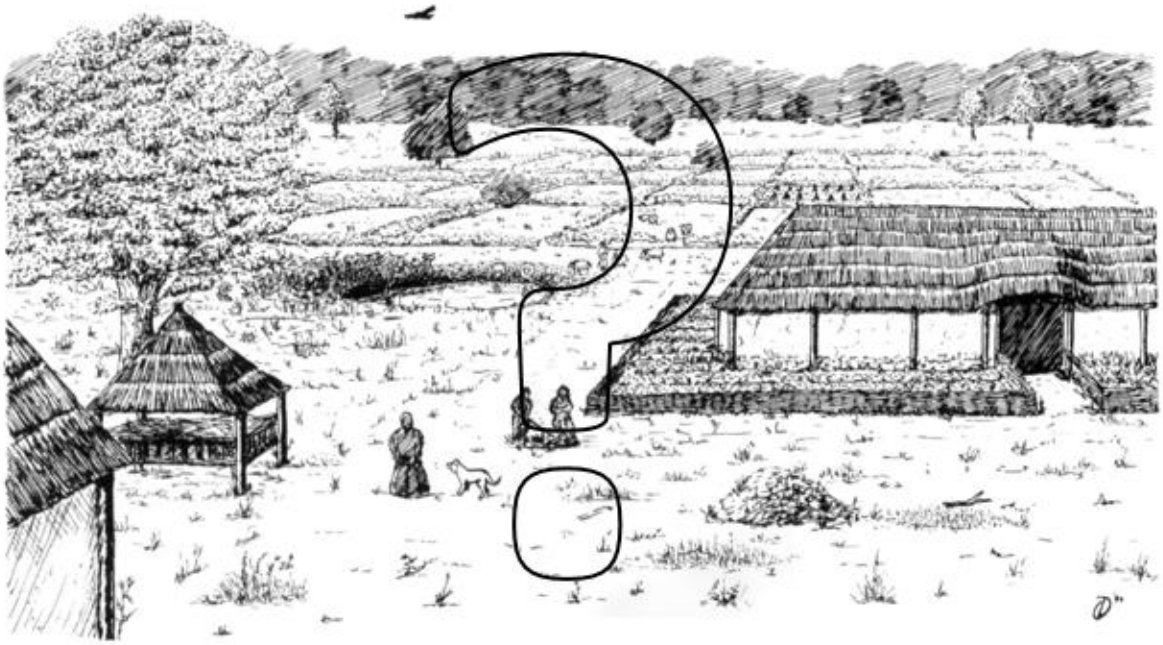
Figuring out the Farmstead

A critical evaluation of the concept Iron Age farmstead in Dutch archaeological research



Leon de Rouw

"We've Got Thousands of These! What Makes an Historic Farmstead Significant?"

Wilson 1990

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Front picture: After Bakels 1998, 347, fig. 1

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Content

Preface and acknowledgements

"How can you write a thesis on such an obvious subject?" is probably the question I heard most often while explaining the subject of my thesis to other people. But I cannot blame the people who asked me this question. Before starting this thesis, I also had no clue what could be written solely about the farmstead. Now, a year after I wrote my first thesis proposal, it turned out that there is so much to be written on this subject that this thesis can only be regarded as a new perspective in farmstead research.

I encountered problems with the interpretation of the farmstead during my bachelor thesis, in which the results of an Iron Age/Early Roman period excavation were elaborated. In this bachelor thesis, I tried to distinguish the farmstead within a site with more archaeological features than I could count. For this purpose, I used archaeological methods, which would help me to distinguish a farmstead within a palimpsest. Nevertheless, I was not satisfied with my conclusion, because I was unable to get significant results from my data. Therefore, my initial master thesis proposal was on the Iron Age farmstead and its role within a wider regional framework. In a short conversation with Maikel Kuijpers and Harry Fokkens subsequently the very simple question was asked: "Can you define the Iron Age farmstead?". At that time, I realised, I could not, thus was born the thesis topic.

This thesis could not have been written without the people who pushed me in the right directions. Therefore, I wish to thank Maikel Kuijpers, for his supportive feedback during the process of writing this master thesis. I also wish to thank Roy van Beek, for supporting me with feedback when I was still searching in the unknown. Furthermore, I wish to thank Bastiaan Steffens, for our constructive conversations about our thesis subjects. And I also thank Dion Stoop, Eric van der Kuijl, Piet van Cruyningen and Wilko van Zijverden for their valuable contributions during my thinking process.

This thesis could not have been written without the persons close to me. Therefore, I want to thank my family and friends, especially the MMB, for taking interest in my undertakings. Furthermore, during the writing of this thesis, I renovated my future home, which meant that I had to live somewhere else temporarily. Therefore, I sincerely thank my (future) parents-in-law and relatives, for taking me up in their home and family, which made it possible to write the majority of this thesis. Last and certainly not least, I thank my girlfriend Laura, for her motivation, patience and understanding.

1 Introduction

1.1 Research theme

The farmstead is the habitat of the farmer through-out the Late Prehistory. It is the place where these people live and act. From an archaeological point of view, the farmstead provides detailed information about the activities of farmers in relation to their environment in the past. The archaeological concept of the farmstead, however, lacks definition. This is because archaeological evidence is not used to determine how a farmstead 'works'. Instead archaeologists assume that a farmstead is always present, and use this assumption as a model to differentiate and explain archaeological evidence. This is problematic, because the result is a multitude of methodologies to extract a farmstead from archaeological data, whilst information about how the farmstead is influenced by prehistoric farmers remains unclear. Therefore, this study elaborates a new perspective on the farmstead, to gain a more credible understanding of how prehistoric farmers used their habitat.

The lack of definition of the concept "farmstead" is not restricted to a specific period, area or methodology. Therefore, boundaries have been applied in order to cover the subject in a single thesis. The emphasis of this study is on the spatial layout of the farmstead, from an agricultural and economical perspective. The social or cosmological meaning of the farmstead and its processes receive little attention in this study (*Cf.* Gerritsen 2003; Beck 2007; Webley 2008). Although these topics are intertwined with the definition of the farmstead, they are beyond the scope of this study. The starting point of this thesis is the Iron Age farmstead in the eastern Netherlands. The reason to tackle the farmstead problem with data from the eastern Netherlands is because in this area several large excavations have been conducted, but there is still relatively little knowledge available about the Iron Age farmstead. In order to gain understanding of the concept "farmstead", therefore the following research question is proposed:

What is the Iron Age farmstead?

1.2 Approach

This study starts with an exploration of the research problem in chapter two. In this chapter, I explain how and why a lack of definition influences the interpretation of the farmstead. In chapter three, the farmstead is studied from an historical and

anthropological perspective. In this chapter, analogies are discussed in order to widen the perspective about the farmstead and at the same time to determine how the archaeological interpretation of the Iron Age farmstead is influenced by present-day analogies. The aim of this chapter is to identify causal relations that define the farmstead and subsequently to establish a model capable of gaining a more detailed understanding of the farmstead. In chapter four the archaeological remains relevant for the application of this model are discussed. In order to further strengthen this model, two case studies are treated in chapter five. Chapter six contains a synthesis which discusses the results of this study and provides recommendations for further research. This thesis is concluded in chapter seven, in which the research question is answered.

2 Current use of the Iron Age farmstead

2.1 Introduction

The farmstead, in the archaeological sense, is usually seen as a series of features that make up multiple structures, all located in relative proximity to each other, which are tied together by contemporaneous activities related to a single household group. The methods to distinguish the farmstead within archaeological excavations vary to a large extent. The main cause for this multitude of interpretation techniques is the palimpsest situation. In this context the palimpsest situation can be described as a situation *"… in which the successive episodes of deposition, or layers of activity, remain superimposed one upon the other without loss of evidence, but are so re-worked and mixed together that it is difficult or impossible to separate them out into their original constituents."* (Bailey 2007, 204). Palimpsest situations are always to a certain extent present on archaeological excavations (Bailey 2007, 203). Archaeologists therefore need specific methodologies capable of avoiding or elucidate the palimpsest situation. According to Bailey (2007), this is done with what he calls a 'microscopic' and a 'macroscopic' view. A microscopic view is the improvement of dating methods and taphonomic analyses, so that a palimpsest situation can be unravelled and post-depositional processes can be determined. This method does not resolve the palimpsest situation, but makes it able to narrow the scale of this situation, so that there is the possibility to interrogate the palimpsest with different research questions (Bailey 2007, 209). A macroscopic view is to gain understanding of a palimpsest situation by using large-scale comparison in order to place phenomena in a wider perspective. In a macroscopic view, the palimpsest is left for what it is and narrowed to a single episode, so that the wider comparative context with other data sets can be studied. The pitfalls of a macroscopic view are the credibility of the comparisons, in terms of representability, interference, geomorphology or chronology (Bailey 2007, 208-210).

In most archaeological research, a combination of both the micro- and macroscopic view is applied to define the farmstead. Where dating methods and the understanding of post-depositional processes are inadequate, comparisons from other time and space are made to complement a synthesis on Iron Age farmsteads. In this chapter, the methods and models that are currently used in archaeological research to define the Iron Age farmstead will be critically evaluated.

2.2 The origin and development of the farmstead concept

The current archaeological definition of the farmstead is closely connected to the study of the spatial distribution of archaeological features. In the Netherlands, this started in the early 20th century, with important contributions made by archaeologists such as Holwerda and van Giffen (Brongers and Mank 1977, 2). Their approach to archaeological research was emphasised by their attention to archaeological features, in addition to finds. This marked the beginning of settlement research, with the interpretation of archaeological features as the key principle. The understanding of archaeological features took flight between 1923 and 1934, when van Giffen encountered excellently preserved foundations near the village Ezinge. The understanding of how foundations evolved to archaeological traces led to a breakthrough in settlement research (Waterbolk 2009, 3). However, it was not until the 1960s that settlement research would rapidly advance in intensity. Before this time, archaeological research focused mostly on cemeteries and material culture. Excavations performed by the ROB and the University of Leiden, primarily in the southern Netherlands, led to interpretations which are currently still being used (Gerritsen 2003, 22-29). However, the farmstead was not yet a specific research aim. At the extensive excavations at Haps, for example, Verwers (1972) describes the presence of many houses, granaries and wells, but does not refer to them as farmsteads (*cf.* Verwers 1972, 53-99).

The first major work written about the Iron Age farmstead in the Netherlands is the dissertation of Schinkel, based upon large-scale excavations at Oss (Schinkel 1994; 1998). Schinkel (1998) defines the farmstead as *"…the land immediately surrounding a farm."* (Schinkel 1998, 26). This broad definition is further argued for by the presence of boundaries and outbuildings situated nearby a farm, such as wells and granaries (Schinkel 1998, 26). In Schinkels dissertation, the farmstead-related features are a significant part of the interpretation of the farmstead. As a result, even in situations where only farmstead-related features were found, a farmstead is identified, even though a house plan was absent. In these situations, it was assumed that the house-plan would be present in an area that was not excavated, indicated by the orientation of other houses and farmsteads on the site (Schinkel 1998, 26).

In his dissertation, Schinkel attempts to portray the farmstead as well as the settlement as a whole. Schinkel defines the settlement, in an analytical sense, *"…to refer to a chronologically and spatially related group of features separated from a different group of features by an 'empty' area."* (Schinkel 1998, 26). When describing his methodology,

Schinkel also defines the settlement as *"…a territory within which one or more farmyards were moved around."* (Schinkel 1998, 26). Within an archaeological excavation this can lead to fairly large settlements that contain various farmsteads which are diachronically related and can be represented in successive phases in the occupation of one, or at most, two farms (Schinkel 1998, 26). Schinkel uses the term 'wandering farmyard' (hereafter wandering farmstead) to describe how farmsteads were periodically relocated (Schinkel 1998, 26).[1]

The concept of the periodical relocation of farmsteads has been proposed earlier. Schinkel refers to Hingley (1989, 75) and Kossack *et al.* (1984). In the Netherlands signs of this periodical relocation of farmsteads were also found before Schinkels model was proposed. According to Gerritsen (2003, 26), the periodical relocation of farmsteads is one of the main characteristics of the urnfield period (ca. 1050-400 B.C.). This idea is based on the results of excavations at a site in St-Oedenrode, in the southern Netherlands. Here, an urnfield was found together with the remains of several farmsteads. According to Van der Sanden (1981), the amount of burials present in the urnfield was much smaller than the number of excavated farmsteads would suggest. This would suggest that the farmsteads could not have been contemporary, but were successively inhabited instead (van der Sanden 1981, 326). Also Waterbolk describes the process of periodical relocation of farms in Drenthe, hereby using the German term *Verlegung* (Waterbolk 1982, 102-103). In the Eastern Netherlands this concept is known as *Einzelhöfe* (Verlinde 1999, 85; van der Velde 2011, 71; van Beek 2009, 79). Both terms have the same meaning, which is 'farmsteads situated in isolation'. Roymans and Fokkens published an overview of the Dutch Bronze Age and Early Iron Age settlements in 1991, stating that most researchers agree that there were no large settlements, like villages, present. In excavations, multiple house plans are often found. However, they represent the periodical relocation of one to three house plans, belonging to a small settlement. Only incidentally, farmsteads were rebuilt on top of a predecessor (Roymans and Fokkens 1991, 11-12).

[1] Gerritsen (2003) defines a farmyard as a single house (phase) and its surrounding structures. He defines a farmstead as a more abstract object which implies successive farmyards in time (Gerritsen 2003, 38). This means that multiple farmyards can belong to the same farmstead (in time). The interpretation made by Gerritsen is useful when determining the farmstead/yard usage in time. However, to use this definition implies an assumption in whether the farmstead exists of one phase or multiple phases. Because this thesis treats the farmstead as an archaeological concept to be used as a research tool rather than a static and spatial structure, this definition is not relevant to this thesis and therefore 'farmstead' is used further on in this thesis.

The influence of the wandering farmstead model is perfectly illustrated by the dissertation of Arnoldussen (2008), written about the nature and dynamics of Bronze Age settlement sites. Arnoldussen (2008) observes how the 'wandering farmstead model' is applied to situations that are far beyond the framework proposed by Schinkel (1998) in both time and space (Arnoldussen 2008, 77). He describes how the model of the wandering farmstead as an isolated farmstead that is successively inhabited, is almost naturally applied on Bronze Age settlements, thereby overlooking the possibilities for contemporaneity (i.e. more houses) and a larger life span (i.e. rebuilt houses; Arnoldussen 2008, 78, note 34). As an example, Arnoldussen illustrates how of 25 excavated (and published) Bronze Age sites known in 1991, only eight contained single farmhouses. Eight more contained several house plans. These eight did not intersect and could not be held apart by dating evidence. The remaining nine examples of farmhouses contained at least two overlapping house-plans. This, he argued, proves how the wandering farmstead model is primarily a descriptive model, based on the known settlement dynamics and cannot always be sustained with supporting evidence (Arnoldussen 2008, 77-78).

