The phenomenon of primary and secondary animals within Iron Age deposits in Denmark

Pernille Bangsgaard[1,3] and Pernille Pantmann[2]

[1] Globe Institute, University of Copenhagen, Øster Voldgade 5-7, 1350 Copenhagen K, Denmark.
[2] Museum Nordsjælland, Frederiksgade 9, 3400 Hillerød, Denmark.
[3] Corresponding author (pernille.bangsgaard@sund.ku.dk) ORCID: 0000-0002-8517-6165

ABSTRACT
Animals are an integral part of deposition practices during the Danish Iron Age, and they probably represent the most common form of deposit within southern Scandinavia. Recently, A. B. Gotfredsen published a volume on animals within Danish Iron Age grave contexts, but similar comprehensive studies of animals from other contexts have not been attempted. Thus, classic sites such as Valmose, Bukkerup Langmose, and Sorte Muld still stand as the type sites for Danish Iron Age animal deposits. This article will argue that there are good reasons for exploring deposits in more detail and for investigating the considerable variation in the treatment and quantities of sacrificial animal deposits. Furthermore, the current study has revealed a deposition pattern where a primary animal is often in the company of one or more secondary animals, the latter typically represented by a few bones. Salpetermosen Syd (MNS50010), south of Hillerød in North Zealand, Denmark is the main case study, but comparisons are made to several sites across Denmark where a similar deposition pattern has been observed.

ARTICLE HISTORY
Received
27 April 2021;
Accepted
11 November 2021

KEYWORDS
Animal deposits; Iron Age; Sacrificial complexity; Human-animal relationship; The primary-secondary phenomenon

Introduction

Animal deposits are frequently mentioned in Danish and Scandinavian archaeological research (e.g., Hansen 2006, 134; Stolt 2001, 35; Vretemark 2013, 57), but they seldom feature in in-depth discussions. Furthermore, the interest rarely extends to details such as the specific combination of animal species or animal parts. Outside of Denmark, studies of such deposits are more common, although with varying focus (e.g. Behm Blancke 2003; Cederholm et al. 2014; McCormick 2009; Morris 2011; Pluskowski 2012; Reichstein 1991; Thilderkvist 2013; van den Helm and van Dijk 2017, Vretemark 2013). Lately, the animal turn has been introduced, which is preoccupied with the human-animal relationship of the past, introducing the implicit understanding that this relationship differed from modern western perceptions (e.g. Boyd 2017; Hill 2013; Jennbert 2014; Salzani 2017). We want to reinvestigate the role of animals in depositional practices in order to improve our understanding of the human-animal relationship and acknowledging the significance of animals during the Iron Age. Such a study would also add to our general understanding of the complexity of these practices.

Deposited animals

This article seeks to present the phenomenon of primary and secondary animals within sacrificial deposits. The term sacrificial deposit is used here to describe intentionally placed ensembles of objects, including faunal remains, which are orchestrated in a manner where they clearly stand out from the background of the mundane scatter of refuse found across most archaeological sites.

The phenomenon of primary and secondary animals has been identified across contexts and regions with no fixed rules as to which animals were primary and which animals were secondary. The terms 'primary' and' secondary' are not related to a preconceived idea of differences in status or value of certain animals. The terms refer to an observation of the relative relationship between the animals within a single find or context and the

'secondary animal' should therefore not be understood as subordinate to the 'primary animal'. The terms 'primary' and 'secondary' are merely used to underline that there is an element of varied representation in deposits that we must be aware of. Thus, they are used here as analytical tools with the purpose of investigating the faunal signatures within each deposit and between deposits, sites, and regions. We have not adopted Gyldion Andersen's term "packages" used to describe the Bukkerup find, as we believe the use of this term served two purposes: firstly, to define a typology of the deposits, and secondly, to underline the uniformity of the deposits (Gyldion Andersen 1993, 71-75; Gyldion 2009, 68-69). The small variations in the depositional pattern risk being overlooked with such typologies as they can create a false uniformity. The term package is therefore not used in this study as it has been important to pay attention to even the smallest variations.

Based on the deposits of Salpetermosen Syd, it appears that in each deposit one animal was represented by more bones, hence the label 'the primary animal'. The ascription of dominance is thus based on the number and volume of bones and body parts represented. For instance, a skull is more substantial than an ulna, and a phalanx is less substantial than a pelvis. Weight is not used to define the primary animal, as that would always favour larger species. Cattle and horses would thus always dominate over sheep, pigs, and dogs. For most deposits, it is relatively straightforward to define which animal is the primary one. However, in a few cases, it is more complicated with a near equal representation.

No rules exist as to which body parts or combinations of them were preferred. Furthermore, the deposits demonstrated a lack of any variation in importance between specific species of animals. This is in opposition to the current consensus granting a superior status to horses (*Equus caballus*) and dogs (*Canis familiaris*) compared to other species, such as cattle (*Bos taurus*), sheep (*Ovis aries*), goat (*Capra hircus*), or pig (*Sus domesticus*) (Backe, Edgren and Herschend 1993, 331; Carlie 2004, 124; Ferdinand and Ferdinand 1961, 81; Jennbert 2011, 67; 2014; Johannesen 2016, 124; Klindt Jensen 1957, 83-88; 1967, 144-146; Kveiborg 2019, 120; Monikander 2010, 62; Møhl 1957, 294; Nilsson 2009; Stolt 2001:35). Furthermore, any specific treatment or pattern of presence such as the combination of head-and-hooves (Klindt Jensen 1957, 83-88; 1967, 145-146; Carlie 2004, 104) was not reserved for one species.

