78	53	19	6	-
	Oldenzaal	15	10	5	-	-
	Purmerend	30	17	11	2	-
	Roermond	42	26	12	4	-
	Rotterdam	14	14			-
	Schiedam	9	6	3	-	-
	Sneek	6	2	4	-	-
	Tiel	46	36	9	1	-

Type of town	Town	N (case identification number)	N (reports available)	N (reports not available)	N (reports irrelevant)	Note
Towns	Utrecht	112	57	48	7	-
	Venlo	49	22	14	13	-
	Vlaardingen	25	20	4	1	-
	Vlissingen	8	5	3	-	-
	Weesp	2	-	1	1	-
	Wijk bij Duurstede	31	22	6	3	-
	Woerden	29	19	9	1	-
	Zaltbommel	21	13	7	1	-
	Zierikzee	17	7	10	-	-
	Zutphen	93	68	12	13	-
	Zwolle	41	30	9	2	-
Subtotal		**2,050**	**1,245**	**616**	**189**	
Failed towns	Ameide	4	3	-	1	-
	Asperen	3	2	1	-	-
	Batenburg	2	2	-	-	reports not suitable
	Bredevoort	9	6	3	-	-
	Buren	8	3	5	-	reports not suitable
	Delden	1	1	-	-	reports not suitable
	Gennep	14	6	6	2	-
	Goor	4	3	1	-	reports not suitable
	Grave	9	4	5	-	reports not suitable
	Hagestein	13	8	3	2	-
	Hardenberg	6	5	1	-	-
	Hattem	5	4	1	-	reports not suitable
	Heukelum	3	1	2	-	reports not suitable
	IJsselstein	20	13	7	-	-
	Leerdam	8	5	3	-	-
	Megen	3	2	1	-	reports not suitable
	Montfoort	10	7	3	-	-
	Nieuwpoort	3	3	-	-	-
	Ommen	9	2	7	-	-
	Oudewater	17	11	6	-	-
	Ravenstein	9	5	4	-	-
	Rijssen	4	4	-	-	-
	Sluis	24	11	10	3	-
	Staverden	1	1	-	-	-
	Steenwijk	3	1	2	-	reports not suitable
	Veere	8	6	1	1	-
	Vianen	18	10	3	5	-
	Vollenhove	3	2	-	1	-
	Vreeland	2	2	-	-	reports not suitable
	Woudrichem	5	2	2	1	-
Subtotal		**228**	**135**	**77**	**16**	**-**
Total		**2,278**	**1,380**	**693**	**205**	

Appendix IV

Reports in ranking A, B, C, D or E sorted by town

Type of town	Towns	Ranking					Total number of reports in ranking	Reports included in manual evaluation
		group A	group B	group C	group D	group E		
Town	Alkmaar	-	11	13	-	-	24	10
	Amersfoort	-	7	21	-	-	28	6
	Amsterdam	-	3	40	4	3	50	4
	Arnhem	1	5	20	1	1	28	7
	Bergen op Zoom	-	3	16	1	-	20	5
	Bolsward	-	-	-	1	-	1	-
	Breda	-	5	33	6	1	45	6
	Coevorden	-	2	11	2	1	16	2
	Culemborg	-	1	13	-	-	14	2
	Delft	-	3	10	2	2	17	3
	Den Bosch	1	1	25	11	3	41	2
	Den Haag	-	2	24	2	2	30	4
	Deventer	1	2	26	4	2	35	4
	Doesburg	-	4	8	2	-	14	4
	Doetinchem	-	5	14	-	2	21	8
	Dordrecht	-	3	20	7	1	31	2
	Edam	-	-	5	-	-	5	2
	Eindhoven	1	4	14	3	-	22	7
	Enkhuizen	2	6	24	1	-	33	9
	Franeker	-	-	1	-	-	1	-
	Goes	-	-	19	3	-	22	1
	Gorinchem	2	1	8	-	-	11	3
	Gouda	1	5	16	1	1	24	7
	Groningen	2	11	36	10	8	67	14
	Haarlem	-	3	19	4	-	26	4
	Harlingen	-	-	1	3	-	4	-
	Hoorn	1	4	12	-	2	19	6
	Kampen	1	3	4	-	-	8	4
	Leeuwarden	-	2	10	6	-	18	1
	Leiden	2	6	28	3	1	40	7
	Maastricht	-	4	10	1	1	16	4
	Medemblik	-	2	4	-	-	6	2
	Middelburg	1	2	13	2	1	19	2
	Monnickendam	-	-	5	1	1	7	1
	Naarden	-	1	2	-	-	3	1
	Nijmegen	-	-	26	15	3	44	7
	Oldenzaal	-	4	4	1	-	9	6
	Purmerend	-	1	14	5	-	20	2
	Roermond	-	1	18	6	-	25	2
	Rotterdam	3	3	5	3	-	14	5
	Schiedam	-	-	5	-	-	5	3
	Sneek	-	-	1	-	-	1	1