2.3 Application of the farmstead concept

Although Schinkel provided a major contribution in farmstead research, he was not able to provide a synthesis on the Iron Age farmstead. In his dissertation, Schinkel describes that archaeological evidence from the excavations at Oss-Ussen was far from complete, therefore his synthesis analysed the site on settlement level, instead of on the farmstead level (Schinkel 1998, 59). Arnoldussen (2008) explains this problem in interpreting the farmstead. In order to interpret Bronze Age farmsteads in the Dutch River region Arnoldussen conducted a Visual Analysis of Spatial Overlays (VASO), which is a method that *"… relies on computer generated overlays of excavations plan from settlement sites, which are thereafter inspected visually in order to trace and outline specific patterns. Examples of such patterns are, for example, the spatial locations of wells or outbuildings in relation to house plans or each other."* (Arnoldussen 2008, 276-277). This method illustrates the emphasis on the spatial characteristics of the farmsteads as a static object and treats the farmstead in an almost typological fashion (*cf.* Arnoldussen 2008, 300-301). The result of this interpretation highlighted the situation, orientation and density of houses, outbuildings and other farmstead-related features. The result of the VASO methodology is that the structuring of house-sites varied to a large extent and is open to manipulation at settlement level (Arnoldussen

2008, 327; *Cf.* Arnoldussen 2008, 329). Arnoldussen further states that *"… Under the scrutiny of VASO, disappointingly few typical elements of Middle Bronze Age house-sites in the Dutch river area could be outlined."* (Arnoldussen 2008, 429). Although Arnoldussen provides several perspectives that can influence this variation, he clearly doubts the use of the farmstead as a methodological aide. This becomes most clear when stating that *"It is for archaeologists among themselves to debate whether such structuring is enough to legitimize the use of interpretative labels such as 'farmsteads'."* (Arnoldussen 2008, 429). According to Arnoldussen, the risk in using the farmstead as a research method is that it is unknown to what extent it is comparable to (sub)modern farmsteads, and that its use requires to use cross-disciplinary cherry picking of a concept in which the research methodology, research aims and connotations so much differs (Arnoldussen 2008, 429). Arnoldussen's research emphasizes that, despite the many Bronze Age houses that have been researched using the VASO method, no single prehistoric farmstead concept can be identified. It is thus all the more problematic that researchers have continued to do so regardless.

To illustrate how the concept of the Iron Age farmstead is applied in archaeological research, two excavations in the eastern Netherlands are evaluated. The chosen excavations illustrate conventional methods to interpret the farmstead. The purpose of this evaluation is to reveal the assumptions and pitfalls in the argumentation of the Iron Age farmstead interpretation, in such a way that it contributes to a better understanding of the methods used to interpret the Iron Age farmstead. In order to exemplify the application of the concept 'farmstead' the extensive excavations of Raalte – Jonge Raan and Zutphen – Looërenk are treated.

2.3.1 Raalte-Jonge Raan

Figure 2.1: Reconstruction of Late Iron Age and Early Roman period farmsteads and arable land at Raalte-Jonge Raan (after Groenewoudt *et al.* 1998, 46, fig. 3.24).

In 1997 and 1998, the ROB conducted extensive excavations at Raalte-Jonge Raan.[2] The aim of these excavations was to gain an insight in the archaeological and historic-geographical function of arable lands covered by sods (Groenewoudt *et al.* 1998, 9; Groenewoudt *et al.* 2000, 9). In the publication of Raalte-Jonge Raan it is assumed that if a house plan is present, there must also be a farmstead present, surrounding the house plan. In order to spatially distinguish these farmsteads, the authors used the location of excavated non-house structures to indicate that these structures formed outbuildings on the border of the farmstead (fig 2.1). In case this was not possible, the authors chose to apply 'middle lines' or so-called 'thiessen polygons', to spatially distinguish the farmstead. Furthermore, if it was not clear to which farmstead the interpreted structures belonged, the method was to assign structures to the farmstead that had relatively fewest structures beforehand (van der Velde 2011, 55).

The authors argue that the farmsteads found at Raalte-Jonge Raan belong to various successive phases, in which the farmsteads were periodically relocated. For this interpretation, the authors estimated the life span of each individual farmstead on 30-40 years. This was based on ^{14}C dating evidence, the typology of the farmhouses as a whole and the extreme low density of stray finds. Furthermore, the authors estimated the size of the arable lands associated with these farms during the Late Iron Age and Early Roman period as being about three hectares. In addition, they determined that the

[2] ROB (Rijksdienst Oudheidkundig Bodemonderzoek) is the predessor of the current RCE (Rijksdienst voor Cultureel Erfgoed), the Dutch archaeological state service.

limited dehydration of these arable lands excludes over-extensive use (Groenewoudt *et al.* 1998, 144).

In the dissertation of van der Velde (2011), covering the long-term history of the eastern Netherlands cultural landscape from 500 B.C to 1300 A.D., the site of Raalte-Jonge Raan is an important case study. Van der Velde (2011), who was the project leader during the excavations at Raalte-Jonge Raan, clarifies the arguments made in the interpretation of the site. In his argumentation, Van der Velde (2011) uses the original chronology of the site proposed by Groenewoudt *et al.* (1998), dating the farmsteads between 100 B.C. and 100 A.D. However, van der Velde (2011) assumes a life span of 50 years, instead of the original 30-40 year, which is derived from the idea that that a single farm covers a single generation. In order to visualize successive phases in the farmstead, van der Velde (2011) uses various dating methods to support his interpretation (Van der Velde 2011, 54-55; table 2.1 and fig. 2.2).

Table 2.1: Dating methods used to separate the various farmsteads in time at the excavations of Raalte-Jonge Raan (After van der Velde 2011a, 55, table 3.10).

FARMSTEAD NR	TYPOLOGY	DATE BASED ON	DATE
1	Hijken	^{14}C (taken from a nearby situated granary)	100 B.C. - 50 B.C.
2	Hijken	Situation and typological similarity house on farmstead 1	50 B.C. - 1 B.C.
3	Haps	Relative spatiality compared to other farmsteads and ceramic	1 B.C. – 50 A.D.
4	Hijken	Relative spatiality compared to other farmsteads and ceramic	50 A.D. – 100 A.D.

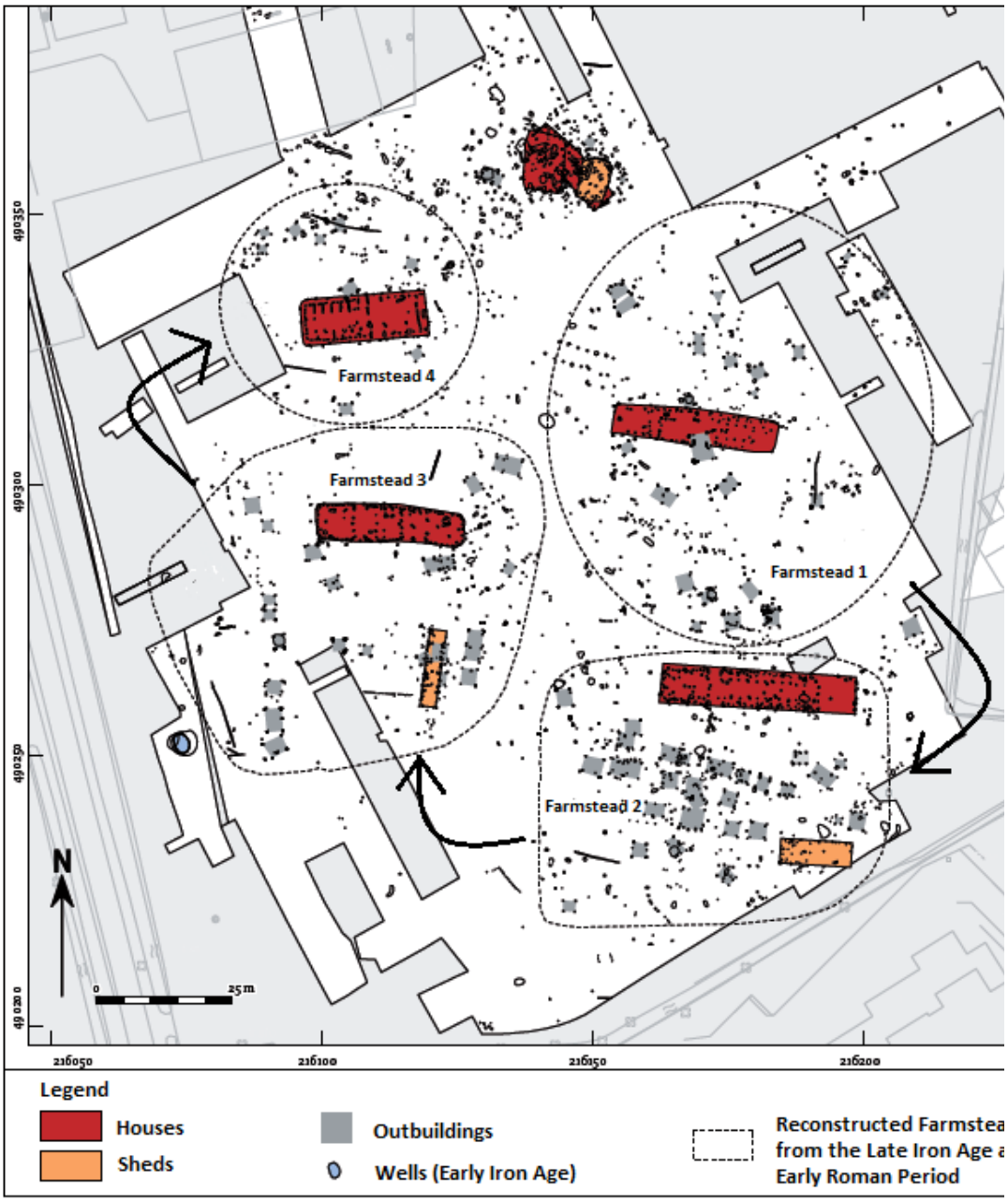

Figure 2.2: The periodical replacement of farmsteads through time at the site Raalte - Jonge Raan (after Van der Velde 2011, 54, fig. 3.9)

When examining the actual archaeological evidence used to interpret and phase the farmsteads at Raalte-Jonge Raan, pitfalls in the argumentation can be uncovered. The first is the method used to spatially distinguish these farmsteads. In the primary publications of Raalte-Jonge Raan, it is not clearly explained how the boundaries of the farmsteads were constructed (Groenewoudt *et al.* 1998; Groenewoudt *et al.* 2000). The interpretations show the assumption that outbuildings located close to a farm belonged to the same farmstead. Furthermore, if the feature density strongly decreases behind a farmhouse or outbuilding, then it was assumed that such an outbuilding marked the

border of the farmstead. However, in the case of Raalte-Jonge Raan, several farmsteads are located adjacent to each other. To distinguish the farmstead in these situations, van der Velde states that thiessen polygons and the relative amount of outbuildings assigned to a farmstead are used to spatially separate the farmsteads. This approach is, however, problematic and does not contribute to any credible knowledge about the farmstead. The use of Thiessen polygons suggest that the farmstead is geometrically assigned. This assumption is already invalidated by van der Velde himself, stating that the situation of outbuildings shows few systematics (van der Velde 2011, 55). Furthermore, the use of thiessen polygons suggest contemporaneity, which is not the case at Raalte-Jonge Raan according to the dating evidence provided by van der Velde. This means that thiessen polygons are not applicable. The assignment of outbuildings to farmsteads that have relatively few outbuildings compared to other farmsteads can even be described as a manipulation of data, and is not based on any sustainable argument whatsoever. In the present example, this contributes to a very subjective view on the farmstead and affects the presence and shape of the farmstead to a large degree.

The dating evidence shows some pitfalls as well. Groenewoudt *et al.* (1998) stated that two dating methods were used for the interpretation of Raalte-Jonge Raan. These are typochronological evidence and ^{14}C evidence (Groenewoudt *et al.* 1998, 25). Groenewoudt *et al.* (1998) furthermore describe that the ceramics did not contain many diagnostic elements and that there is a lack of typochronological framework for Late Iron Age and Early Roman period ceramics in the eastern Netherlands. As a result, it is difficult to provide an accurate dating (Groenewoudt *et al.* 1998, 25). Several ^{14}C samples did not match the dating evidence provided by the ceramics. As supporting evidence, the typological reference of houses was used as an argument to separate the farmsteads in time. However, these results may also be questioned; two houses are assigned to the Hijken type. Groenewoudt *et al.* (1998) use two typologies to date the Hijken type. The first typology describes a date between 300-250 B.C., according to a typology proposed by Huijts (1992) and the second describes a date between 250 and 100 B.C., according to a topology proposed by Kooi (1992). Remarkably both type Hijken houses are subsequently dated by Groenewoudt *et al.* (1998) between 100 B.C. and 1 B.C., which does not match either of the typochronological references. The same accounts for the house of farmstead four, which is dated between 50 A.D. and 100 A.D., although it is originally meant as a Wijster type A, which dates between 100 A.D. and 250 A.D (Groenewoudt *et al.* 1998, 35-38). Van der Velde states that this fourth house

type better fits the Hijken type (van der Velde 2011, 56, note 219). However, this does not clarify the contradiction to the dates provided by the typochronological evidence.

At Raalte-Jonge Raan multiple dating methods were used to support the dates of the farmstead. The date of the site between 100 B.C. and 100 A.D. is primarily based on the ceramics. Furthermore, two ^{14}C samples are used to plea for the interpretation. The first ^{14}C sample was taken from an as granary interpreted structure, allocated near one of the farmhouses. The sample showed a dating range between 166 B.C. and 42 B.C. The proposed dating of the farmstead, between 100 B.C. and 50 B.C., is a selection of the ranges provided by the ^{14}C sample. Furthermore, it was not taken from the farmhouse itself, but from a structure near the house, which makes it hard to sustain the date provided by the typological reference of the house. In addition, the ceramics found cannot narrow down the palimpsest situation to a period of 50 years.[3] As a result, the actual archaeological evidence provided by the authors cannot prove the proposed life span of 50 years.

From the original arguments used to sustain periodical relocation of single-phase farmsteads, only the arguments using the size and dehydration of arable lands and the low density of archaeological finds are more difficult to debunk. However, these arguments alone cannot prove successive phases of a single farmstead. The size and revenue of arable fields cannot be used as an argument alone, because it is not known to which extent other food supplies were used as addition to arable farming. The argumentation that a relatively low density of archaeological finds indicates periodical relocation lacks evidence and is speculative.

In summary, at Raalte-Jonge Raan the argumentation used to separate and interpret the farmsteads in space and time are questionable. Although van der Velde argues for periodical relocation, the actual archaeological evidence presented provides little support for this interpretation. Therefore, models put forward beyond the boundaries in time and space are used to prove the presence of the farmstead within the palimpsest. However, these models are uncritically applied. On the contrary, it seems that the periodical relocation of a single-phase farmstead is taken for granted and archaeological evidence is adjusted to fit this hypothesis.

[3] The closest typological framework of Iron Age ceramics is provided by Van den Broeke (2012) at Oss. However, even his interpretation is according to Van den Broeke not applicable in the eastern Netherlands (Van den Broeke 2012, 149, fig. 5.2).

2.3.2 Zutphen-Looërenk

In Zutphen, several excavations were conducted at the Looërenk between 2000 and 2004 (Bouwmeester *et al.* 2002; Bouwmeester *et al.* 2008). Especially the third campaign resulted in an extensive publication covering Iron Age farmsteads (Bouwmeester *et al.* 2008). At these excavations, little to no boundary-type features, such as fences, ditches or other parcel divisions were found (Bouwmeester *et al.* 2008, 257). In order to interpret farmsteads, the authors use a model proposed by Fokkens and Jansen (2002) in which the size of the farmstead is estimated as a square of 50x50m on average, with a farmhouse situated in the centre (*Cf.* Fokkens and Jansen 2002). Bouwmeester *et al.* state that they are aware that this is only a rough estimation, possibly only regionally applicable. Nevertheless, the authors decide to use the model proposed by Fokkens and Janssen to see what effect it would have on the interpretation of the farmstead. Instead of a square, Bouwmeester *et al*. (2008) applied a circle with a diameter of 30m around each house-plan, implicating that within this circle farmstead structures should be expected (fig. 2.3).

The application of the 30-meter circle showed, according to Bouwmeester *et al.*, some remarkable results. It was observed that with the application of the 30-meter circle, possible farmstead areas also covered areas that were too wet to inhabit. Furthermore, At the Looërenk, the majority of structures interpreted as granaries were situated in areas lower than the farmhouse itself (Bouwmeester *et al.* 2008, 258). The authors also noticed that wells were not located within the 30-meter circle. Wells were situated farther from the farmsteads, in the low areas of the Looërenk. The authors presume that the wells were purposely located in the lower areas where it was not necessary to dig deep for water (Bouwmeester *et al.* 2008, 259). According to Bouwmeester *et al.* 2008, characteristic for the farmsteads at Zutphen-Looërenk is that in many farmsteads a relatively large granary (with more than four poles) was found within 10 meters of the farmhouse. In general, most outbuildings that were interpreted as granaries were found within 15 to 20 meters around the farmhouse. In situations where this was not the case, the authors argue that the local relief was responsible for outbuildings that were situated farther away from the farmhouse (Bouwmeester *et al.* 2008, 259).