The deposited animals of the Salpetermosen Syd site will be used to exemplify the phenomenon, followed by a comparison with other sites where similar patterns have been observed. The perspectives of these results will be discussed followed by a recommendation for more attention to be given to animal deposits and to reinvestigate previously excavated sites.

Salpetermosen Syd

The excavations of Salpetermosen Syd were conducted from 2013-2018. The site is situated south of Hillerød, in an area characterized by a low-lying hilly moraine landscape with a dead ice relief. Today, the area presents itself as a relatively level agricultural landscape, but it used to be characterized by smaller wetlands all connected to a large former inland lake, which became boggier during the Neolithic. The area was inhabited during the Neolithic and most of the Iron Age; however, this article will focus on the Iron Age finds. The wetlands used during the Iron Age included kettle holes, different sized fens, and seeps related to multiple springs. Judging by the many finds and structures discovered within the wetlands, they appear to have been a major reason for settling in the area (Figure 1). Furthermore, the number of Iron Age settlements, particularly from the late Roman Iron Age (approx. AD 160-400), suggests that this landscape offered rich pasturelands that encouraged occupation in the region. Thus, it has been suggested that the subsistence economy was based primarily on livestock and herding resulting in a relatively wealthy society (Pantmann 2020a).

The overall impression is that wetlands were a resource offering water, peat, and possibly grass and hay. Daily use of the area is reflected in the different measures taken to ease access to the wetlands. Pavements, steppingstones, gravel layers, and tree trunk bridges are all examples of how the wet conditions were managed. Several of the wetlands closest to the dwellings were also used for dumping

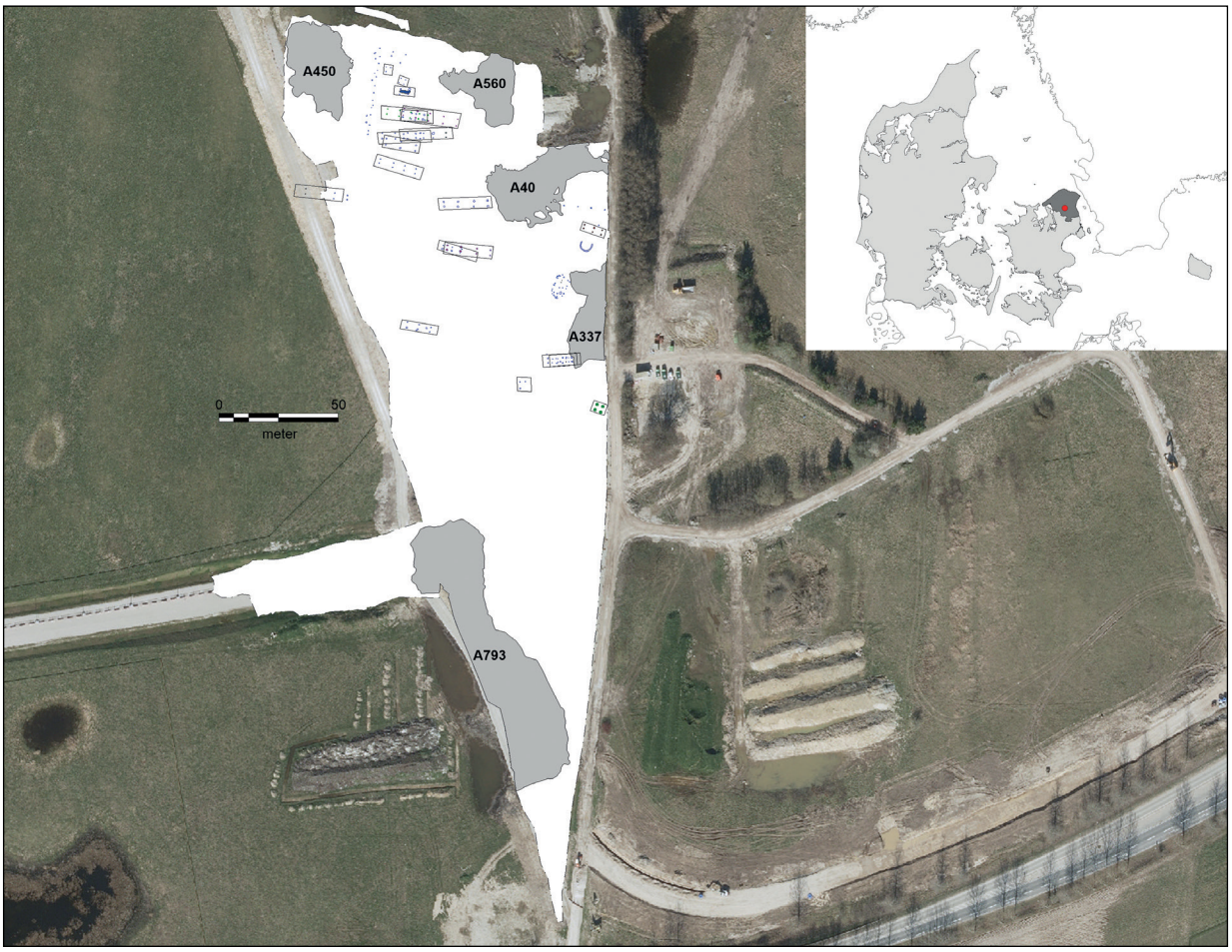

Figure 1. Map of the Salpetermosen Syd Area with the mentioned wetlands. The map contains data from "Styrelsen for Dataforsyning og Effektivisering, Danmark 1:200.000, vektor".

household waste including faunal remains. Additionally, there are numerous examples of wetlands being used for the placement of sacrificial animal deposits, wooden artefacts, pottery, and whitish stones. Apart from the visual impact of the stones against the dark soil and water, their mere presence implies clear human involvement and intention, as these stones do not occur naturally in peaty layers (Pantmann 2020b).