Type of town	Towns	Ranking					Total number of reports in ranking	Reports included in manual evaluation
		group A	group B	group C	group D	group E		
Town	Tiel	1	5	26	2	1	35	8
	Utrecht	-	10	38	6	-	54	12
	Venlo	1	2	18	4	1	26	4
	Vlaardingen	-	9	15	-	1	25	9
	Vlissingen	1	3	-	1	-	5	3
	Weesp	-	-	-	-	-	-	-
	Wijk bij Duurstede	1	5	11	4	-	21	7
	Woerden	1	-	12	3	2	18	2
	Zaltbommel	-	2	8	1	-	11	2
	Zierikzee	1	-	4	1	-	6	1
	Zutphen	-	11	50	3	2	66	14
	Zwolle	-	1	25	1	1	28	6
Subtotal		**25**	**168**	**805**	**137**	**44**	**1179**	**238**
Failed towns	Ameide	-	1	2	-	-	3	1
	Asperen	-	1	1	-	-	2	2
	Batenburg	-	-	1	1	-	2	-
	Bredevoort	-	-	4	2	-	6	1
	Buren	-	-	2	-	1	3	-
	Delden	-	-	1	-	-	1	-
	Gennep	-	1	5	-	-	6	2
	Goor	-	-	3	-	-	3	-
	Grave	-	-	3	-	-	3	-
	Hagestein	-	3	4	-	-	7	1
	Hardenberg	-	-	3	-	2	5	1
	Hattem	-	-	3	1	-	4	-
	Heukelum	-	-	1	-	-	1	-
	IJsselstein	-	2	7	3	-	12	2
	Leerdam	-	-	5	-	-	5	2
	Megen	-	-	1	-	-	1	-
	Montfoort	1	-	6	-	-	7	1
	Nieuwpoort	-	-	3	-	-	3	1
	Ommen	-	-	1	-	-	1	1
	Oudewater	-	1	7	3	-	11	1
	Ravenstein	-	1	4	-	-	5	1
	Rijssen	-	-	4	-	-	4	1
	Sluis	-	1	7	3	-	11	1
	Staverden	-	1	-	-	-	1	1
	Steenwijk	-	-	1	-	-	1	-
	Veere	-	-	4	1	1	6	3
	Vianen	-	1	7	1	-	9	2
	Vollenhove	-	1	1	-	-	2	1
	Vreeland	-	-	2	-	-	2	-
	Woudrichem	-	1	1	-	-	2	1
Subtotal		**1**	**15**	**94**	**15**	**4**	**129**	**27**
Total		**26**	**183**	**899**	**152**	**48**	**1308**	**265**

Appendix V

List of keywords used in text mining and that were assessed.

Of some keywords a variant has been evaluated. Other keywords were not assessed, such as species names.

Keyword (dutch)	Keyword (English)	Rated	Reason why keyword is not rated
Achtertuin	backyard	rated	-
Achtertuinen	backyards	not rated	variation is rated
Agrarisch	agrarian	rated	-
Agrarische	agrarian	rated	-
Akkerbouw	arable farming	rated	-
Akkerlaag	layer of arable soil	rated	-
Akkerlagen	layers of arable soil	rated	-
Amaranthus	amaranthus	not rated	species name
Anethum	anethum	not rated	species name
Angelica	angelica	not rated	species name
Anthemis	anthemis	not rated	species name
Anthriscus	anthriscus	not rated	species name
Apium	apium	not rated	species name
Appelboom	apple tree	not rated	species name
Artemisia	artemisia	not rated	species name
Atriplex	atriplex	not rated	species name
Atropa	atropa	not rated	species name
Begraasd	grazed	rated	-
Begrazing	grazing	rated	-
Bemest	fertilized	rated	-
Bemesten	fertilizing	rated	-
Bemesting	fertilization	rated	-
Beta	beta	not rated	species name
Bijenkorf	beehive	rated	-
Bijenkorven	beehives	not rated	variation is rated
Binnentuin	garden	rated	-
Binnentuinen	gardens	not rated	variation is rated
Bloempot	flowerpot	rated	-
Bloempotten	flowerpots	rated	-
Boerderij	farmstead	rated	-
Boerderijen	farmsteads	rated	-
Boerenbedrijf	farm	rated	-
Boerenbedrijven	farms	rated	-
Bogaard	orchard	not rated	does not occur
Bommel	orchard	not rated	does not occur
Bonenhof	bean garden plot	rated	-
Bongerd	orchard	not rated	does not occur
Boomaanplant	tree planting	not rated	does not occur
Boomgaard	orchard	rated	-
Boomgaarden	orchards	rated	-
Braakliggend	fallow/undeveloped	rated	-
Braakliggende	fallow/undeveloped	rated	-