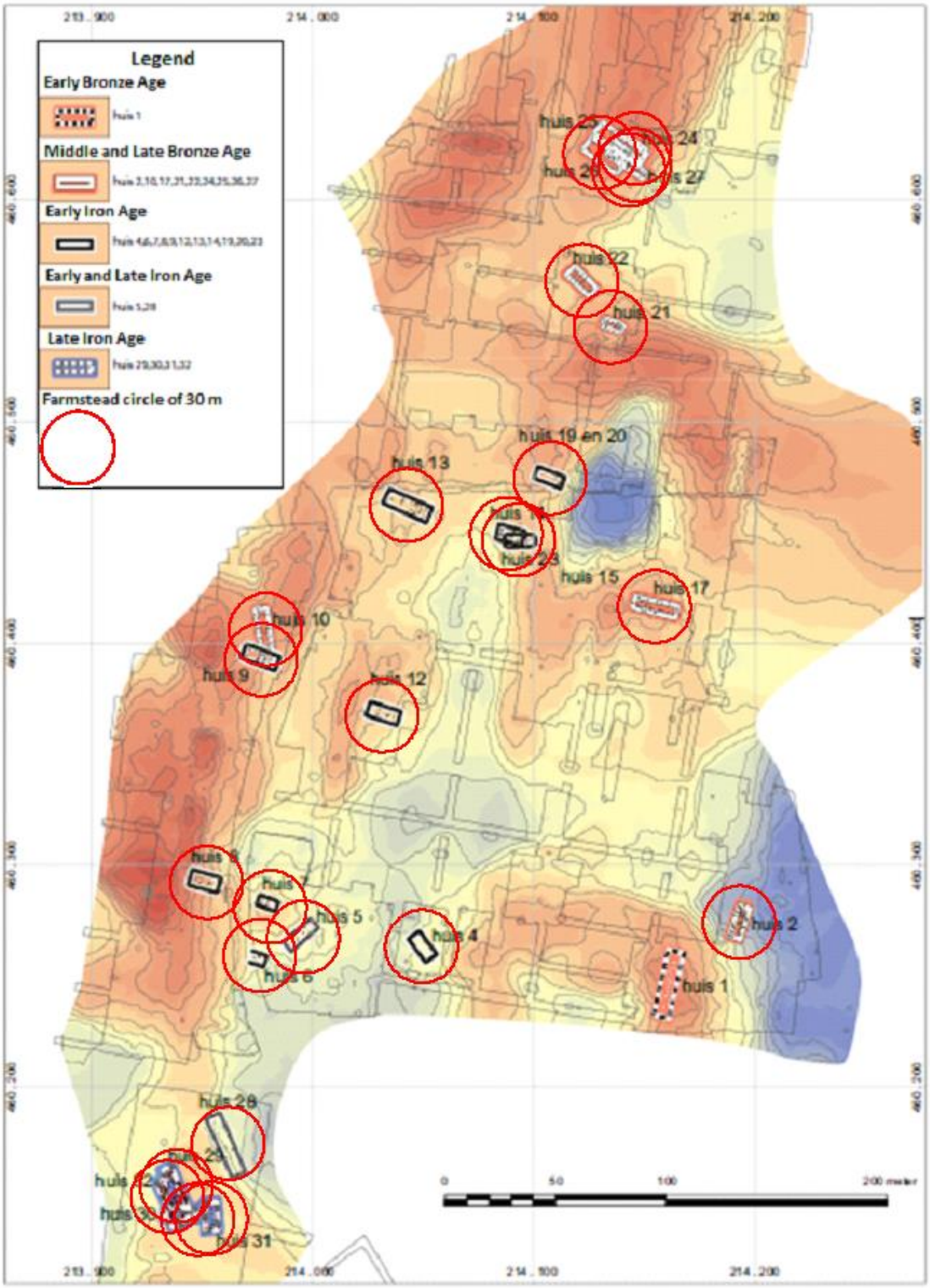

Figure 2.3: The interpreted farmsteads at Zutphen - Looërenk, based on the application of a 30-meter circle around each house. (After Bouwmeester *et al.*, 261, fig. 4.117)

At Zutphen - Looërenk, Bouwmeester *et al.* (2008) applied the wandering farmstead model. However, instead of basing their argument on archaeological evidence, it is the amount of arable land available in relation with the consuming population of a single farm that leads to the suggestion that only one generation could have lived on the relatively small amount of arable lands available. Furthermore, the authors state that the exhaustion of the soil could well be a main reason for the former inhabitants of the Looërenk to displace their farmsteads (Bouwmeester *et al.* 2008, 263-264).

Although at Zutphen - Looërenk an extensive study was applied to gain insight in the food supply of the former inhabitants, none of this data is used in relation to the farmstead. This is probably because of the definition of the farmstead maintained by the authors. Bouwmeester *et al.* (2008) limit the interpretation of the farmstead to its boundaries and the outbuildings within these boundaries. All the outbuildings are interpreted as granaries, which means that observations performed by the authors only treat the situation of granaries in relation to the house or to each other (Bouwmeester *et al.* 2008, 259). Information about the food supply could not be related to the farmstead, because the definition of the farmstead does not include food supply. Therefore, the authors could not provide explanations for their observations on the layout of the farmstead.

The application of boundaries does not work for the interpretation of Zutphen - Looërenk. This is because the processes which influence the boundary of the farmstead are not defined. In situations where structures were interpreted outside the 30-meter circle, there is no explanation about what this observation would mean for the farmstead. This shows how the application of boundaries, whether it is by determining outbuildings as boundaries or using models from other time and space in which boundaries are included, is useless if it is not defined which processes are responsible for the presence of boundaries. The same accounts for the interpretation of outbuildings and therefore the farmstead as a whole. The understanding of causally related processes is necessary to subsequently interpret archaeological data.

2.4 Conclusion

Despite the importance of the farmstead for understanding prehistoric settlements, the Iron Age farmstead is ill defined. The archaeological definition of the farmstead is based on the presence of a house with surrounding outbuildings, wells, fences and ditches (*Cf.* Schinkel 1998, 161; *cf.* Waterbolk 2009, 139, 163). In order to interpret the farmstead, archaeologists rely on models that distinguish the ground plan of a farmstead within a

site. As a result, the farmstead is regarded by archaeologists as a static spatial entity, and interpreted in an almost typological fashion, which results in syntheses that only highlight the spatial layout, situation and life span of archaeological features. What is lacking in these interpretations is an explanation why the spatial layout of the farmstead or the features in this farmstead differ, other than an increase or decrease in volume. It is therefore justified that Arnoldussen (2008) doubts the applicability of the concept farmstead in archaeological research. However, even though the concept of the farmstead is not unwarranted, the argumentation used to identify the farmstead can certainly be seen as flawed. In this chapter it is shown how the presence of a farmstead is taken for granted, and archaeological evidence is adjusted to fit the models that prove its existence. The definition of a farmstead as a house surrounded by outbuildings is therefore inadequate to use as a research method in archaeological research.

In order to use the farmstead as a credible research method, the concept must be redefined. A new definition of the term 'farmstead' should not emphasize the farmstead as a static archaeological object. Instead, in order to understand the farmstead, a model is needed which is capable of understanding the processes which influence its presence. A consequence of this approach is that its presence cannot be explained by archaeological features alone. Instead it is the other way around, by understanding the processes responsible for the presence of a farmstead, the archaeological features can be interpreted. Only then can the spatial characteristics of a farmstead be used to actually contribute to our understanding of the Iron Age farmstead.

3. Towards a new perspective

3.1 Introduction

In the last chapter, the lack of an explanatory model for the presence of Iron Age farmsteads was problematized. As of yet, use of the farmstead-concept has been characterized by our inability to understand the farmstead as the archaeological remnant of past processes. Rather, in our conception, the farmstead is treated as a singular and unchanging idea that is repeatedly projected onto the past. This contributes to a lack of understanding of how a farmstead 'works'. Archaeologists assume that a farmstead is always present, defined by a house and its surrounding outbuildings, and study the life-span, lay-out and situation of the farmstead in a typological fashion, as if the farmstead is a static entity rather than a lived in dynamic place. The presence of a farmstead, however, is influenced by various processes. The understanding of these processes is essential to understand why a farmstead should be present in the first place, and subsequently to determine how a farmstead works. Only then, a farmstead can be understood and used as a proper research method.

To understand past processes, archaeological research relies heavily on the use of analogies; examples from another time and space. According to Wylie (1985), there are two reasons for this. The first is that the application of well-established theory on the archaeological record, whether sociological, psychological or ecological, is a matter of extending theories to new terrains. Such an extension always fundamentally depends on analogical reasoning. The second reason is that the processes responsible for connections between material, behavioural or other cultural variables cannot be observed directly by archaeologists and are therefore always reconstructed or derived from existing knowledge (Wylie 1985, 148). To this, it is added that analogical reasoning does not necessarily have to be used as an interpretative argument, but also creates creative insight about the cultural past (Wylie 1985, 152; Pobiner and Braun 2005, 60). In this chapter, analogies are used to obtain a broader perspective on the use of farmsteads and to gain insight to which extent the interpretation of the Iron Age farmstead already depends on analogical reasoning. The aim is to determine the processes that influence the presence of a farmstead and to identify how these processes are causally related to the creation of the farmstead.

3.2 Theoretical Framework

3.2.1 The use of Analogies in Archaeology

At their simplest, analogies are used to search for similarities and differences between source and the subject. At the basis of such an approach is the assumption that if the source and subject share some properties, it can be inferred that they share others as well (Wylie 1985, 147). However, a crucial stage is to incorporate relevance to the variables responsible for the source and the subject, in order to determine causal relations between process and product (Binford 1981; Wylie 1985, 148; Pobiner and Braun 2005, 62). The understanding of causal relations between process and product is the actual purpose of analogical reasoning (*Cf.* Pobiner and Braun, 2005, 62). Binford (1967) even states that no matter how well ethnohistoric contexts are understood, it will never make analogical reasoning more credible. Credibility from analogical reasoning can only be gained by establishing causal relations and to test these through a deductive approach (Binford 1967, 10; Wylie 1985, 144). This is perfectly illustrated by Pobiner and Braun (2005), who state that the importance of Binfords study regarding the butchery practices of the Nuniamut[4] in relation to hunter-gatherer populations, is not a full understanding of the Nuniamut themselves, *"but the realization that the economic utility of skeletal parts affects the butchery practices of hunter-gatherer populations and the subsequent material residues of these practices"* (Pobiner and Braun 2005, 62). Therefore, analogical reasoning is not fundamentally about the similarities or differences between source and subject. The most essential part is the understanding of causal relations between process and product, which can subsequently be applied to the archaeological record through deductive reasoning (Wylie 1985, 148; Pobiner and Braun 2005, 58).

The main criticism on the use of analogies is that archaeologists are limited in their understanding of the past, hence overlook 'unique' processes. In addition, archaeologists run the risk of a direct reading of the past from the present, thereby taking a strictly uniformitarian approach which neglects the context of a framework from another time and space (Pobiner and Braun 2005, 62). As a result, there is a risk is that an ethnocentric image of the past is created. In this case, one ends up in circular reasoning (Wylie 1985, 139). It cannot be expected that analogical reasoning provides complete explanatory closure, because it remains difficult to understand all the variables responsible for process and product (Wylie 1985, 145). Nevertheless, the

[4] An Inuit tribe in Alaska

correct use of analogies offers an alternative between clear-cut material physics on the one hand, and mere speculation on the other hand (Wylie 1985, 153).

3.2.2 The use of observations from the discipline Rural History as inspiration

In order to understand the processes causally related to the farmstead, inspiration is taken from the rural-historical discipline. Especially farmsteads between the 16th and 18th century A.D. are used as examples in the present study. This timescale was chosen because information of farmsteads from these periods is available from first-hand observations. Furthermore, during the 19th century Dutch agriculture started to modernize quickly, in which many distinctive farms vanished or were thoroughly renovated (Cruyningen 2014, 134). This does not mean that the previous period was static (Bieleman 1992, 11). Several studies show that the agrarian production in the post-medieval period steadily increases. However, farming methods show relatively little change in comparison with the 19th and 20th century (Slicher van Bath, 1957, 587).

Observations and the gathering of information on rural society started in the late 19th century and 20th century. Several researchers, both with and without an academic background, have been engaged in rural research. In this study, the work of Gallée and Uilkema is used (Gallée 1908; van Olst 1991). Both studied the rural society of the eastern Netherlands. Gallée was the first to collect large amounts of information about farmhouses and to synthesize this data from a construction-historic and culture-historic point of view (van Cruyningen 2002, 5). Uilkema provided presumably the largest collection of data, containing hundreds of detailed drawings and thousands of photos, taken between 1914 and 1934. However, His work was not published at the time. Nearly fifty years after his death, van Olst (1991) studied and published his extensive work.

A major turning point in rural history is the work of Slicher van Bath, who studied the discipline from a more socio-geographic perspective, focusing on the tension between population size and agricultural production, thereby taking a Malthusian perspective (van Cruyingen 2014, 135-136; Slicher van Bath, 1957, 1960). In the nineties rural history took another turn, this time focusing more on social property relations (van Cruyningen 2014, 146). In this study, the work of Bieleman (1992) is used, because he provides an extensive overview of agrarian history and is able to determine regional variations, therefore avoiding globalized assumptions (Bieleman, 1992; *Cf.* van Cruyningen 2014, 142).

Present studies in agrarian history mostly focus on agrarian society on supra-regional level, not on the level of individual farmsteads. Studies focusing on the individual farmstead in the eastern Netherlands, are primarily performed as popular scientific work, initiated by foundations such as *De Rijksdienst voor de Monumentenzorg* and the *Stichting Historisch Boerderij-onderzoek.* For qualitative methodological and deductive research purposes, these works are not applicable, because they only provide global overviews and lack research questions, methods and synthesis. However, given the fact that several works contain many extensive representations of farmhouses and farmsteads, written by experts in the field of agrarian history, a number of these works are useful if used for representation purposes such as the appearance of typical farmstead objects.

The oldest remaining farm type in the Netherlands is the *los hoes*[5] (van Olst 1991, 378). The *los hoes* is a farmhouse in which living-, stable- and storage functions are brought together under the same roof (Gallée 1908, 44; van Olst 1991, 355). The most remarkable aspect of this 'intertwining of functions' is that the spaces belonging to these functions are barely demarcated by physical boundaries (van Olst 1991, 378). From an archaeological perspective, this corresponds with the layout of Iron Age farmhouses, in which clear-cut spatial boundaries inside the farmhouse are also often absent or difficult to establish. Furthermore, the activities performed on the farmstead of the *los hoes* in relation to its long-term use shows little dynamic and therefore provides an indication of characteristic farmstead processes. Therefore, the *los hoes* is taken as starting point for the understanding of processes relating to the presence of a farmstead.

3.3 The establishment of processes causally related to the farmstead

The farmstead cannot be treated as a static entity, because it is the nerve centre of the total farming business, including the surrounding environment (*Cf.* Leopold 2001, 56). In order to understand the dynamic of the farmstead, its place within the agrarian business as a whole need to be understood. Each of the variables influencing the farming business as a whole can also be related to the farmstead. Determining this connection is necessary to understand how the farmstead is influenced by its agricultural purpose. The aim of this study is therefore to determine activities which occur in the farming

[5] Which can roughly be translated as 'open house'

business and are related to the farmstead. Therefore, the agricultural function of the farmstead, in economical perspective, is taken as a basic principle.