The largest group of finds within the household waste was the faunal remains, which were generally well preserved. Recent modern farming has drained the wetlands, but the preservation improved for remains from a lower depth. So far, the settled area is mostly dated to the late Roman Iron Age, whereas the deposits mainly concentrated in wetland A793 (figure 1) date from the pre-Roman Iron Age to the transition between the early and late Germanic Iron Age, from 381 BC-AD 537. As this article has its focus on the closed finds of animal deposits, the faunal remains of the household waste will not be further discussed, but it is noteworthy that based on NISP (8.545 in total), cattle (2.944) dominate followed by sheep/goat (1.711), and pig (1.538). This pattern repeats itself in the sacrificial deposits from A793 based on MNI (Minimum Number of Individuals). Although dog (26) and horse (124) are present in both contexts, they clearly play a minor role. The combination of animals regarding both species and age distribution resembles contemporary societies, where animal husbandry was the main livelihood (Bangsgaard 2018; van Dijk 2016).

Sacrificial deposits were found in contexts that also included household waste (A337, A450, and A560). Nonetheless, the deposits stood out from their surroundings. Their orchestration, their cleansed expression without charcoal and other items of household waste, and the combination of animals and animal parts resembling deposits elsewhere, all led to their identification as sacrificial animal deposits (Pantmann 2020a, 175). Further-

more, the large fragments of bone or, in many instances, complete bones also set the deposits apart from the typical fragments discarded as household waste. Although all sacrificial deposits were placed in a wetland context, the specific context of some of these (particularly in A337, A450, and A560), identifies them as a part of the settlement. As such, they are not referred to as either specific wetland deposits or settlement deposits.

Zooarchaeological method and SPIN

The faunal collection from Salpetermosen Syd was studied at the Natural History Museum of Denmark, University of Copenhagen, using their extensive comparative collections. Information registered for each bone included context, species, bone, fragment, and side, along with a series of additional factors, when these were available or relevant, such as age-at-time-of-death, size (including measurements), sex, burning, cut-marks and pathology. Generally, the results of the analysis were summarised in NISP (Number of Identified SPecimens), but for all deposits MNE (Minimal Number of Elements) and MNI (Minimum Number of Individuals) were also calculated for each deposit (the results for Salpetermosen are summarised in tables 1A and 1B). The calculation of MNI was based on the comparison of skeletal elements from each species, taking side, age, sex, and size of each element into consideration (Chaplin 1971, 69-75). This process was carried out by direct comparison of the elements and was possible due to the limited number of bones from each deposit. The calculation of MNE and MNI was an important step in order to evaluate which species represented the primary and secondary animal. A further step in the analysis included looking at variation in body-parts and age categories as well as the treatment of the remains, which could be addressed through evidence of butchering, burning and placement.

A few fragments (63) from the large Salpetermosen Syd faunal selection, apart from being verified by morphological criteria, were also selected for further analysis as part of the development of a new protein-based analysis and species identification method called Species by Proteome Investigation (SPIN)(Rüther et al.).

The deposits in wetlands A337, A450, and A560 at Salpetermosen Syd

The total number of animal deposits from Salpetermosen Syd is approximately 58 of which 48 are relevant for this article with more than one species in a single deposit. All of these are defined as closed finds of sacrificially deposited animals or animal parts. A deposit could consist solely of animals, or it could be an ensemble of animal parts and other items. Single finds of animal bones are not included here, as it is difficult to establish whether a single bone is deliberately deposited or simply thrown out. Of the 48 deposits, 44 were concentrated in the same wetland, A793 (Table 1B), whereas the

Konc.	X#	Primary species	MNE	MNI	Description	Secondary species	MNE	MNI	Description	Cut-marks
Area 337										
A	994	Pig	6	1	Head, body, front leg, 30-52 m	Cattle	5	1	Head, body, extremities, 12-42 m	
B	995	Pig°	28	3	Head, body, 12-52 m, 30-52 m, 18-96 m	Large ungulate Sheep/goat	2 1	1 1	Head, body Body	X
Area 450										
	10	Dog		1	Head, leg	Cattle	1	1	Head	
Area 560										
		Dog		1	front-, hind leg	Pig		1	Head	

Table 1A. Faunal deposits at Salpetermosen Syd, A337, A450, and A560, containing a primary-secondary animal deposit. °Species also identified by SPIN.