Keyword (dutch)	Keyword (English)	Rated	Reason why keyword is not rated
Brassica	brassica	not rated	species name
Broeibed	hotbed	rated	-
Broeibedden	hotbeds	not rated	variation is rated
Broeien	brewing	not rated	does not occur
Brouwgraan	brewing cereals	not rated	does not occur
Cannabis	cannabis	not rated	species name
Chenopodium	chenopodium	not rated	species name
Coriandrum	corindrum	not rated	species name
Corylus	corylus	not rated	species name
Cucumis	cucumis	not rated	species name
Cucurbita	curcubita	not rated	species name
Daucus	daucus	not rated	species name
Diergraf	animal grave	rated	-
Diergraven	animal graves	rated	-
Diervoeding	fodder	not rated	does not occur
Doodgeboren	stillborn	rated	-
Dorsvlegel	flail	rated	-
Drenkplaats	watering place	rated	-
Drinkbak	drinking trough	rated	-
Druiventeelt	viticulture	not rated	does not occur
Eendenkooi	duck pen	not rated	does not occur
Eergetouw	plough	not rated	does not occur
Esdek	plaggen soil	rated	-
Foeniculum	foeniculum	not rated	species name
Foetaal	fetal	rated	-
Foetale	fetal	rated	-
Foetus	fetus	rated	-
Fragaria	fragaria	not rated	species name
Fruitbomen	fruit trees	rated	-
Fruitboom	fruit tree	not rated	variation is rated
Fruitboomgaard	fruit orchard	not rated	does not occur
Fruitteelt	fruit cultivation	rated	-
Fuiken	fish trap	rated	-
Gaard	orchard	rated	-
Gaert	orchard	not rated	does not occur
Gaffel	pitchfork	rated	-
Gekweekt	cultivated	rated	-
Gieter	watering can	rated	-
Graanopslag	grain storage	rated	-
Groente	vegetable	rated	-
Groenten	vegetables	rated	-
Groenteteelt	vegetable cultivation	rated	-
Groentetuin	vegetable garden	not rated	does not occur
Groentetuinen	vegetable gardens	not rated	does not occur
Grondbewerking	tillage	not rated	does not occur
Haksporen	hoe marks	not rated	does not occur
Hark	rake	rated	-
Harken	rakes	not rated	variation is rated

Keyword (dutch)	Keyword (English)	Rated	Reason why keyword is not rated
Hazelaar	hazel	rated	-
Hengel	fishing rod	not rated	does not occur
Hoefafdruk	hoofprint	not rated	does not occur
Hoefafdrukken	hoofprints	not rated	does not occur
Hoefindruk	hoofprint	not rated	does not occur
Hoefindrukken	hoofprints	not rated	does not occur
Hooi	hay	rated	-
Hooiberg	haystack	rated	-
Hooibergen	haystacks	rated	-
Hooiland	hay field	rated	-
Hooilanden	hay fields	rated	-
Hooivork	pitchfork	rated	-
Hooivorken	pitchforks	not rated	variation is rated
Hop	hop	rated	-
Hopplant	hop plant	not rated	species name
Hopplanten	hop plants	not rated	species name
Hoptuinen	hop gardens	not rated	does not occur
Humulus	humulus	not rated	species name
Hyoscyamus	hyoscyamus	not rated	species name
Hypericum	hypericum	not rated	species name
Hyssopus	hyssopus	not rated	species name
Inkuilen	ensilage	rated	-
Juglans	juglans	rated	-
Kassen	greenhouses	not rated	does not occur
Kippenhok	chicken coop	rated	-
Kippenhokken	chicken coops	not rated	variation is rated
Koehuis	cowshed	rated	-
Koeienstal	cowshed	not rated	does not occur
Kooi	cage	not rated	does not occur
Kooien	cages	rated	-
Kruidentuin	herb garden	rated	-
Kruidentuinen	herb gardens	not rated	variation is rated
Kweekbedden	grow beds	not rated	does not occur
Kweekvijver	fishing pond	not rated	does not occur
Kweekvijvers	fishing ponds	not rated	does not occur
Kwekerij	nursery	not rated	does not occur
Kwekerijen	nurseries	not rated	does not occur
Lactuca	lactuca	not rated	species name
Landbouw	arable farming	rated	-
Landbouwareaal	agricultural area	not rated	does not occur
Landbouwgrond	arable land	rated	-
Landelijk	rural	rated	-
Laurus	laurus	not rated	species name
Leonurus	leonurus	not rated	species name
Lepidium	lepidium	not rated	species name
Lusthof	pleasure garden	not rated	does not occur
Lusthoven	pleasure gardens	not rated	does not occur
Meent	common	rated	-