The farmstead strongly depends on the cultivation of the surrounding arable- and wastelands. This entails the necessities to cultivate these lands, as well as the processing of revenue coming from these lands. Within the agrarian practice, the size of the farming business and the relation between farming opportunities and necessities is of essential value. Key features within the farming business are the amount of arable land, hayfields and pastures available, the amount of traction animals, technology, storage function, the amount of fertilizer needed and therewith related the amount of animals needed to provide fertilizer (Slicher van Bath 1960, 25). Especially in older sub modern agrarian communities, where the emphasis is on arable labour rather than cattle breeding, the relationship between these various factors is vital (Slicher van Bath 1960, 26). According to Slicher van Bath, the size of the agrarian company, including the availability of arable lands, pastures and cattle, the extent of traction available, the size of the family and the amount of labour depend on each other in an optimal ratio (Slicher van Bath 1960, 26). In the fringe, agrarian businesses of the pre-18th century there were little opportunities to diverge from this ratio (Slicher van Bath 1960, 26).

3.3.1 The cultivation and processing of surrounding fields in relation to the farmstead

Cultivation and the processing of surrounding fields is directly related to the farmstead in terms of storage space needed for the yield. Before the 19th century, agrarian production was almost exclusively meant for food purposes (Slicher van Bath 1960, 31-32). Field revenues contained for a large part various grain types and hay, from which a significant part was reserved to sow the fields for next season (Slicher van Bath 1960, 27-28). In addition to grain, root vegetables were also harvested (Slicher van Bath 1960, 32-33).

The harvesting of hay and grain started with the bundling of sheaves on the fields (Bieleman 1996, 250). Subsequently the sheaves were taken to the farmstead and stored there in a stack or pile, or on the attic of the farmhouse (van Olst 1991, 379). Hay was needed to feed the animals in the winter and was therefore for a large part stored inside the farmhouse, in the nock or in the small attics on either side of the threshing yard. If kept outside, a haystack was built close to the shed, so that the hay did not have to be transported over long distances. Grains, on the other hand, needed to be threshed

before they could be used for other purposes. On the threshing yard the cereal grain was removed from the spike. The grains were threshed by hand. This started shortly after the harvest and lasted until spring. Only in the summer, threshing did not take place (Koldeweij *et al.* 2001, 25). The threshing yard be covered from rain or frost. Therefore, the threshing yard was located inside the central hall of the *los hoes*. Root vegetables, vulnerable to frost, moist, light and heat, had to be stored underground (Gallée 1908, 46; Koldeweij *et al.* 2001, 145). In areas where the emphasis was on arable farming, the threshing yard was exclusively used for threshing purposes. At specialized cattle breeding farms, the threshing yard was used to store hay, in order to feed the animals. In addition, the threshing yard was also used for short-term storage purposes. When the grain was processed, it was stored inside a granary, shed or farm (Koldeweij *et al.* 2001, 145).

3.3.2 The livestock in relation to the farmstead

Even in areas with an emphasis on arable farming, there is a need for cattle. Cattle provides three advantages: Primary and secondary products to consume; animal traction for transporting, ploughing, harrowing and other processing purposes; and fertilizer purposes (Slicher van Bath 1960, 30, 309-310). Specific buildings on the farmstead are equipped to feed and shed the cattle. The revenue provided by cattle, in terms of primary and secondary products, is processed and stored on the farmstead. However, the raising of cattle is restricted by the availability of food and labour. On the farmstead, structures were erected to store animal food. There are additional variables restricting the keeping of cattle not directly related to the farmstead, such as the availability of pastures or heathlands and the amount of labour needed to keep cattle (Koldeweij *et al.* 2001, 119).

The shedding space of cattle on the farmsteads varies by animal. In places where the emphasis is arable farming, the caring for cows had the highest priority. This is due to the amount manure they provide, in addition to primary and secondary products and traction. The cows were herded on pastures, such as grasslands or more extensively used heathlands and marshlands. In addition, the cow spent considerable time inside the shed, which was located on the farmstead, but also inside the farmhouse, on either sides of the threshing yard (Gallée 1908, 45-46).

The horses, if present, are also shed inside the farmhouse, on either side of the threshing yard (Gallée 1908, 45-46). The horse does not provide fertilization or primary

and secondary products, but excels in animal traction (Slicher van Bath 1957, 528). According to Slicher van Bath, based on 16th century French sources, a horse provides three to four time as much animal traction then the cow. The horse is more common in areas with the emphasis on cattle breeding then on arable farming, because in arable farming areas there is not always enough food present to feed the horse, in addition to other animals and the farming family themselves. Slicher van Bath therefore states that the transition from cows to horses suggests an increase of prosperity of the farming population (Slicher van Bath 1960, 317-318).

Sheep and goats are an exception when it comes to animals in relation to the farmstead. Most of the time they were herded outside, on the outstretched heathlands or extensively used marshlands. They were shed in so-called sheep pens, which from the medieval period onwards also often functioned to collect manure, to use as fertilizer. These sheep folds were not necessarily located on, or in the neighbourhood of, the farmstead (Koldeweij *et al.* 2001, 119). The herding of sheep is closely connected to the multifunctional use of the animal. The sheep does not provide traction, but it does provide primary and secondary production and fertilizer (Slicher van Bath 1957, 543-548).

Pigs were kept on the farmstead (Gallée 1908, 45-46). Most of the time they were walking outside, around the manure pile for instance. When a pig was fattened, it was taken inside the shed or farmhouse (Koldeweij *et al.* 2001, 119). From historical sources, a view is provided in which it seemed that the pig is strictly used for self-sufficiency, because only a handful of pigs were kept on farmsteads (Slicher van Bath 1957, 538). The advantage of pigs is that they can be fed cheaply with garbage, yet, they primarily provide only meat (Koldeweij *et al.* 2001, 21).

Other possible livestock present on the farmstead are poultry and beehives (Gallée 1908, 45-46). In some situations, poultry was shed in henhouses, although there are also examples in which poultry is shed inside the farmhouse (Koldeweij *et al.* 2001, 119). Beehives were located on the borders of the farmstead. These bees provided products such as beeswax for candles in addition to honey (Gallée 1908, 46).

3.3.3 The farming family in relation to the farmstead

The farming family is responsible for all the processes on farmstead. From an economical perspective, they provide the labour needed to perform all the tasks to cultivate. These include processing the harvest and revenue of the livestock, for example

the processing of secondary products, such as the weaving of wool or the processing of milk to butter. However, in return the farming family needs resources to survive and perform these tasks. These are the basic needs to live, such as food consumption, clothing and housing.

One structure on the farmstead that can be related to the activities performed by the farming family is the place in which they eat and sleep. This is the farmhouse, characterised by the hearth and the bedstead. In the *los hoes* the hearth is located in the same central hall as the threshing yard. The division between the two spaces is often not demarcated, showing the intertwinement of the 'living space' with the 'labour space'. Chimneys were not present in the *los hoes*, therefore the smoke had to search for a way out through the upper shelves and the thatched roof, which resulted in a dusky room (Olst 1991, 378). In the summer, the door was open to keep the smoke out. In the winter there was enough 'draught' to keep the air breathable (Olst 1991, 377-378). The quarters of the living space contained the bedsteads (Gallée 1908, 45-46; van Olst 1991, 383; Koldeweij *et al.* 2001, 15).

Outside the farmhouse, structures that were used for the basic necessaries were present as well. The well was, unless fresh surface water was available, located on the farmstead (Koldeweij *et al.* 2001, 107). Furthermore, the restroom is also a common farmstead object, although it was preferably build above a ditch or channel, so that the dung was quickly drained (Koldeweij *et al.* 2001, 113).

3.4 The farmstead as an agricultural model

In archaeology the interpretation of finds and features is established by the application of models, in which 'what is known' is applied to 'what is unknown'. Archaeology is interpretative at its base; this means that the definition of an archaeological subject depends on how it is defined by the one who interprets. In order to gain a more credible understanding of archaeology, it is necessary to create models that are capable to provide measurable data which can strengthen an interpretation. For the concept "farmstead" this means that a credible interpretation cannot be sustained using archaeological evidence, such as the life-span, situation and layout of the farmstead, because these interpretations do not contribute to an understanding of what took place on a farmstead. In order to strengthen an interpretation of the farmstead, it is necessary to establish the factors that influence the farmstead, so that its processes can explain the archaeological product.

The rural-historical approach performed in this chapter shows that the presence of a farmstead depends on its agricultural purpose. This means that the farmstead is not a static object, and its existence cannot be solely defined based on its spatial characteristics. The farmstead is a dynamic object and its presence changes to fit its agricultural purpose. The understanding of the agricultural purpose of the farmstead is therefore key to determine its characteristics. In this study I put forward a model, capable of gaining understanding in the processes influencing the farmstead (fig 3.1). This process-related farmstead model (hereafter PRF-model) focuses on the agricultural purpose of the farmstead and depicts how these variables are causally related to the farmstead and each to each other. The model is based on the information described in this chapter and can be used to establish quantifiable causal relations. In it, the archaeological product, the features and finds, are linked to the processes responsible for their presence. The purpose of this model is to provide additional argumentation to for the interpretation of a farmstead. As such, the process related farmstead model redefines the concept of the farmstead.

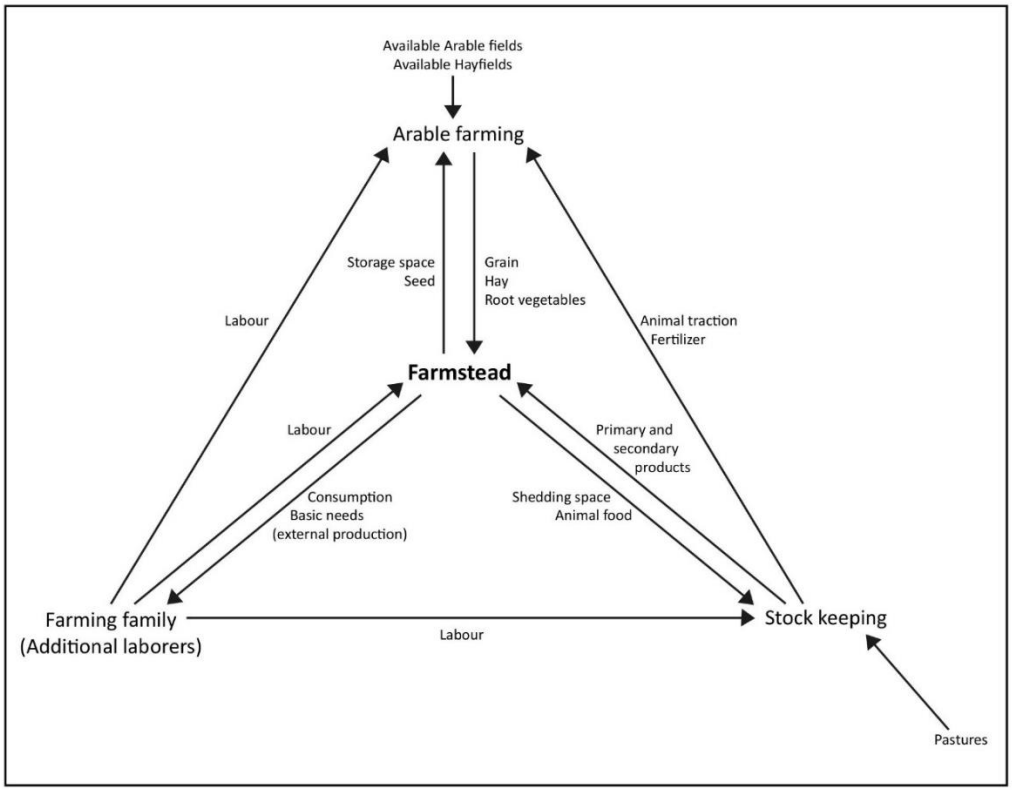

Figure 3.1: The process related farmstead model: The agricultural processes causally related to the presence of a farmstead.

4 Relevant archaeological features

4.1 Introduction

According to the PRF-model, the presence of the farmstead depends on three variables: arable farming, stock breeding and the farmer's activities. These three variables express themselves through various processes causally related to each other and causally related to the farmstead. With the farmstead considered as viewpoint, these processes are divided in internal or external processes. Internal processes are directly related to the farmstead. In arable farming, this is considered as the storage space to provide sowing seed and to store and process the harvest. In stock breeding, the internal processes are the available shedding space, the food stored at the farmstead and the primary and secondary products provided by cattle. The farming activities directly related to the farmstead are the basic necessities to provide labour. External processes do not present themselves in farmstead features, but are directly related between the three variables, arable farming, stock keeping and farmers' activities. Therefore, the external processes are indirectly related to the farmstead. In arable farming, these external processes are expressed through the availability of arable fields and hayfields. In stock keeping, these are expressed in the availability of pastures. Other external processes include the technological or economical processes influencing the extent to which arable farming or stock keeping can be conducted. The key process in this is the amount of labour provided by the farming family, both in arable farming and in stock breeding. Another interrelated causal relation is the amount of fertilizer and animal traction provided by the livestock in relation to arable farming. In this chapter the archaeological features relevant for the determination of the internal processes of the farmstead are discussed.

The structure of this chapter is not based upon a division in function, but on a division in structure type. Therefore, in subsequent order, the agrarian related function of houses, outbuildings and individual pits are treated. The reason for this division is that the specific function of many structures is ambiguous and open for discussion, which will be exemplified further on in this chapter. Therefore, a division by function is not possible without making assumptions on the exact definition of each archaeological feature or structure. In addition, a division in structure type is easier to relate to the conventional structure of archaeological features in archaeological synthesis (*Cf.* Arnoldussen 2008, 167-272; *cf.* Waterbolk 2009).

In this study, demarcating features are not treated. The reason for this neglect is because their exact agricultural function is unclear. On some occasions they can be related to arable farming or stock keeping, beside social processes, which would be external processes in view of the farmstead. However, the primarily reason to not include boundary features such as fences as ditches is that they are not present in the case-studies treated in this study.

4.2 The house

The most examined archaeological structure related to the Iron Age farmstead is undoubtedly the house. Research on this subject is extensive, varying from typological studies (e.g. Schinkel 1998; Waterbolk 2009; Lange *et al.* 2014) to more post-processual approaches on the social context of the house (i.e. Gerritsen 2003; Beck 2007; Webley 2008). However, there is no study specifically emphasising the agrarian function of the house. The function of the farmhouse is typically explained as the living space of the farming family. However, there are also examples in which the layout of the ground plan suggests a division in two or more sections, which are interpreted as separate spaces, defined as a dwelling section and a byre section (Gerritsen 1999, 83; Waterbolk 2009, 54-67).

According to Waterbolk (2009), attics or lofts for storage purposes were probably present inside the house, although they are difficult to distinguish in a house-plan and almost impossible to direct to a specific function (Waterbolk 2009, 54). Another feature interpreted as a storage space are cellars, in the shape of rectangular pits (Waterbolk 2009, 129). Waterbolk primarily points to the Late Medieval Period for the appearance of cellar pits inside the house. However, these are also known from Late Prehistory. Arnoldussen observed various Bronze Age sites in the river region where storage pits inside the house are interpreted as cellar pits on multiple occasions, in which cereals in properly sealed containers were possibly stored (Arnoldussen 2008, 263).

Archaeological features which point towards a strict agrarian function regard to the activities of farmers are limited. Only the hearth is often interpreted as the centre of the living space (*Cf.* Gerritsen 1999, 83). It can be assumed that in this living space also activities occurred that are related towards agriculture, for example the weaving of wool. There is much debate over the interpretation of specific activities in the living space, it is therefore hard to assign specific agricultural processes to spaces in the farmhouse to.