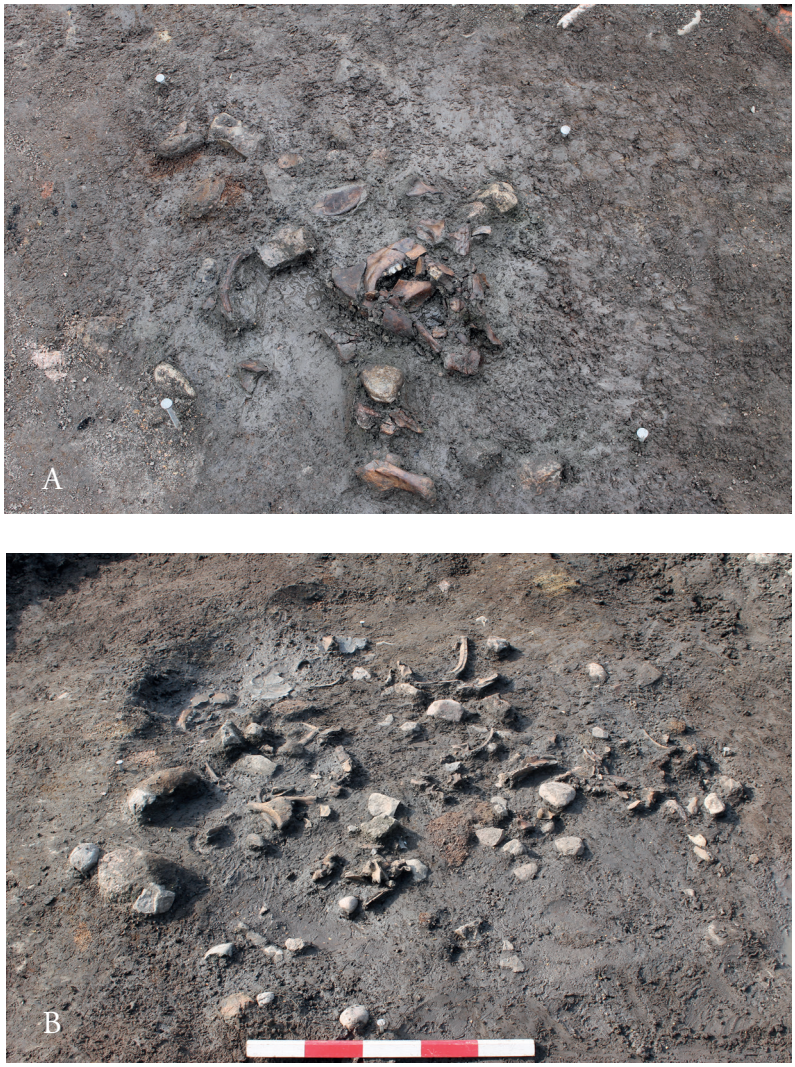

Figure 2. A337. Deposits A and B. (A) Remains of pig and cattle. (B) Remains of three pigs with a few bones from two additional species (Photo: Museum Nordsjælland).

remaining four deposits are related to wetlands A337, A450 and A560 (Table 1A). Dwellings were situated very close to the latter three, which also made them suitable for dumping of household waste, resulting in superimposing cultural layers in all three wetlands.

A337 was a seep, supplied with water from nearby springs and with a localized subsoil consisting of extremely elastic blue clay. As a result, the seep was constantly fed with fresh water, with little or no drainage. Discharge of water from the system was therefore limited to the naturally occurring evaporation. These factors created a small pool, a perfect watering hole for livestock, which probably explains the coarse paving on the brink closest to the dwellings, easing the access to the water. Unfortunately, extended modern drainage has had a severe impact on the preservation of the bones. In A337, three sacrificial deposits of animals and ceramics were deposited on the margins next to the actual springs, suggesting that these were honoured or sanctified, like the Röekillorna in Sweden (Stjernquist 1997). Animals were included in two deposits: A and B (Figure 2). The primary animal of deposit A was a pig represented by the head and elements from the body and the front leg totalling six bones (MNE). The fragmented pig skull formed the centre of the deposit encircled by stones. The secondary animal was cattle represented by five bones, including elements from the head, body, and extremities. A few badly preserved potsherds completed the deposit. Deposit B was more complex and had a more scattered appearance as the deposit consisted of several elements beside the bones. The primary animals were, in this instance, three pigs, each represented by the skulls and a few bones from the body, in total some 28 bones. Sheep accompanied the pigs along with a large ruminant as the secondary animals, each represented only by one or two bones. Several whitish stones were deposited among the scattered bones, a ceramic vessel was situated at the

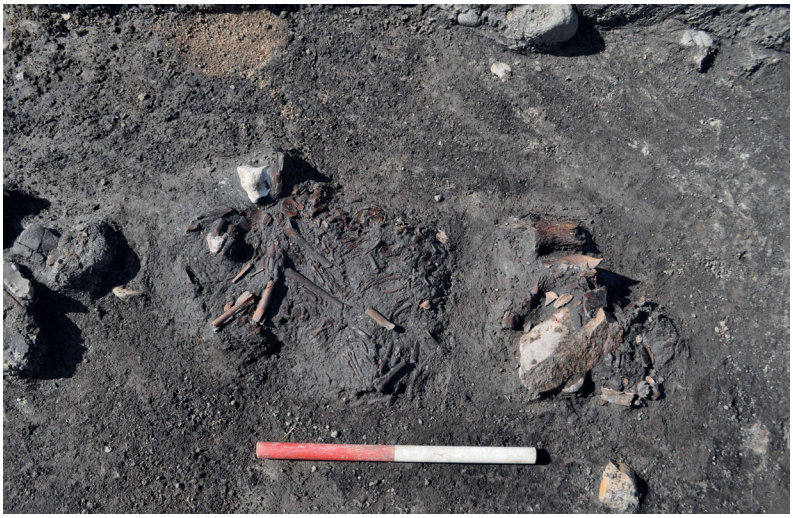

Figure 3. A450. Deposit X10. Remains of a complete dog and a horn core from cattle (Photo: Museum Nordsjælland).

edge of the bone layer, and finally a fragmented amber bead was placed on one of the pig skulls. Unfortunately, the lack of collagen prevented a dating of both deposit A and B, but based on the ceramics it is likely that the deposits date to the late Roman Iron Age. Afterwards, the deposits and the pool were superimposed by a layer of charred material, probably the result of a clearing of a nearby burnt house.

The deposit X10 of A450 contained a complete dog, which had been placed on its left side. It was located under a cultural layer of household waste from the late Roman Iron Age (Figure 3). A ^{14}C dating of the dog was not possible due to poor preservation. Zoological analyses revealed that the dog was an adult animal of a smaller and slender type based on the limb bones. The secondary animal was, in this case, cattle, represented by a horn core, and the find was completed with a badly preserved ceramic vessel. The deposit in many ways resembles the dog burial from Svinninge, NW Zealand (Wickman 2011).

Figure 4. A560. Deposit of the skull and one leg of a dog and a pig mandible. (Photo: Museum Nordsjælland).