Keyword (dutch)	Keyword (English)	Rated	Reason why keyword is not rated
Mest	dung	rated	-
Mestbereidingskuilen	dung (fermantation) pits	not rated	does not occur
Mestbochten	dung heaps	not rated	does not occur
Mestkuil	dung pit	rated	-
Mestkuilen	dung pits	rated	-
Mestopslag	dung storage	not rated	does not occur
Mestschimmel	dung fungus	rated	-
Mestschimmels	dung fungi	rated	-
Mestvaalt	dung heap	rated	-
Mient	common	not rated	does not occur
Moerneringskuilen	peat pits for salt extraction	rated	-
Moesbed	vegetable patch	rated	-
Moesbedden	vegetable patches	not rated	variation is rated
Moestuin	vegetable garden	rated	-
Moestuinbed	vegetable patch	not rated	variation is rated
Moestuinbedden	vegetable patches	rated	-
Moestuinen	vegetable gardens	rated	-
Neonaat	neonate	rated	-
Neonaten	neonates	not rated	variation is rated
Nepeta	nepeta	not rated	species name
Nijverheidsgewassen	economic crops	not rated	does not occur
Notenboom	nut tree	not rated	does not occur
Oogstafval	harvest waste	rated	-
Ophogingslaag	accumulated layer	rated	-
Ophogingslagen	accumulated layers	rated	-
Ophooglaag	accumulated layer	rated	-
Ophooglagen	accumulated layers	not rated	variation is rated
Opslag	storage	rated	-
Opslaggebouw	storage building	not rated	does not occur
Oranjerie	orangery	rated	-
Origanum	origanum	not rated	species name
Paardenstal	stable	rated	-
Papaver	papaver	not rated	species name
Park	park	rated	-
Pastinaca	pastinaca	not rated	species name
Perenbomen	pear trees	not rated	does not occur
Perenboom	pear tree	not rated	does not occur
Petroselinum	petroselinum	not rated	species name
Physalis	physalis	not rated	species name
Pimpinella	pimpinella	not rated	species name
Pisum	pisum	not rated	species name
Plantage	plantation	not rated	does not occur
Plantgat	planting hole	not rated	variation is rated
Plantgaten	planting holes	rated	-
Ploeg	plough	rated	-
Ploegen	ploughing	not rated	variation is rated
Ploegkras	plough mark	not rated	does not occur
Ploegkrassen	plough marks	not rated	does not occur

Keyword (dutch)	Keyword (English)	Rated	Reason why keyword is not rated
Ploegschoen	plough share	not rated	does not occur
Ploegspoor	plough mark	rated	-
Ploegsporen	plough marks	rated	-
Portulaca	portulaca	not rated	species name
Raapbrood	rapeseed press cake	not rated	does not occur
Raapkoek	rapeseed press cake	not rated	does not occur
Raapkoeken	rapeseed press cakes	not rated	does not occur
Raphanus	raphanus	not rated	species name
Roedenbergen	haystacks	rated	-
Rosmarinus	rosmarinus	not rated	species name
Rundergraf	cattle grave	rated	-
Rundergraven	cattle graves	rated	-
Ruta	ruta	not rated	species name
Satureja	satureja	not rated	species name
Schaapskooi	sheepfold	rated	-
Schep	shovel	rated	-
Schoffel	hoe	not rated	does not occur
Siertuin	ornamental garden	rated	-
Siertuinen	ornamental gardens	rated	-
Silybum	silybum	not rated	species name
Snoeiafval	trimmings	not rated	does not occur
Spitspoor	spade mark	rated	-
Spitsporen	spade marks	rated	-
Stadsakker	urban arable field	rated	-
Stadsboerderij	urban farmstead	rated	-
Stadsboerderijen	urban farmsteads	rated	-
Stadstuin	city garden	not rated	variation is rated
Stadstuinen	city gardens	rated	-
Stadsweide	common	rated	-
Stadsweiden	commons	not rated	variation is rated
Stal	barn	rated	-
Stalafval	barn/stable waste	rated	-
Stalfunctie	function as barn	rated	-
Stallen	barns	rated	-
Stalling	barn	rated	-
Stalmest	dung	rated	-
Stro	straw	rated	-
Symphytum	symphytum	not rated	species name
Teelt	cultivation	rated	-
Telen	cultivate	not rated	variation is rated
Thymus	thymus	not rated	species name
Trog	trough	rated	-
Tuin	garden	rated	-
Tuinaanleg	garden landscaping	rated	-
Tuinaarde	garden soil	rated	-
Tuinafval	garden waste	rated	-
Tuinbouw	horticulture	rated	-
Tuinbouwproducten	horticultural products	rated	-