In some cases, a byre section is interpreted. This section is defined by the presence of archaeological features such as stalls. The presence of a byre section is used to argue that relatively large cattle, especially cows but also horses, were kept inside the farmhouse, and that they had an important role in the agricultural processes in the Iron Age. Especially in areas where zoological evidence is missing due to conservation, the byre is used as a supporting argument to calculate the amount of cattle kept within the house. by Excavations in the Rhine-Meuse river area, where zoological material was found, further support such theories. Based on these excavations, a division was made which shows the relevance of each animal in the Iron Age (van Wijngaarden-Bakker and Brinkkemper 2005, 491-512; fig. 4.1). How these interpretations relate to comparable situations other areas is not always argued due to the absence of supporting zoological material. Van der Velde (2011), argues that in the eastern Netherlands, the size of byre sections seems to increase during the Iron Age. He suggests that this is linked to an increased importance of cattle breeding, but could also be connected with an increase in land fertility (Van der Velde 2011, 75). The function of cows compared horses is treated by van Wijngaarden-Bakker and Brinkkemper (2005). They state that animal traction, as for example ploughing or pulling heavy carts was primarily done by cows, because technological features for horses were not available (Van Wijngaarden-Bakker and Brinkkemper 2005, 493). However, van Wijngaarden-Bakker and Brinkkemper (2005) do not specify these technological features, which makes this idea questionable. Van Wijngaarden and Brinkkemper (2005) nevertheless question the agricultural status of the horse. According to them, there are indications that horse meat was eaten, but at the same time there are also indications that the horse had a special status (Bakker and Brinkkemper 2005, 493). Whether these perceptions are mutually exclusive can be questioned. Nevertheless, it shows that the horse is not necessarily causally related to a specific agrarian function.

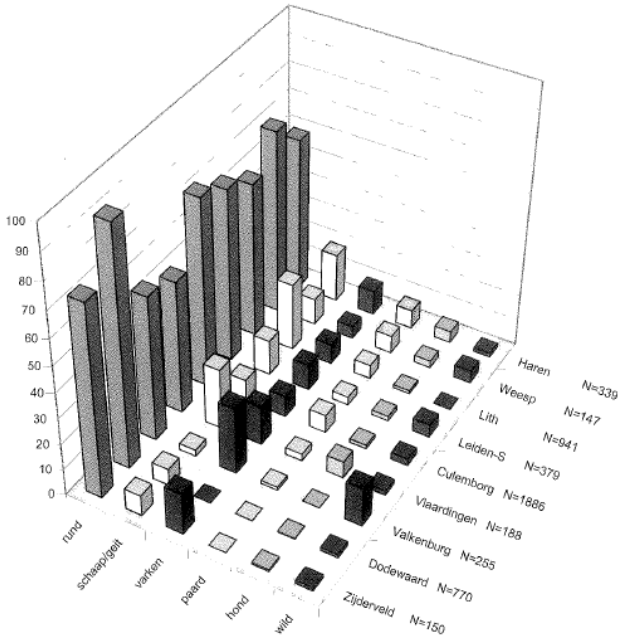

Figure 2.1: Percentage of different domestic animals in prehistoric settlements in the river area. (N=total determined fragments). Translations from left to right: Cow, sheep/goat, pig, horse, dog and wildlife (Van Wijngaarden-Bakker and Brinkkemper 2005, 494, fig. 22.4)

4.3 Outbuildings

Outbuildings are defined as farmstead-related structures that consist of multiple archaeological features and are not interpreted as a house. This definition is very broad and made because outbuildings have been interpreted in all types and sizes. In archaeological research, this broad definition is often divided in two divisions. Granaries[6], as storage space for all kinds of commodities, however, and other shed-like structures. This division essentially means that only granaries are defined in archaeological research, while other interpreted shed-like structures are not.

By far the most interpreted outbuilding in archaeological research is the granary. The granary is the earliest known explanation to interpret multipolar non-house structures. Since then, the concept of the granary has become a much-used interpretation method in archaeological research. The problem in the application of the granary concept is not that its interpretation is incorrect, there is plenty of anthropological examples that point out that granaries are common storage structures on farmsteads (*Cf.* Arnoldussen 2008, 238-237). Furthermore, there are some excavations in which botanical evidence is used to link a multipolar structure to a presumed storage function of different kinds of raw materials (*Cf.* Arnoldussen 2008, 236-237). However, in archaeological excavations it seems that the granary is the only defined explanation for multipolar structures. This

[6] In Dutch called *spieker* or *spijker*.

can perfectly be exemplified by typological overviews covering the ground-plans of interpreted granaries. Figure 4.1 and 4.2 show two typological overviews of interpreted granaries. The first (Fig. 4.1) is based upon Bronze Age research in the Dutch River Area by Arnoldussen (2008) while the second is based upon archaeological excavations at the Late Bronze Age and Iron Age site Hatzum-Boomborg in north-west Germany, near the Dutch border, provided by Waterbolk (2009). These typological overviews show a proliferation of granaries lay-outs, without critically evaluating on the function of such different ground-plans. Because there is no understanding why granary lay-outs differ, the typological methods used to differentiate between granaries are practically meaningless.

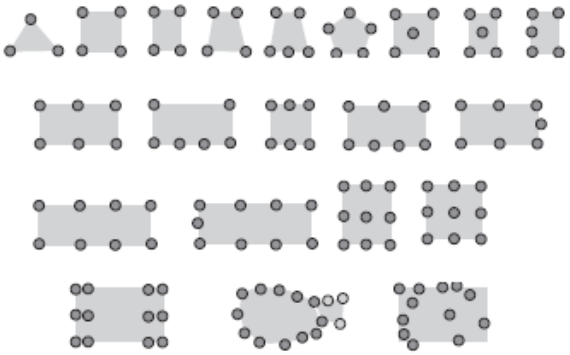

Figure 4.1: Typology of Bronze Age granaries interpreted in the Dutch River Area (After Arnoldussen 2008, 239, fig. 5.39).

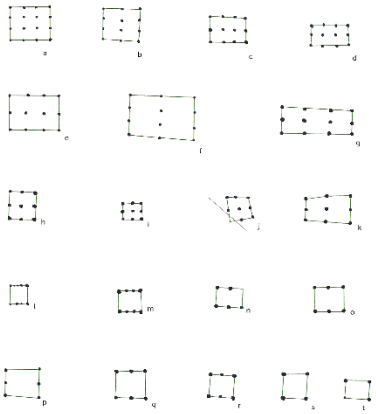

Figure 4.2: Examples of granaries excavated at Hatzum-Boomborg in 1965-1967 (Waterbolk 2009, 89).

Research on other shed-like structures is scarce. In several excavations there have been alternative functions suggested for the interpretation of multipolar structures. According to Arnoldussen (2008), other interpretations of granaries as multipolar structure include storage for fodder, haystacks, livestock pens, religious structures, watch-towers, privies, fighting stages and exposure platforms, but are from an archaeological perspective difficult to prove, highly speculative or rarely applied (Arnoldussen 2008, 236). In the archaeological interpretation of the Iron Age farmstead only the haystack is considered as a viable other explanation. The haystack is defined as a storage structure meant for the storage of hay, in contrast to the granary, which is meant for grains. According to Arnoldussen (2008), the haystacks most important function is to dry hay, in which conservation is less important. This is in contrast with granaries, which need to conserve food, and therefore need to have free-air circulation

and less vulnerability to animal or insect attacks (Arnoldussen 2008, 137). Waterbolk defines the haystack as a triangular or cylindrical pattern, this in contrast to the granary, which he defines on a square or rectangle pattern. Arnoldussen also includes triangular and cylindrical patterns as granaries, while Waterbolk specifically assigns them to the interpretation of haystack. However, just as is the case of the interpretation of the granaries, the typological approach on the presence of haystacks contains the same problem as the interpretation of the granary. That is to say, the processes influencing the layout of a haystack are unknown. The definition of these structures depends on the way archaeologists argue their interpretation. The typological approach in which granaries and haystacks are interpreted, and unknown spatial layouts are interpreted as a new not yet discovered shape of a granary or haystack, reveals a circular argument in which the concept of granary and haystack is taken for granted, without critically approaching why they would by all means present on archaeological excavations.

The remaining type of outbuilding treated in this paragraph is the shed. Essentially the granary or haystack is also a shed-like structure. However, in archaeological research the shed is defined as the remaining structure that is too large to be interpreted as a granary and too small to be interpreted as a house. This ill definition, is to a large extent, arbitrary, which highly influences its application in archaeological research. For example, Waterbolk (2009) suggests that the Iron Age farmstead is limited to granaries and haystacks and that sheds are not present (Waterbolk 2009, 111). However, there are multiple examples of archaeologists interpreting sheds on the Iron Age farmstead (e.g. Van Beek 2009, 176-177; Van der Velde 2011, 52; Verlinde 2000, 18, 21).

4.4 Pits

In every excavation, pits are interpreted. Schinkel (1998) defines pits as all non-linear features that cannot be interpreted as a posthole or burial (Schinkel 1998, 267). This broad definition results in large numbers of pits interpreted on an Iron Age farmstead. Examples are refuse purposes, storage purposes, animal care purposes, living space purposes, processing purposes or burial purposes (*Cf.* Huijbers 2007, 195-196 for the Medieval period; Arnoldussen 2008, 262-264 for the Bronze Age).

Wijngaarden-Bakker and Brinkkemper (2005) suggest that the storage of grain for consumption purposes was most likely storage in granaries or indoors within provision pots (Wijngaarden-Bakker and Brinkkemper 2005, 509). Bakels (1989) assumes that where no storage pits are found, all the grain must have been stored in granaries (Bakels 1989, 10; *cf.* Schinkel 1998, 163). However, the storage pits that are found, can be

divided in two categories. Silos dug for the conservation of sowing seed and storage pits used to temporarily store remaining (raw) materials.

Van Wijngaarden-Bakker and Brinkkemper (2005) suggest that in some occasions silos were used to store sowing seed. This argument is based on interpreted silos at Deventer-Colmschate, that were quite large ($3m^3/4m^3$) and could not be re-opened. Re-opening a silo contacts the seed with oxygen, which can make the seed mouldy or causes it to germinate. Furthermore, the silo was situated above groundwater-level, which was necessary because contact with water can cause mould (van Wijngaarden-Bakker and Brinkkemper 2005, 509). On some occasions, silos may have been re-used and sanitized by fire (Arnoldussen 2008, 263).

Although the silo is linked to a specific function, the remainder of storage pits are more difficult to define. A common interpretation can be found in Arnoldussen (2008), who states that the storage pit is characterised by its flat bottom in which boxed bulk matter, bags or vessels could be stored. These storage pits would be easier accessible then silo's, because an oxygen-free environment is not necessary in the pit itself. In addition, these pits occur often close to the surface (Arnoldussen 2008, 263).

5 The application of the process-related farmstead model

5.1 Introduction

Establishing the variables and related processes directly and indirectly influencing the farmstead results in a dynamic model explaining the presence of the Iron Age farmstead. In the previous chapter, the emphasis was on the discussion of relevant archaeological features for the application of the PRF-model on Iron Age farmsteads. This discussion was put forward on an abstract level, using archaeological syntheses as a starting point. However, to show the relevance of the PRF-model it is necessary to apply the model to an analysis of actual archaeological excavations. The case studies used to exemplify the problems in the interpretation of the Iron Age farmstead in paragraph 2.3 are used for this purpose. These case-studies are chosen because they are firmly criticised in these thesis, but their interdisciplinary and extensive archaeological approach also show potential for the application of the PRF-model on the interpreted Iron Age farmsteads.

The purpose of this chapter is to reinterpret the sites using the PRF-model proposed earlier. This is accomplished by placing the site in a new agricultural perspective, established in in the previous chapters. The starting point in the approach of each case study are the archaeological features that are relevant for the interpretation of the agrarian function of a farmstead, as is determined in the previous chapter. In the case studies, information is also provided about some of the external processes relevant for the application of the process-related farmstead model on the Iron Age farmstead. These ideas are therefore also critically approached in this chapter.

5.2 Methodology

In the previous chapter I stated that the reasoning behind the interpretation of outbuildings is to a large extent questionable. Yet they are the key to define and understand the farmstead. A re-evaluation of the function of outbuildings would therefore be recommended before analysing the full potential of an agricultural perspective, so that more credibility can be gained from this analysis. However, this is not fully achievable in this present study. Therefore, the understanding of outbuildings must be established by establishing the processes related to the presence of outbuildings, which is partly done in the current analysis.

The proposed PRF-model explains which processes influence the appearance of the farmstead. In order to put this model to practice, it is necessary to argue how these processes are expressed in archaeologically visible ways, and how this stands in relation

to the farmstead. For this purpose, a ratio to understand the quantitative relationship between farmstead related processes and archaeologically visible traces should be established. For such a ratio the exact volume of archaeological structures related to storage, shedding, processing and living spaces needs to be understood. In the previous chapter it was explained that the methods to interpret archaeological features, especially outbuildings, is questionable. Therefore, this ratio must be established by using data from another time and space, through the use of analogies. The risk in this approach is a direct reading of the present onto the past. The purpose of nevertheless applying such an approach, is to provide a new perspective on current archaeological interpretations that can be questioned if additional information on the functioning of outbuildings would come to light.

The relation between the size of the haystack and its storage function is studied from an archaeologic point of view by Huijbers for a medieval context (Huijbers 2007, 152-159). Based on studies of Bieleman (1996), the volume of piled hay is expressed in the amount of livestock that can be fed in the winter, based on 180 days of winter (Bieleman 1996, 259). According to Kuijsten (1919), based on his own observation of Frisian haystacks, hay can weigh approximately between 75kg and 125kg per m^3, depending on how it is stacked (Kuijsten 1919, 4; Huijbers 2007, 157). Huijbers maintains an absolute weight of 125 kg as a starting point (Huijbers 2007, 158). The variable is referred to as *'koe'sete'*, and comprises, according to Kuijsten (1919), 2500 kg of hay (Kuijsten 1919, 5; Huijbers 2007, 158). According to Uilkema (1916), a four-poled haystack could contain 20 *'koe'sete'*, a five-poled haystack 28 *'koe'sete'* and a six-poled haystack 36 *'koe'sete'* (Uilkema 1916; Huijbers 2007, 157). Therefore, Huijbers (2007) calculates the amount of hay that could be stored inside a haystack on 50.000 kg, 70.000 and 90.000 kg hay in respectively four-poled, five-poled and six-poled haystacks (Huijbers 2007, 158). This would mean that one fully piled up four-pole haystack would provide food for 20 cows during winter. According to Huijbers (2007), the total volume of the haystack barely differs from the average barn. In addition, the use of a haystack as storage structure for hay has advantages to storage inside the house or in barns. They are relatively easy to build structures, the consequences in case of fire are less severe, there is less of a chance of vermin related problems and the structure provides a smooth drying of hay (Kuijsten 1919, 8; Bieleman 1996, 256-257; Huijbers 2007, 156).

The volume of storage space for a granary is more difficult to determine from an agrarian historical viewpoint, because the granary-type structure determined by

archaeologists is not known from post-medieval and modern observations of Dutch farmsteads. Huijbers (2007) assumes for the medieval period in the Maas-Demer-Schelde region that all four- five- and six poled-outbuilding could in principal be used for all kinds of storage space (Huijbers 2007, 161). The question how much can be stored in a granary is, however, difficult to answer. To determine the potential volume of the granary, constructional and anthropological data is needed. Bakels (1989) mentions English experiments that estimate the average size of a granary on a floor surface of 4 m^2. Furthermore, the height of the granary is assumed on an average of 2 meter. This results in a capacity of 8 m^2, which can bear approximately 5000 kilos of threshed grain (Bakels 1989, 11). Bakels provides various pitfalls in the use of this number as a starting point. The first is the question whether a granary can carry the weight of 5000 kilo's of threshed grain and the second is the question whether or not only threshed grain was kept inside the granary, or only unprocessed grain. The weight of unprocessed grain is significantly lower than stored threshed grain (Bakels 1989, 11). However, in a more recent publication Bakels clearly states *"…that the granary was certainly not, at least not commonly, used for bulk storage of grain. In the few instances where the burnt contents of granaries, destroyed by fire, could be studied, the conclusion was that they held several products stored apparat, in separate heaps, sacks, baskets or chests."* (Bakels 2009, 121). In her publication, which emphasised the loess region in the southern Netherlands, Belgium and France, Bakels also state that common sizes of granaries can be 9m^2 or even larger (Bakels 2009, 121). This would mean that the amount of stored harvest could even be larger. In this thesis, however, the amount of 5000 kilos is maintained as a starting point to compare with the amount of yield needed to store at the farmstead.