In A560, another deposit was situated below a cultural layer of household waste. Unfortunately, this deposit went missing prior to a full zoological analysis and therefore no identification number has been assigned, but the primary animal was a dog, represented by a skull and one leg and accompanied by a secondary animal, a fragmented pig mandible (Figure 4). The expression of the deposit was very compact, as if the bones were originally wrapped in hide or textile and, as it was located beneath the cultural layers from the late Roman Iron Age, it must predate these.

The deposits in A793 – a few examples

A793 is a larger fen, though situated close to the dwelling area, it is not located right next to it. Still, the many activities indicated that it was not considered inaccessible or hidden. The pollen analyses supported the archaeological observations, confirming that during the time of use, the wetland was surrounded by open grassland. A793 was exposed to peat cutting in at least two

Konc.	X#	Primary species	MNE	MNI	Description	Secondary species	MNE	MNI	Description	Cut-marks
B	020	Cattle	76	1	All parts, 3	Cattle Sheep°	1 1	3 1	Extremities Body	X
C	021	Cattle	62	1	All parts. M, 1-3 y	Dog	2	1	Front leg, body	X
D	040 022	Cattle°	74	1	All parts, M, 6-8 y	Cattle Pig	1 1	1 1	Extremity Front leg, juvenile	X
F	1072	Cattle	2	1	Body, extremities	Pig	2	1	Body	
H	1011	Sheep/ goat	4	1	Head, body, hind leg, juvenile	Cattle	2	1	Head, front leg, juvenile	
I	1073	Cattle	3	1	Body, juvenile	Pig	1	1	Front leg, < 42 m	X
J	1074	Cattle	5	1	Front leg, extremities, > 42-48 m	Medium ungulate	1	1	Body	X
K	1012 1013	Cattle	9	1	Body, front-, hind leg, > 12-18 m	Medium ungulate	1	1	Head	X
M	1014	Pig	34	1	All parts, 12-24 m	Pig	26	1	Prob. all parts, < 12 m	X
P	1016	Cattle	6	1	Head, body, extremities, < 24-36 m	Pig	1	1	Extremity, > 12 m	
R	1014	Cattle°	27	1	Front leg, extremities, > 42-36 m	Cattle°	1	1	Extremity	
T	1018	Equid°	1	1	Hind leg, > 20-34 m	Cattle° Pig	1 1	1 1	Head Extremity, < 18-36 m	
U	1109	Sheep	1	1	Front leg, > 3-13 m	Large ungulate	1	1	Body, juvenile	
AE	1029	Equid	3	1	Head, body, < 18-24 m	Pig	1	1	Body	
BB	1023 1112	Cattle	2	1	Hind leg, extremities	Sheep/goat	2	1	Hind leg, extremity	
CC	1021 1025	Sheep	119	3	Body, front, hind leg, 2M & 1F, 3-6 m	Cattle° Pig	5 1	1 1	Body, hind leg, 24-48 m Head, 3-8 m	X
EE	1028 1030	Cattle°	4	1	Head, body, front leg, < 42-48 m	Roe deer Goat°	1 1	1 1	Head Body	
GG	1027	Pig	2	1	Head, extremities, F, 72-92 m	Cattle°	1	1	Front leg	
OE	1024 1199 1833	Horse°	20	1	All parts, < 15-18 m	Cattle Sheep Roe deer Pig°	9 3 2 1	1 1 1 1	All parts, 24-48 m Head Front leg, > 4-9 m Hind leg	X
PP	1116 1825	Sheep	66	1	All parts, M, 2-3 m	Goat°	3	1	Body, hind leg, extremities, M, < 11-15 m	X
QQ	1754 1824	Sheep°	11	1	All parts, 3-4 y	Cattle°	6	1	Head, body, front leg, extremities, 12-18 m	
RR	1206 1207	Cattle	62	1	All parts, 6-18 m	Pig Sheep°	1 1	1 1	Head, 52-96 m Body, >6-10 m	X
SS	1733 1738 1750 1841	Cattle	8	1	Head, body, front leg, 10-84 m	Sheep° Medium ungulate	5 1	1 1	Head, body, front leg, 2-3 y Hind leg, juvenile/pullus	X
TT	1208 1848	Sheep°	113	1	All parts, F, 6-12 m	Cattle Sheep	2 1	1 1	Head, extremities, juvenile Extremities, < 18-28 m	X
UU	1209	Sheep	20	1	Head, body, front-, hind leg, F, 48-60 m	Cattle Pig	3 2	1 1	Body, extremities, 24-84 m Extremities, < 14-27 m	X
VV	1210	Cattle	41	1	All parts, 6-12 m	Sheep° Cattle Goat° Pig	13 3 2 2	1 1 1 1	All parts, 3-4 y Head, body, extremities Front leg, > 11-13 m Front leg	X

Table 1B. Faunal deposits at Salpetermosen Syd, A573, containing a primary-secondary animal deposit. °Species also identified by SPIN, M = males, F = Female, m = months, y = years (Table continued next page).