Keyword (dutch)	Keyword (English)	Rated	Reason why keyword is not rated
Tuinder	gardener	not rated	does not occur
Tuinen	gardens	rated	-
Tuingereedschap	garden tools	not rated	does not occur
Tuinhuis	garden shed	rated	-
Tuinhuizen	garden sheds	not rated	variation is rated
Tuinieren	gardening	not rated	does not occur
Tuinman	gardener	rated	-
Tuinmanshuisje	gardener's house	rated	-
Tuinmuur	garden wall	rated	-
Tuinpot	garden pot	rated	-
Tuinpotten	garden pots	not rated	variation is rated
Tuinslak	garden snail	rated	-
Valeriana	valeriana	not rated	species name
Valerianella	valerianella	not rated	species name
Varkensstal	pigsty	not rated	does not occur
Varkensstallen	pigsties	not rated	does not occur
Vee	livestock	rated	-
Veehouderij	livestock farming	rated	-
Veekraal	corral	rated	-
Veekralen	corrals	not rated	variation is rated
Veestalling	barn	rated	-
Veeteelt	animal husbandry	rated	-
Veeteeltgebieden	livestock farming areas	not rated	does not occur
Veevoer	fodder	rated	-
Verbena	verbena	not rated	species name
Verwerkingsafval	processing waste	not rated	does not occur
Viburnum	viburnum	not rated	species name
Vicia	vicia	not rated	species name
Vijver	pond	rated	-
Voedergewas	fodder crop	rated	-
Voer	fodder	rated	-
Vogelkooi	birdcage	rated	-
Vogelkooien	birdcages	not rated	variation is rated
Walnootbomen	walnut trees	rated	-
Weidegrond	grazing grounds	rated	-
Wijnbouw	viticulture	not rated	does not occur
Wijngaard	vineyard	rated	-
Wijnproductie	winemaking	not rated	does not occur
Wijnrank	grapevine	not rated	does not occur

Appendix VI

Overview of the ABR codes, meanings and translations.

ABR_code	Meaning (Dutch)	Translation (English)	Start	End
HIST	historie	history	-12	1999
ME	middeleeuwen	Middle Ages	450	1499
MEL	late middeleeuwen	late Middle Ages	1050	1499
MELA	late middeleeuwen a	late Middle Ages A	1050	1249
MELB	late middeleeuwen b	late Middle Ages B	1250	1499
MEV	vroege middeleeuwen	early Middle Ages	450	1049
MEVA	vroege middeleeuwen a	early Middle Ages A	450	524
MEVB	vroege middeleeuwen b	early Middle Ages B	525	724
MEVC	vroege middeleeuwen c	early Middle Ages C	725	899
MEVD	vroege middeleeuwen d	early Middle Ages D	900	1049
NT	nieuwe tijd	modern period	1500	1999
NTL	late nieuwe tijd	late modern period	1850	1999
NTM	midden nieuwe tijd	middle modern period	1650	1849
NTV	vroege nieuwe tijd	early modern period	1500	1649
PROTO	protohistorie	protohistory	-12	450
RECENT	recent	recent	1850	1999
ROM	Romeinse tijd	Roman period	-12	449
XXX	onbekend	unknown	unknown	unknown

Historic towns were certainly not only urban, farming belonged to urban life. This volume surveys twenty years of commercial archaeological research in the Netherlands and presents evidence for a range of urban farming activities in the years between 1250 up to 1850. Much relates to household activities, and it is clear that different kinds of urban farming contributed to a degree of self-reliance for many town dwellers. Although the evidence combined for the first time in this volume is fragmented, the body of new data that has been assembled from seemingly unspectacular contexts in backyards and urban fringes demonstrates the power that urban archaeology has to shine a light into everyday lives and household activities in the past.

This scientific report is intended for archaeologists, as well as for other professionals and amateur enthusiasts involved in archaeology.

The Cultural Heritage Agency provides knowledge and advice to give the future a past.