To determine the amount of sowing seed stored on the farmstead, yield ratios studied by Slicher van Bath (1960) are used as starting point. Slicher van Bath (1960) studied yield ratios of over 700 case-studies between 1600 and 1650, and concluded that yield ratios were on average 1:3,8, which can slightly alter depending which grain type is harvested (Slicher van Bath 1960, 26-27, 361-362, Table II). According to Bieleman, this study is highly relevant in the understanding of yield ratios in historical perspective, because modern ratios of between 1:28 to 1:39 are totally out of proportion when used to historical analysis (Bieleman 1987, 625). Bakels (1989) estimates the amount of sowing seed needed and yield provided for the LBK-period on 1:3 (Bakels 1989, 8). Although exact numbers on the amount of sowing seed needed in relation to the

harvest are not available for the Iron Age, the numbers proposed by Slicher van Bath and Bakels show little difference, although taken over a long period of time. In order to estimate the sowing seed in relation to the harvest, therefore 1:3 is taken as the starting point when critically evaluating the case-studies. According to Bieleman, the exact yield cannot be calculated because it is not known how much sowing seed was needed by farmers to seed their arable fields in, for example, the 17th century (Bieleman 1992, 86). This is also stated by Bakels (1989), who proclaims that the amount of yield calculated for prehistoric periods depends to a large degree on the research method (Bakels 1989, 8). In both case-studies, however, statements are made considering the revenue of harvest. These statements will be taken as a starting point.

The interpretation of stock keeping is expressed through the amount of shedding space available on the farmstead and the availability of zoological material pointing towards the presence of specific animals. The amount of hay provided by haystacks at the farmstead is also related to the ratio of stock keeping. To determine the amount of livestock in relation to the farmstead, the interpretation in the case-studies are taken as starting point. This choice I made because in the case-studies interpretations are made considering the presence of a particular type of stock keeping. The same accounts for determining the amount and type of farmstead-elements causally related to the farming family.

5.3 Raalte-Jonge Raan in an agricultural perspective

5.3.1 The relevant data

The excavations of Raalte-Jonge Raan took place on a sandridge in the landscape. The excavation showed how the archaeological features were densest on top or at the flanks of this sandridge. The archaeologists searched for old arable fields by using a stratigraphic and spatial landscape and pollen analysis combined with archaeological finds. This analysis indicated that a large part of the prehistorical arable fields was incorporated in later fields. Especially on the highest areas of the sandridge, no prehistoric arable fields where found. However, there were still some parts of the original arable fields preserved on the slopes of the sandridges. From these remaining arable field traces, a calculation is made covering the size of the total available arable fields.

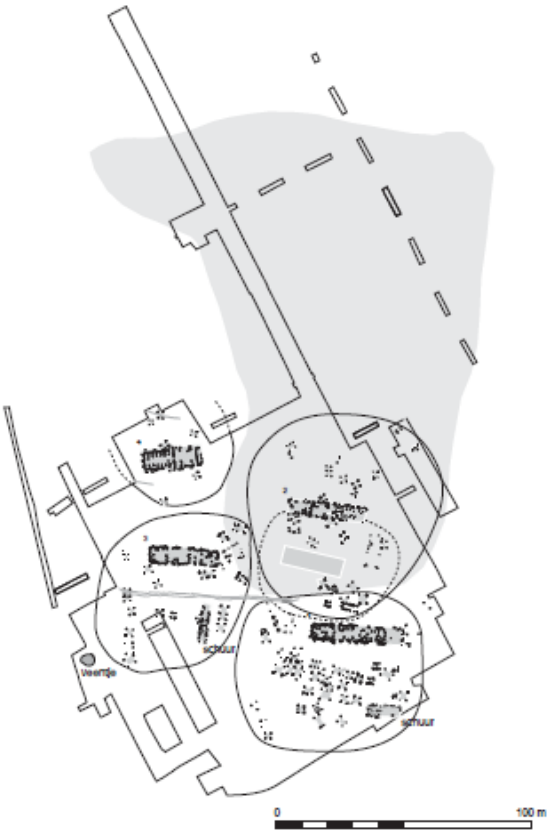

Figure 5.1: Reconstruction of Late Iron Age and Early Roman period farmsteads and arable land at Raalte-Jonge Raan (Groenewoudt *et al.* 1998, 46, fig. 3.24).

The interpretation of the size of the arable fields is based upon the area in which older arable fields were found, approximately 6 meters +NAP. The farmhouses were also found on this altitude. Furthermore, an important argument for the establishment of the arable fields is the fertility of the soil. The authors analysed the soil and determined that the soil present above the altitude of 6m +NAP is very fertile, in contrast to the lower situated soil types.[7] In addition, the determinations of arable ditches further refined the altitude of which the arable field was situated. These arguments led to the idea that the arable fields from the Late Iron Age and Early Roman Period were about 3 hectares wide, covering the area to the north side of the archaeological features (Groenewoudt *et al.* 1998, 81; fig. 5.1).

Groenewoudt *et al.* calculated the amount of harvest needed to provide a single farming family on approximately 900 kg (Groenewoudt *et al.* 1998, 122). This is based upon a 1:10 yield per hectare with references to a verbal statement made by O. Brinkkemper. The authors therefore assume that 90 kilo of sowing seed is needed for 1,5 hectares of land, thus providing a 900 kg yield. For the PRF-model this means that 90 kilos of sowing seed 810 kilos of harvest needed to be stored at the farmstead (Groenewoudt *et al.* 1998, 122). In accordance to the methodology proposed in this chapter, the 1:10 yield per hectare seems to be incorrect. The verbal statement of O. Brinkkemper can also be doubted, because in later work he also uses a ratio of 1:3 (*Cf.* Groenewoudt *et al.* 2008, 250). Therefore, in this interpretation 1:3 is maintained. A proposed amount of 1:3

[7] In Dutch this soil is typed as a *moderpodzol*.

results in 1200 kilos of grain needed to be stored at the farmstead of which 300 kilos is used as sowing seed and 900 kilos for the farming family.

At the excavations of Raalte-Jonge Raan a total of four houses, 3 large shed-like outbuildings and approximately 75 small outbuildings were found (fig. 5.2). In addition, only one pit was found that is possibly related to a storage function. In each farmhouse, a division is interpreted between the living space and the shedding space. Individual stalls were interpreted in only one of the houses. In total 14 stalls were distinguished. This led to the idea that an amount of 14 units of cattle were present in a single farmhouse. The large shed-like outbuildings are not interpreted with a specific function. However, considering that the authors only presume an amount of 14 animals, it is clear that the outbuildings were not interpreted as an animal shedding space. The small outbuildings are classified as two- to six-poled structures. Almost all small outbuildings are interpreted as granaries, for the purpose of storing grain and other raw materials. Only the three-poled structures are related to possible haystacks. The two-poled structures are related to possible racks or predecessors of bowl-shaped huts.[8] (Groenewoudt *et al.* 1998, 35-37).

[8] In Dutch called *hutkommen*.

Figure 5.2: Raalte-Jonge Raan: Archaeological features and structures from the Late Iron Age and Early Roman Period (Groenewoudt *et al.* 1998, 34, fig. 3.15)

5.3.2 The application of the process-related farmstead model

The application of the PRF-model show the processes responsible for the interpretation of the farmstead (fig. 5.3). In this application it is chosen to analyse the excavation at a site level, and to take the average of the amount of outbuildings in relation to the amount of houses interpreted. Furthermore, the house in which stalls are interpreted is taken as a basic principle to interpret livestock. By studying the site on the farmstead level, assumptions must be made regarding the exact characteristics of the farmstead. In chapter two it is already problematized how speculative these assumptions are. Because of this, the productive effiency of farmsteads is used at a site-level is used at a site level, opposed to at the level of individual farmsteads.

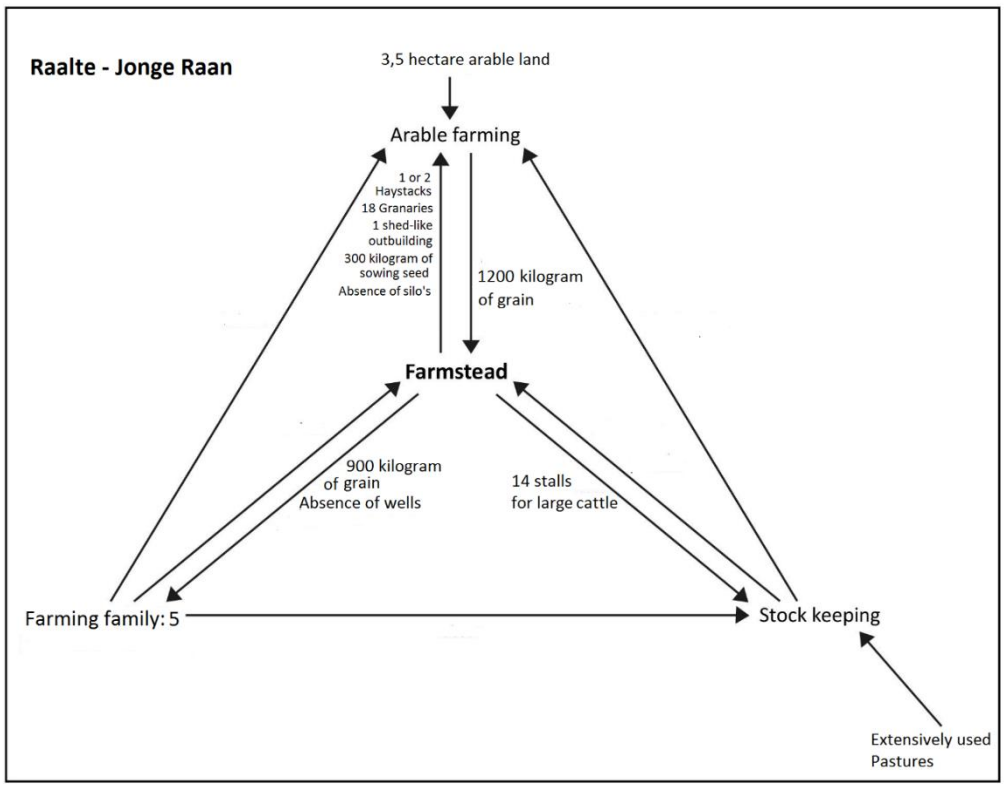

Figure 5.3: The process related farmstead model applied on the site Raalte-Jonge Raan.

To begin with, the data to determine the three variables influencing the farmstead is scarce or to some degree speculative. As a result, only few of the processes put forward in the PRF-model can be distinguished. Nevertheless, the application of the PRF-model at Raalte-Jonge Raan showed some remarkable results. First it must be noticed that the amount of grain calculated in this study concerns threshed grain. The amount of unprocessed grain is not yet calculated. If four farmsteads are present, than 18 of the 73 (rounded to ¼) outbuildings belong to a single farmstead. Based on the methodology, in which a average amount of 5000 kilogram threshed grain is taken as a starting point, it would mean that if the granaries would be contemporaneous, 900 kilogram of grain would be stored on a yearly basis in granaries which have storage room for 90.000 kilogram of grain (!). However, even if every granary would have been built successively, then still 900 kilograms of grain would be stored in a building that can contain 5000 kilogram of grain. As is stated in the methodology, there are different reasons why this discreppancy can occur. This can be because the estimatiom of the storage space is incorrect. Furthermore, also the calculation of the amount of harvest and consumption can be incorrect. However, given the fact that these calculations are all argued to some extent, two possibilities remain. Firstly, there is the palimpsest situation, which is always to a certain extent present on archaeological excavations. Although it can be rightfully

doubted whether the granaries are contemporaneous, the amount of granaries interpreted show us that the granary must have been rebuilt in relatively swift succession, compared to a house. The second reason is that the interpretation of the granary is incorrect. As is outlined in the previous chapter, the interpretation of the granary is uncritically applied at excavations. Both the palimpsest situation and the problems in the interpretation of the granary, point towards the same conclusion. There is a lack of understanding of how these outbuildings were actually used.

Based on the PRF-model, beside a lack of understanding of outbuildings and a palimpest situation, a reason that can explain the presence of the granary can be identified. Additional labourers beside the farming family could have helped, so that a production surplus was achieved at the site. This, however, does not agree to the amount of arable fields available at the site Zutphen - Looërenk.[9] Another reason is proposed by Bakels (1989), who suggest that it is also possible that if the society was not fully self-sufficient, the granaries belonged to the receiving instead of the producing farmsteads (Bakels 1989, 11). This observation, however, questions the habitation dynamics on supra-regional scale and cannot be answered using the PRF-model.

Another causally related process between arable farming and the farmstead is the amount of storage seed provided by the farmstead. According to the authors, 90 kilos of sowing seed would be needed to sow the arable fields. However, there is no mention of silos in the interpretation of the farmstead. Only one pit has been found which could suggest a storage function, but this feature could also be interpreted as a furnace. Therefore it must be concluded that the storage of sowing seed at the site Raalte-Jonge Raan is not expressed through the presence of underground features.

As is mentioned earlier (see paragraph 5.2), no calculation is provided for the amount of cows that can be fed from a three-poled haystack. Furthermore, it is stated that four-five and six-poled haystacks in the 16th to 18th century in Frisia delivered enough food for respectively 20, 28 and 36 cows. When this amount is deductively applied to a three-poled haystack then it is assumed that enough food is provided for 12 cows during winter. Groenewoudt *et al.* (1998) used the byre section of houses to estimate an amount of 14 pieces of cattle, which means that each farmhouse should on average have a need for slightly more storage space then one haystack. Considering that four

[9] Although it must be noted that the arable fields interpreted at Raalte – Jonge Raan where situated in the vicinity of the settlement. It cannot be excluded that also arable fields where present that where situated on a larger distance of the settlement.

farmhouses are found, this means that at least five three-poled haystacks must be available to provide this amount of cows. At the excavations of Raalte-Jonge Raan all the three-poled structures are determined as haystacks by Groenewoudt *et al.* (1998, 39). Based on the ground plan of the site a total of seven haystacks can be distinguished. On average this means that each house plan should contain 1 or 2 haystacks. According to the calculation made by Huijbers (2007), this is a plausible amount to feed 14 cows. A critical application of the PRF-model shows that this is a correlation, rather then a causal relation. Considering the fact that there is no supportive argumentation for the interpretation of a three-polar structure as a haystack, other structures could also have been used to store hay.

The last possible farmstead related structure is the shed. Only three shed-like structures are interpreted at the site Raalte-Jonge Raan, but due to the absence of stalls they are not interpreted to shed cattle. The lack of additional evidence makes it hard to direct the sheds to a specific function. Hypothetically their purpose could still be the shedding of livestock, only without stalls indicators. In addition, this could also be smaller livestock, such as sheep, goats or pigs, that are normally not associated with the farmhouse in archaeological research. Furthermore it also cannot be excluded that they are related to arable farming processes, such as the threshing and storing of grains. The PRF-model can be used to reinterpret the interpretation of shed. However, therefore more variables and causal processes needs to be presented with supportive evidence.