XX	1835	Cattle	4	1	Head, front leg, 3-6 y	Equid	2	1	Front leg, 1-3½ y	X
YY	1845	Pig°	1	1	Head, 8-52 m	Horse°	1	1	Body	
EEE	1815	Goat°	3	1	Head, front leg, extremities, 1-2y	Pig Goat	2 1	1 1	Extremities, < 24 m Head, 2-4 y	X
FFF	1813	Pig	3	1	Head, body, extremities	Cattle	1	1	Head, 15-26 m	
HHH	1832	Cattle°	1	1	Body	Pig	1	1	Head, F, 12-16 m	X
III	1843	Cattle	1	1	Head, 2-8 y	Roe deer	1	1	Front leg, > 15-16 m	X
LLL	1834	Goat°	13	1	All parts, 2-3 y	Sheep° Pig Cattle	6 4 2	1 1 1	Extremities, > 6-16 m Front, hind leg, 12-24 m Body, front leg, > 12-18 m	X
MMM	1836	Sheep	27	1	Body, front-, hind leg, extremities, > 36-42 m	Pig Cattle	4 3	1 1	Head, adult Body, hind leg, 24-30 m	X
NNN	1821	Cattle	1	1	Head	Dog	1	1	Head, adult	
OOO	1817	Cattle°	3	1	Body, extremities, 42-84 m	Sheep	2	1	Front leg, > 9-13 m	X
QQQ	1814	Cattle	4	1	Head, body, front leg, 18-84 m	Sheep/ goat	1	1	Head (teeth), 1-3 y	X
RRR	1837	Cattle	4	1	Body, hind leg, 36-42 m	Pig Dog	1 1	1 1	Extremities, app. 12 m Head, adult	X
SSS	1840	Cattle°	11	1	Body, front leg, extremities, < 24-36 m	Medium ungulate	1	1	Leg	X
TTT	1842	Cattle°	2	1	Head, body, 2-8y	Medium ungulate	1	1	Front leg	X
YYY	1847	Cattle	2	1	Head, body	Goat° Dog	1 1	1 1	Head Head	X
ÆÆÆ	1844	Horse°	8	1	Body, front leg, extremities, 15-18 m	Sheep°	1	1	Body, >6-10 m	X
ABB	1031 1032	Cattle°	7	1	Body, front leg, extremities, 36-84 m	Sheep°	4	1	Head, body, front leg, M, > 6-10 m	
ABC	1728 1731	Cattle	5	1	All parts, 15-26 m	Sheep/ goat	1	1	Body, > 6-10 m	X

Table 1B. continuing.

phases; during the pre-Roman Iron Age and the Roman Iron Age. Only in very few cases were the deposits placed on the bottom of the peat cuts. Instead, they were frequently deposited between or in the subsequent rapid and probably intentional infill of the peat cuts. The majority of these have a very compact expression, as if they were originally wrapped in hide, skin, or textile. In some cases, the deposits appear less compact, but they still have the appearance of closed finds, due to the orchestration of the bones and other objects. Based on field observations the variation of the deposits was considerable, but there was never any doubt as to whether the bones were deliberately placed, and as described above, these contexts did not include any charcoal, fire-cracked stones, or potsherds etc. Opposed to the above-mentioned wetlands, no cultural layer superimposed the deposits in wetland A793, which made it easier to identify the deposits as closed finds. As 54 deposits were identified from this wetland, only a few are described here as representatives of the general assemblage, but all deposits containing primary-secondary animals can be found in table 1B (44 in total, as the remaining 10 contained a single animal).

Deposits B, C, and D were found in this wetland during the initial excavation, soon to be followed by numerous others. The similarity of the three deposits was already noticed in the field. They all include adult or near adult cattle remains represented by multiple bones, mainly from the skull and extremities (primary animal). In deposit B, the extremities were placed in a pile next to the skull (Figure 5 B). The zooarchaeological analyses corroborated and confirmed that the deposit contained extremities from a second adult cattle (secondary animal), as well as the vertebrate from a medium sized ungulate, probably sheep/goat (a further secondary animal). This deposit is ^{14}C dated to 170 BC-AD 20.

Deposit C included the skull and extremities, as well as a few more bones from across the body of a

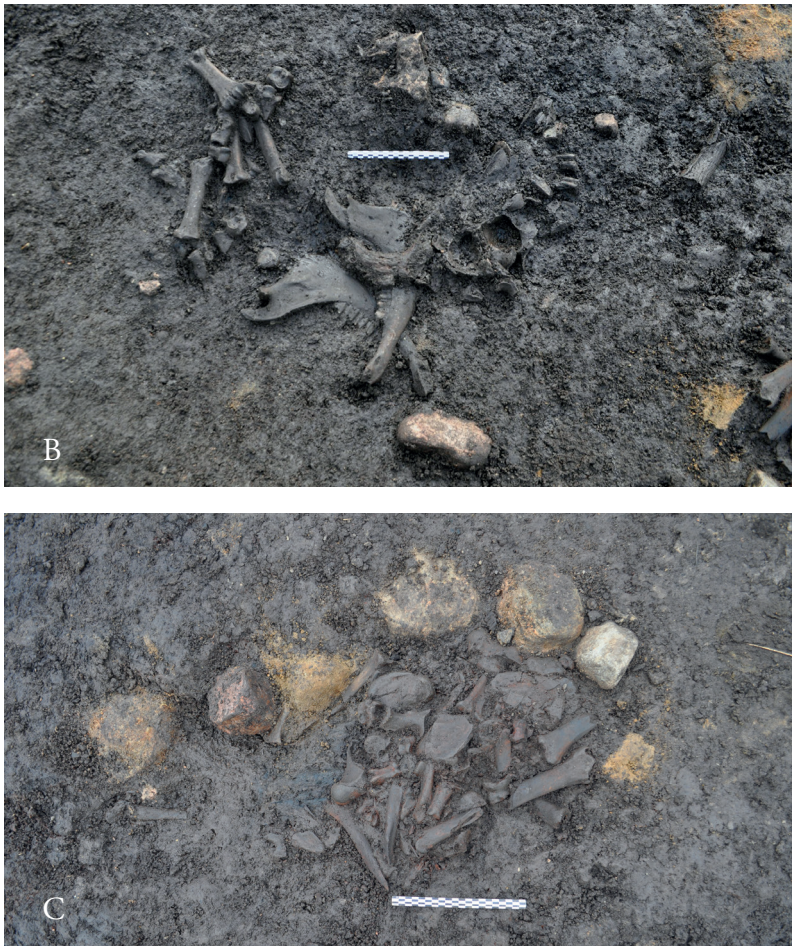

Figure 5. A793. Deposit B and C. Remains of cattle combined with a medium ungulate (B) or a dog (C) (Photos: Museum Nordsjælland).

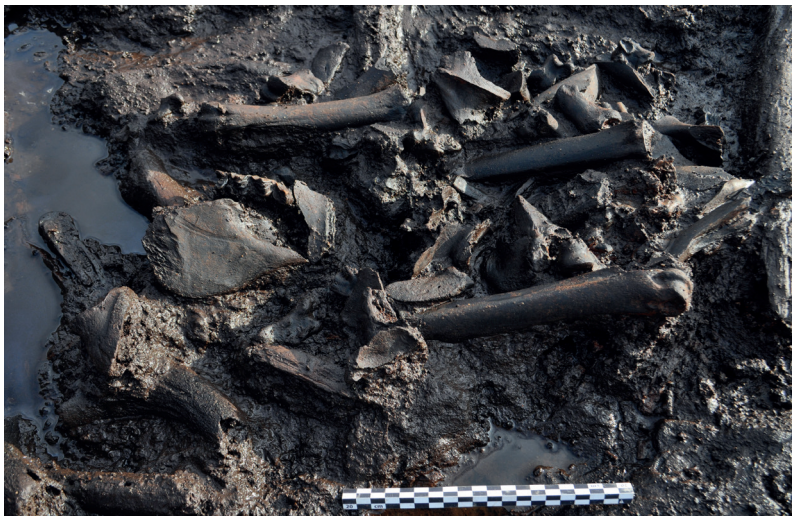

Figure 6. A793. Deposit D. Remains of an adult bull with a single pig bone (Photo: Museum Nordsjælland).

young bull (primary animal) accompanied by the ulna and vertebrate from a dog (secondary animal, Figure 5 B). In this case, the bones were concentrated in a pile with the extremities on top of the skull and stones encircled the entire pile. ^{14}C dates place this find between AD 50-260.

Deposit D contained the skull, the extremities, and some bones from across the body of an adult bull (primary animal). In addition, there was the radius from a juvenile pig (secondary animal). This pile of bones was very compact, as if it had been wrapped in skin or textile. ^{14}C dates placed this deposit in AD 240-400/250-430 (Figure 6).

The remarkable aspect of these three deposits is the similarities of composition as well as their temporal spread. On the other hand, the difference in secondary animals is also noteworthy.

Deposit OE is situated within a recut into the regrowth of a former peat cut, possibly with the intension of recreating the water table. This deposit

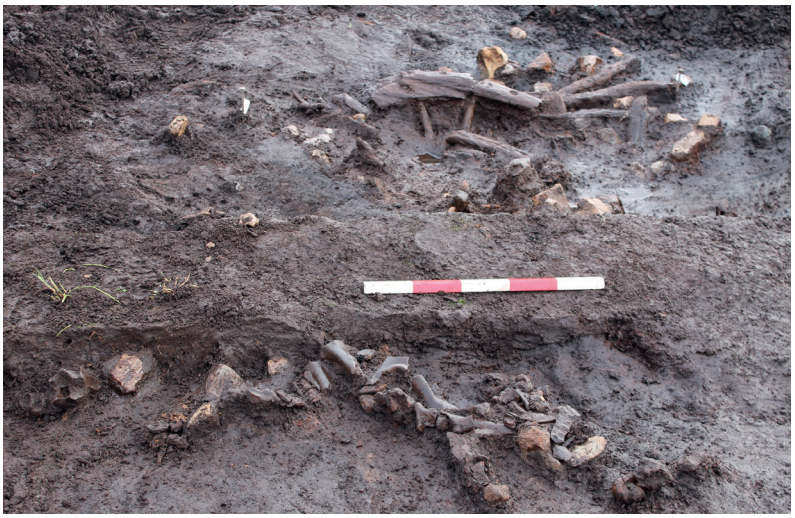

Figure 7. A793. Deposit OE. Remains of a juvenile horse with less bones from cattle, sheep, pig, and roe deer (Photo: Museum Nordsjælland).

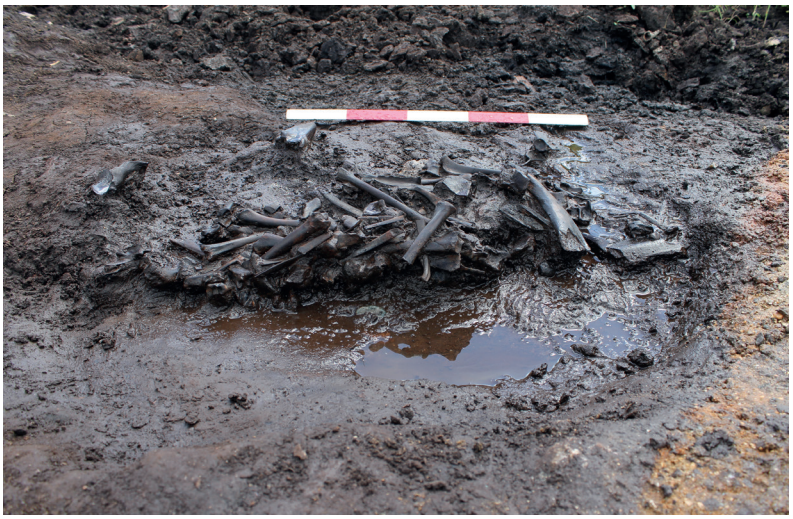

Figure 8. A793. Deposit CC. Remains of three sheep with a few cattle and pig remains (Photo: Museum Nordsjælland).