5.4 Zutphen - Looërenk in an agricultural perspective

5.4.1 The relevant data

The excavations of Zutphen - Looërenk are based on the situation of archaeological features similar to the excavation of Raalte-Jonge Raan. Also at Zutphen - Looërenk the archaeological features were densest at the top and flanks of the sandridge. The excavation of Zutphen - Looërenk is remarkable for its extensive study on the food supply and land use in the Bronze age and Iron Age. Therefore, this excavation qualifies for the application of the process related farmstead model.

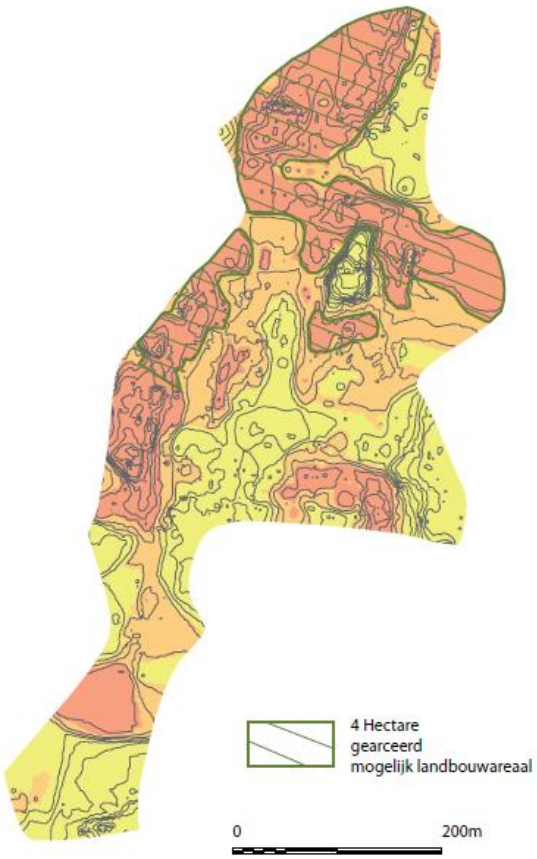

Figure 5.4: Map with relief on which the amount of hectares (4) needed for a single household to consume is indicated (Bouwmeester *et al.* 2008, 253, fig. 4.116).

At Zutphen - Looërenk the authors estimated the amount of available arable land based on the size of the area available just above the groundwater level, on which a specific fertile soil type was present (fig 5.4). The argumentation to interpret an amount of 4 hectares is provided by Vanderhoeven (1991), in a publication of a small early iron age settlement in Heesmortel (Brabant). In his publication Vanderhoeven (1991) estimated the amount of people living in a farmhouse interpreted with a living section and a byre section at six individuals. Furthermore, he estimated the yearly grain consumption on 200 kilos of grain per individual (Vanderhoeven 1991, 146. According to Bouwmeester *et al.* (2008), therefore 1200 kilos of grain are needed to be harvested to provide a yearly consumption for the farming family. In addition, sowing seed needed to be reserved. According to Bouwmeester *et al.* (2008), the amount of sowing seed needed in addition to the yield is 1:3. To get a harvest of 1200 kg, therefore 400 kg of sowing seed is needed. Therefore, in total 1600 kilos of grain must be produced on the lands (Bouwmeester *et al.* 2008, 250-251). According to Bouwmeester *et al.* (2008), on each hectare of land 200 kilos of seed can be sowed. This results in ca. 533 kilo of harvest for

each hectare, thus 3 hectares of land are needed to provide a family consisting of 6 persons. At Zutphen - Looërenk, the authors assume an amount of nine individuals instead of six, which will be explained later in this paragraph, and conclude therefore that at Zutphen - Looërenk the total amount of arable fields needed was 4,5 hectares of arable fields (Bouwmeester *et al.* 2008, 251).

In addition to the calculations made by Vanderhoeven (1991), the authors also use studies performed by Brinkkemper (1991). Brinkkemper suggests that 31% to 44% of the total amount of food needed for the farming family is provided by wild and domestic animals. The remaining part is provided by the revenue from the arable fields. This means 850 to 1030 kilos of grain are needed each year. Furthermore, according to Brinkkemper (1991) there are two ways to sow the arable fields. The first is to sow in rows, in this case 60 kg of sowing seed is enough to sow a hectare of arable fields. In addition, the revenue of such a method is 1:7 instead 1:3. The amount of arable fields needed for nine individuals would be 3,6 to 4,35 hectares with such a method. When the seed is randomly distributed, 200 kilos of sowing seed is needed for each hectare. The yield ratio would be 1:3,5, which means that 3,25 hectares of land are needed to provide the minimum amount of 850 kilos of grain required for nine persons (Brinkkemper 1991, 147; Bouwmeester *et al.* 2008, 251). Bouwmeester *et al.* (2008) assume that the sowing in rows would be preferable, although it would require slightly more fertile arable fields to do so. In addition, the authors argue that the presence of the plough as technological improvement proves that the Iron Age inhabitants were capable of sowing in rows (Bouwmeester *et al.* 2008, 251). The authors further remark that in the calculations further technological improvements, such as the availability of a course-rotation system is not incorporated in their study (Bouwmeester *et al.* 2008, 251-252).

According to Bouwmeester *et al.* (2008), there was limited availability of arable land. No more than one household could use the sandridge of Zutphen for cultivation purposes. However, a pollen sample collected at the site showed the availability of heathlands close-by. This means that these heathlands could be used for extensive stock breeding for especially smaller livestock, such as sheep (Bouwmeester *et al.* 2008, 255).

At the excavations at Zutphen - Looërenk, a total of 25 farmhouses dated to the Iron Age have been found. In none of these houses, stalls were interpreted. The authors are aware that this could have related to post-depositional processes. Nevertheless, it is

remarkable that in none of the farmhouses stalls were interpreted. This observation resulted in the idea that the farmhouses of Looërenk did not have byre sections. According to Bouwmeester *et al.* (2008), this means an increase in living space, from which the authors argue that each farmhouse was inhabited by nine persons, instead of six (Bouwmeester *et al.* 2008, 250). In addition to farmhouses outbuildings have been interpreted at the site of Zutphen-Looërenk. In total, 113 outbuildings were interpreted (Bouwmeester *et al.* 2002, 75; Bouwmeester *et al.* 2008, 185). These are only distinguished by their ground plan, there is no additional information concerning their dating, therefore it is not sure whether all these outbuildings date to the Iron Age. Almost all the outbuildings were interpreted as granaries. Only two outbuildings have not been assigned to a specific granary typology, but it is assumed by the authors that they have a storage function of some kind (Bouwmeester *et al.* 2008 108).

5.4.2 The application of the process-related farmstead model

At Zutphen – Looërenk, the PRF-model is applied in the same fashion as is done with the analysis of Raalte – Jonge Raan (fig. 5.5). According to Bouwmeester *et al.* (2008), there was hardly any room for arable farming at Zutphen - Looërenk. In their calculation the authors estimated that only one household of nine persons could perform arable farming on the sandridge of Zutphen - Looërenk. This is also an influential argument to assume that all the farmsteads were used successively through time (see also paragraph 2.3.2).

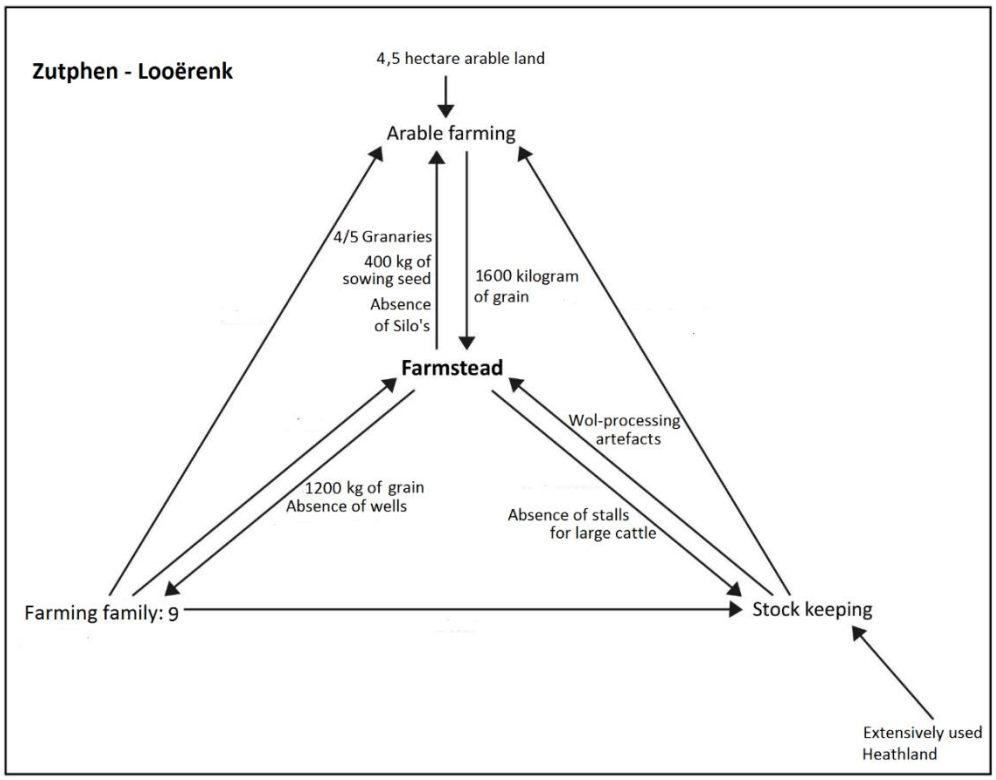

Figure 5.5: The process related farmstead model applied on the site Zutphen - Looërenk.

At Zutphen – Looërenk a total of 25 Iron Age houses have been interpreted. Furthermore, 113 outbuildings were interpreted, dating from to Bronze-and Iron Age. Because it cannot be determined whether they belong to a specific farmhouse, I assume an average amount of 4 to 5 outbuildings per farmstead. Because none of the outbuildings could, due to the absence of dating evidence, be dated exactly to the Bronze Age or Iron Age, the number of outbuildings per farmhouse is probably even lower. Every outbuilding at Zutphen-Looërenk was interpreted as a granary. This means that every outbuilding was used to store grain or other raw materials. In this situation 1600 kg of yearly grain consumption is taken as a starting point. That means that in each outbuilding at least 400 kg of grain must have been stored. At the excavations of Zutphen - Looërenk no indications for Iron Age silos have been found. This means that storage space would have been provided by aboveground structures. As is the case at Raalte – Jonge Raan, the estimation of the storage space at the site Zutphen – Looërenk is also highly questionable.

The original exavators of Zutphen-Looërenk propose that sheep breeding could have occurred at the site (Bouwmeester *et al.* 2008, 255). This is based upon the absence of stalls in the interpreted byre section of house-plans. In addition, there is evidence of

heathlands in the region and multiple Spindle whorls and loom weights have been interpreted at the site (Bouwmeester *et al.* 2008, 231-236). According to the PRF-model, stock breeding depends on available pastures, labour, shedding space and animal food available. Furthermore, it can be recognised by the processing of secondary products. Stalls for smaller livestock are unknown in the Iron Age, so the presence of sheep breeding should be argued with other sources. The available heathlands and the amount of sheep breeding related artefacts therefore also indicate sheep breeding.

A possible emphasis on sheep breeding at Zutphen – Looërenk could also be expressed by the les favourable circumstances to conduct arable farming. If sheep breeding was indeed the agricultural purpose of the farmsteads at Zutphen – Looërenk, this would mean that the interpretation of the structures also cohere with this purpose. Compared with the relatively large amount of outbuildings found at Raalte – Jonge Raan, this could hypothetically mean that farmsteads with an emphasis on sheep breeding contained less outbuildings than farmsteads with another agricultural purpose, such as arable farming.

6 Discussion

6.1 Introduction

In current archaeological research the concept “farmstead” is inadequately applied. Studies emphasising the presence of the farmstead in excavations, primarily Schinkel (1998) and Arnoldussen (2009), show that the farmstead cannot be used as a proper research method for archaeological interpretations. The reason for this problem is that the farmstead is viewed as a static entity, that is defined by a house and a set of surrounding archaeological features, which looks more or less similar everywhere. The use of analogical reasoning in this thesis to gain understanding of the concept farmstead, resulted in a concept which defines the farmstead as a dynamic construct whose presence depends on its agricultural purpose. In order to understand the agricultural purpose, I put forward a model that is capable of understanding the processes which influence the presence of the farmstead (fig. 6.1). The result of this approach is that presence of the farmstead cannot be explained by archaeological features. Instead the understanding and determination of processes influencing the presence of a farmstead, leads to more credible argumentation that can be used to subsequently interpret archaeological features. To test this process related farmstead model, two case-studies, the sites of Raalte – Jonge Raan and Zutphen – Looërenk, are chosen to put the model in practice.

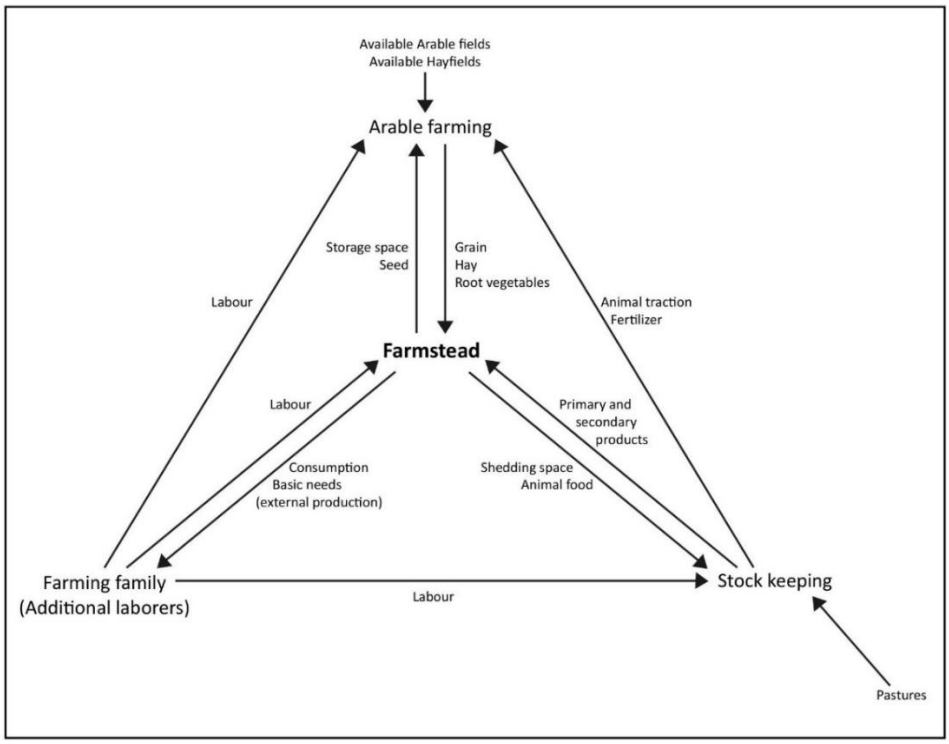

Figure 6.1 The agrarian processes causally related to the farmstead.

6.2 The application of the Process Related Farmstead model on the sites Raalte-Jonge Raan and Zutphen-Looërenk

In the studies of Raalte – Jonge Raan and Zutphen – Looërenk the interpretation made by the excavators are taken as a starting point. Their interpretation of the farmstead is characterized by outbuildings which are almost all interpreted as granaries with a different spatial lay-out. However, as is outlined in this study, the interpretation of these features, especially outbuildings, which are considered as key elements in the interpretation of the farmstead, are highly speculative. Although the method of excavating features has already been used for over a hundred years used in archaeological research in the Netherlands, it seems that archaeologists are only in their infancy in understanding the practical function of these archaeological features. Based on the PRF-model, the three variables influencing the archaeological remains of a farmstead are the farming family, the extent to which arable farming is conducted and the size and type of livestock that is herded. The determination of these variables contributes to a more credible argumentation to interpret the archaeological features belonging to a farmstead.

The PRF-model is applied on site level, in which the farmstead is treated as the average sum of all the relevant archaeological features divided in the total amount of houses present. The data available to apply the PRF-model on the sites Raalte – Jonge Raan and Zutphen – Looërenk was too poor to apply the PRF-model on farmstead level at the treated sites. In addition, farmsteads within the site showed already difference in the occurrence of archaeological features, which means that zooming in to the farmstead level requires to make the same assumptions as are invalidated in chapter two. Furthermore, the establishment of some of the variables, such as the amount of arable land available or the amount of the farming family habiting a single house, is also determined on site level by the authors.

At the treated case-studies the argumentation to determine the amount of people living inside the house, as well as the amount of consumption needed by a single farming family is not thoroughly established. Nevertheless, the starting points are quite the same. At Zutphen – Looërenk it was proposed that the amount of people living inside the house would be 9 persons instead of 6 persons. As a result, their calculation in the amount of grain consumption needed and the amount of arable fields needed is also slightly bigger than at the site of Raalte – Jonge Raan (fig. 6.2 and fig. 6.3). The scenic attributes in the environment of the two case-studies are both comparable, and it can

be assumed that in the neighbourhood of the farmsteads extensively used pastures where present, where cattle could be herded. However, at the site of Zutphen – Looërenk also additionally heathland could be established.

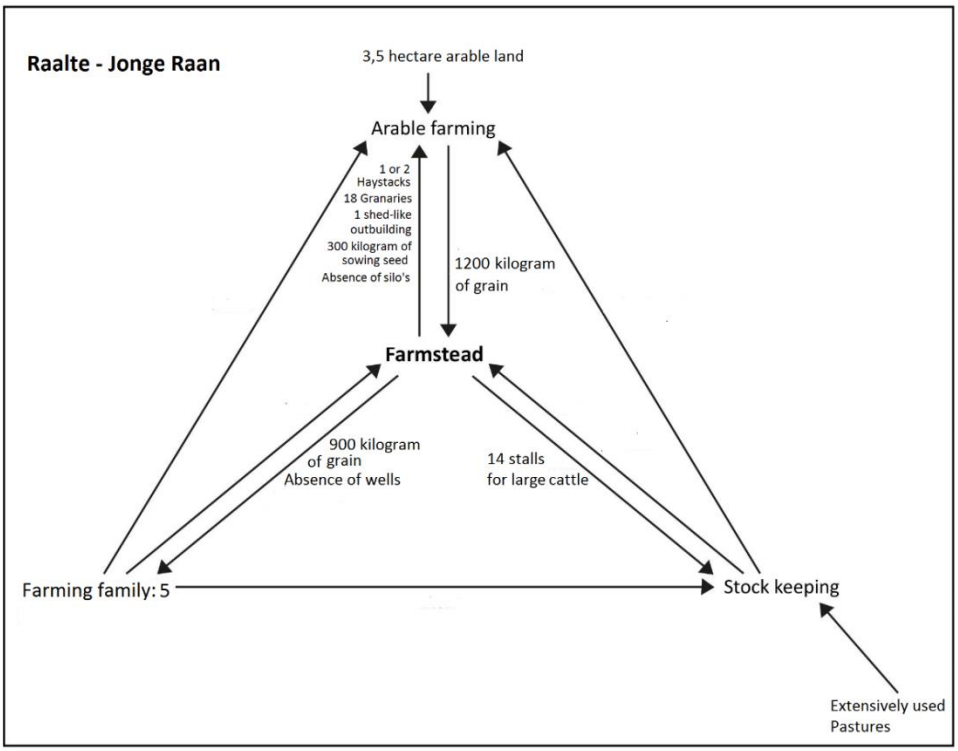

Figure 6.2: The process related farmstead model applied on the site Raalte-Jonge Raan.

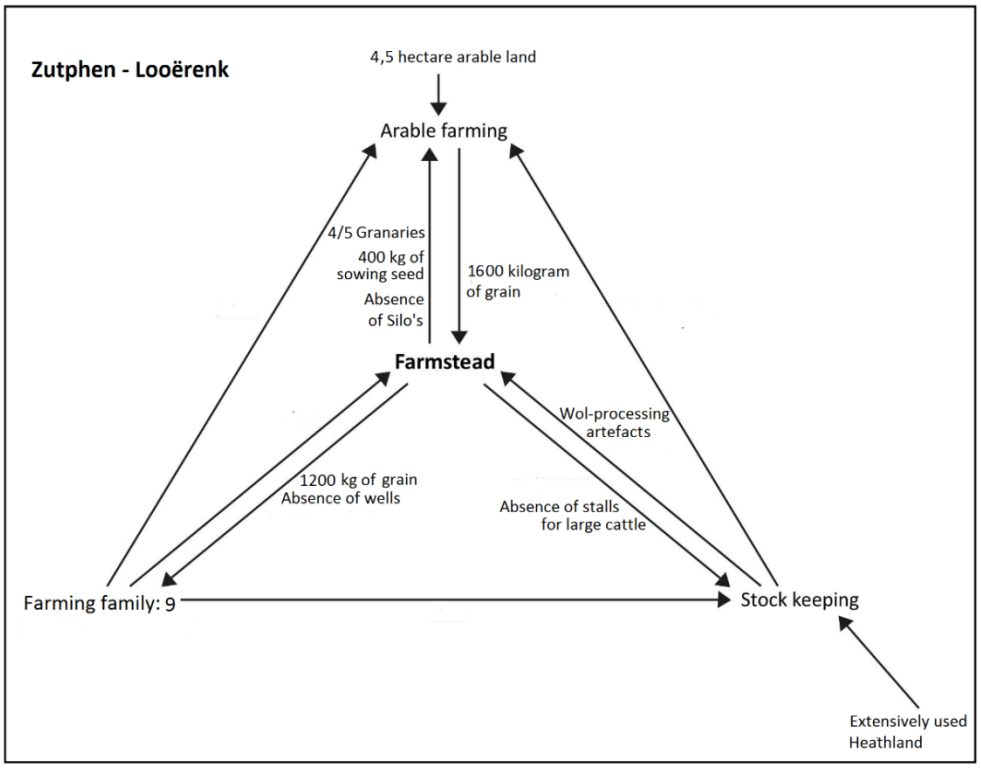

Figure 6.3: The process related farmstead model applied on the site Zutphen - Looërenk

The presence of cattle has been established by the presence of stalls, in the byre section of houses. Only at Raalte – Jonge Raan stalls have been established. In total a number of 14 stalls have been proposed by Groenewoudt *et al.*, which therefore has been taking as a starting point to apply the PRF-model on. At the site of Zutphen - Looërenk, remarkably, in a total sum of 25 houses, not a single byre section with stalls could be established. The absence of stalls, from an archaeological perspective, points towards an absence of shedding space for large cattle. At the site Raalte – Jonge Raan, in a single pit some bone evidence of the pig has been found. Although at the site carefully is looked at other bone material, or fragments of better conserving teeth, no additional zoological material has been found (Groenewoudt *et al.* 1998, 45). This means that the presence of cattle cannot be further argued at Raalte – Jonge Raan. The site Zutphen – Looërenk show some remarkably different results. There a considerable amount of spindle whorls and loom weights have been found. Although one pit full of loom weights was dated to the Middle Bronze Age, the spindle whorls are dated to the Iron Age. According to the authors, both cannot be mutually exclusive which means that both in the Bronze Age as in the Iron Age evidence for the processing of sheep products have been found. This in relation to the amount of heathland nearby and the absence of stalls for large cattle, provide argumentation to propose that at the farmsteads at Zutphen - Looërenk the emphasis was at least to a certain extent on sheep breeding.

The most remarkable difference between the sites Raalte – Jonge Raan and Zutphen - Looërenk is the amount of outbuildings determined. In both sites the vast majority of outbuildings are interpreted as granaries. At Raalte – Jonge Raan in total 73 outbuildings have been interpreted and at Zutphen – Looërenk 113 outbuildings have been interpreted. In addition, at Raalte - Jonge Raan three larger shed-like structures and seven haystacks has been interpreted. A total of 4 houses are interpreted at Raalte – Jonge Raan and a total of 25 houses are interpreted at Zutphen – Looërenk. When taking the average amount of outbuildings in relation to a single house-plan, the conclusion is that on average every house at Raalte – Jonge Raan contains approximately 18 outbuildings, 1 to 2 haystacks and a single shed-like outbuildings, while at Zutphen - Looërenk each single house-plan contains on average 4 to 5 granaries.

The similarities between the case-studies are reflected in the absence of certain elements that can according to the PRF-model be present on Iron Age sites. These are wells, which in both instances are situated in the lower situated areas and not at the sandridges themselves. Furthermore, both sites show that there is no direct evidence

for the underground storage of sowing seed. In both instances storage structures for sowing seed would be present above-ground in granaries, sheds or the farmhouse itself.

The analysis of the case-studies showed a discrepancy in the amount of storage space provided by the interpretation of granary and the amount of harvest calculated to be used by the farming family. This discrepancy can be that the amount of harvest needed for the farming family is incorrect, the estimation of storage space of the granary is incorrect, or the interpretation of the granary is incorrect. The analysis of the archaeological features showed that although the amount of harvest calculated to be used by the farming family could slightly differ, there are no arguments available that prove that the harvest needed for the farming family would in reality be much larger (*Cf.* Brinkkemper 1991, 147). The estimation of the storage space of the granary could in reality be a lot less than 5000 kilos (*Cf.* Bakels 1989, 8-10). However, even if the amount of storage space of the granary would be halved, then the 2500 kilo of storage space provided would still be more than sufficient to cover the amount of harvest needed at Raalte – Jonge Raan and Zutphen - Looërenk in a single granary. The argument that the interpretation granary in incorrect, however, seems more logical. Thus only one argument remains, based on the PRF-model it can be concluded that the interpretation of granary in excavations is uncritically applied, and its concept needs to be reconsidered.

In summary, I argue that the large differences between sites Raalte – Jonge Raan and Zutphen - Looërenk can be explained by a different agricultural purpose, in which agricultural processes are causally related to the shape and presence of the farmstead. It can be concluded that the application of the PRF-model at the excavations of Raalte – Jonge Raan and Zutphen - Looërenk shows that, to begin with, there can be spoken of different farmsteads which share similarities as well as large differences. Secondly, the farmsteads at Zutphen - Looërenk can be more specifically assigned to the function of sheep breeding. Thirdly, this observation is associated with a relative small amount of outbuildings. Fourthly, the interpretation of granary as a storage structure that stored the local harvest is speculative and to large extent incorrect. Fifthly, by interpreting all outbuildings as granary, the understanding of the processes influencing habitation characteristics are clearly not understood.

6.3 Shortcomings and recommendations in farmstead research

In this thesis is explained that in current archaeological research the concept farmstead is difficult to use as a proper research method, due to its ill-definition. Schinkel

acknowledged this problem when trying to distinguish farmsteads in the extensive excavations of Oss-Ussen. In his dissertation, he was not able to interpret the farmstead and therefore he analysed the site on site level (Schinkel 1998, 59). Arnoldussen deployed a more extensive spatial method (VASO) to interpret the farmstead in his dissertation. However, also he was not able to trace typical farmstead elements by determining the shape of the farmstead (Arnoldussen 2008, 429).

In this thesis I also encountered the problems in determining the individual farmstead within a site. However, with the application of the PRF-model it is possible to understand why archaeologists are not able to trace typical farmstead elements. In archaeological research the farmstead is typically viewed as a static entity which can be studied in an almost typological fashion. The PRF-model, however, showed that the farmstead is a dynamic construct that is the result of various agricultural processes causally related to the presence, and thus shape, of the farmstead. The understanding of the processes influencing the farmstead leads to argumentation which can be used to subsequently interpret the features belonging to the farmstead.

In the analysis of Raalte – Jonge Raan and Zutphen – Looërenk only few of the processes needed in the PRF-model could be established. However, even with this deficient data I was able to distinguish farmstead processes at the site, which were used to verify the interpretation of the archaeological features at the site. This analysis showed that with the help of the PRF-model it is now possible to provide a more credible argumentation when interpreting archaeological features. The added value of the PRF-model in relation to the history of farmstead research thus is that it is now possible to design new research questions and subsequent methodologies, that are able to analyse the archaeological features in a site on farmstead level, without using out-dated and uncritically applied interpretation techniques on archaeological features.

In current archaeological research the presence of archaeological features is the main argumentation to interpret the farmstead. The analysis of Raalte – Jonge Raan and Zutphen – Looërenk showed that in order to gain better understanding of the farmstead, it is the other way around. Instead of interpreting the farmstead based on archaeological features, the PRF-model can be used as an interpretative farmstead model to interpret archaeological features. In further research, it is therefore recommended that archaeologists should not only focus on the archaeological features, and compare them with other archaeological features. Instead archaeologists should be

aware on the processes influencing the presence to these features and try to establish these processes by using models. As a concluding remark, I emphasize that the application of the agricultural context of the farmstead, by using the PRF-model, is only one way to view the farmstead. Archaeology is the projection of our interpretation onto the past. The establishment of models dealing with different aspects of the farmstead would also provide in new methods capable of gaining a more credible understanding of the past.

7 Conclusion

In introduction the following research question was stated: **What is the Iron Age farmstead?**

From an archaeological point of view, the Iron Age farmstead is defined as a farmhouse and surrounded outbuildings. This definition, however, does not provide understanding of how a farmstead was used by prehistoric farmers. Therefore, in this study a model capable of gaining understanding of the processes on an Iron Age farmstead is proposed. For this purpose, in this study inspiration is used from premodern farmsteads provided by data from agrarian history. This argumentation provided in the following definition: The Iron Age farmstead is a dynamic construct whose shape depends on its agricultural purposes.

In order to understand the agricultural purpose of the Iron Age farm, I put forward the process related farmstead model, which is able to interpret the archaeological features in an agricultural perspective, therefore providing significance to the archaeological interpretation. With this thesis, I hoped to have shown that the way the farmstead is presented to us as part of the archaeological record depends on many things, but foremost on our interpretation technique. For this reason, the search for a uniform static farmstead as guiding principle applicable to all farmsteads is futile. Rather, the concept “farmstead” should be understood as a research question. Through the application of the process related farmstead model the concept can be rid of the assumptions surrounding its use, and we can hope to begin to understand the Iron Age farmstead.

Abstract

This thesis treats the Iron Age farmstead in Dutch archaeological research. The farmstead is commonly applied as interpretation method in archaeological research, however, the information that is gained from applying the farmstead to interpret archaeological features is poor. The reason for this is that the farmstead as a concept lacks definition. The farmstead is in archaeological research defined as a house surrounded by outbuildings, and excavated in an almost typological fashion, as a static entity. Studies that have tried to use the farmstead as a research method, however, did not succeed, because the farmstead lacks standard typological characteristics.

In order to understand the concept of the farmstead, a model is proposed in this study. This model, the process related farmstead model (PRF-model), is designed to gain insight in the processes influencing the presence of the farmstead. The PRF-model is based upon analogical reasoning, using data from premodern farmsteads. The basic principle of this model is that the farmstead is not a static entity, but a dynamic place, which presence depends on its agricultural purpose. The purpose of applying this model is to provide additional argumentation which can be used to interpret archaeological features. Such an approach is needed because the interpretation of farmstead related features is almost uncritically applied in current archaeological research.

The PRF-model is tested upon two case-studies. These are the sites Raalte – Jonge Raan and Zutphen – Looërenk. This analysis showed that the farmstead in both sites greatly differ, because their agricultural purpose differs. Especially a difference in the amount and interpretation of outbuildings was shown by the use of the PRF-model. By applying the PRF-model I have shown that the interpretation of the farmstead in archaeological research largely depends on our interpretation technique. Therefore, I emphasize that there is a need for models to be applied on the archaeological record, so that a more credible understanding of the past can be obtained and new research methods can be proposed. This is necessary in order to get rid of the out-dated and uncritically applied interpretation methods of the archaeological features that make up the farmstead.

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