is interesting as it contains many animal parts from several different species. Furthermore, the bones were placed with a fragmented wagon wheel on top (Figure 7). This deposit has not been ^{14}C dated, but based on the local stratigraphy, it is probably dated to the Roman Iron Age. At least five individuals were represented with a juvenile horse as the primary animal, whereas cattle, sheep, pig, and roe deer (*Capreolus capreolus*) constituted the secondary animals. The horse was represented by bones from across the body, but it is far from a complete skeleton (20 bones in total). The cattle were represented by parts of the skull, the extremities, and a few bones from the body (9 bones). The sheep was represented by the skull and body (3 bones), the roe deer was represented by the front- and hind leg (2 bones), and finally the pig was represented by a tibia. The deposit primarily contained younger animals, but the exact age varied considerably. The presence of a humerus and a tibia from roe deer is remarkable as Iron Age animal deposits usually consist exclusively of remains from domesticated animals. Two further examples from Salpetermosen Syd include a radius in deposit III and an antler in deposit EE. The latter does not represent evidence of hunting, as the antler was shed and therefore could have been collected. However, the remains from OE and deposit III, provide inferred evidence of hunting and clearly wild animals were occasionally included in the deposition practices.

Deposit CC is another example of a deposit with multiple animals; five individuals in total, yet it is very different from deposit OE. In this case, three sheep are in a nearly complete state, but without the skull and extremities (in total approx. 119 bones), comprising two males and one female, all between 3-6 months (primary animals). Cattle and pig, represented by single elements from body and hind leg and a mandible respectively, accompanied these (secondary animals and 5 bones in total). The cattle were between the ages 2-4 years, whereas the pig was between 3-8 months old. The

orchestration of the bones was very compact, as if they were originally wrapped firmly in textile or skin (Figure 8). This deposit has been ^{14}C dated to AD 230-380.

Deposit VV was situated in peat cut 11 (A1577). The deposit was complex as it consisted of five individuals representing four species, half a ceramic vessel, and sherds from two other vessels, and finally a worked piece of wood. The wood has been ^{14}C dated to 2 BC-AD 125, a dating consistent with the typology of the pottery. The primary animal is cattle represented by all parts of the body but not with a complete skeleton and aged to 6-12 months. A second adult individual was represented by the extremities (in total 44 bones MNE), representing a secondary animal. Further secondary animals included two sheep represented by all parts of the body (13 bones) and aged to 3-4 years, a goat represented by the front leg (2 bones), likely between 1 and 2 years old, and an adult pig represented by the front- and hind leg (2 bones).

The phenomenon of primary and secondary animals

Based on the above-mentioned examples and the overview in table 1A and 1B, a very complex pattern of practice of animal deposition is emerging. The results suggest that a vital aspect of the animal deposits is the combination of primary and secondary animal parts and contribute to discussions of the selection of animals, the human-animal relationship, and the complexity of Iron Age deposits in general. The idea of sacred actions being governed by clear concepts of how and which animals and animal parts are selected and placed are well known from the Roman Empire. The *suovetaurilia* is a sacrifice of three specific species: pig (*Sus domesticus*), sheep (*Ovis aries*) and cattle (*Bos taurus*). Thus, the concept of specifically selected animals and specific combination of animals are well known (Bendlin 2013), including from Danish contexts (see e.g. Gotfredsen et al. 2017).

The lack of any overall rule as to which animal species or body parts were favoured at Salpetermosen Syd is therefore remarkable. The variability is not limited to species and body part, as no clear preference could be found for a specific age or sex of the animal. However, it is worth noting that the age distribution does demonstrate that the majority of animals were in their prime. Few very young and no senile or animals with clear signs of pathology have been identified. Furthermore, the probable treatment of these remains appears to differ considerably. The identification of cut-marks in some deposits suggests that the animals were butchered, dismembered, and potentially eaten before being deposited, while other deposits appear to have contained complete animals or parts of bodies with very few or no observable cut-marks.

Cattle is the most common amongst the primary animals in Salpetermosen Syd based on the MNI count. Based on NISP, sheep appear to be the dominant species, because sheep is often deposited in nearly complete state (Bangsgaard 2018, 32). The previously mentioned concept of the superiority of horse can only be confirmed in Salpetermosen Syd if measured in absence, as the horse played a lesser role on this site. This tendency follows what has been reported at other sites, such as Bukkerup Langmose (Albrechtsen 1944; Gyldion Andersen 1993) and Alken Enge (Kveiborg 2019, 118). The question remains whether value and superiority can be observed through absence. Could it be that the horse was so important that it only appears in a few cases at Salpetermosen Syd? Or does the rareness of horse suggest that they were not particularly important to these societies? Following this line of thought, we may ask if the dominance of cattle is an expression of high value and superiority, or if the dominance expresses a lesser value. However, the latter will go against the traditional idea of socioeconomic status being measured in cattle (Carlie 2004, 116; Roymans 1999). Consequently, the traditional discussion of animal status is worth re-opening, as the complexity of the animal deposits suggest a nuanced relationship between animals and humans.

As previously mentioned, cattle were the most dominant animal amongst the primary animals, with a presence in 25 out of 48 cases, which equals 52,1 %. However, a substantial variation is observable between the cattle remains in each deposit. In 15 cases, the skull was represented, in 14 the extremities, but only in six cases were both body parts

represented. In four cases, neither of these body parts occurred. The focus on skulls and extremities is particularly interesting because these body parts have often been labelled synonymous with horse deposits, as part of the "special treatment" of the horse (e.g. Klindt Jensen 1957; 1967; Johannesen 2016, 55). However, as we have established, the selection of skull and extremities is not exclusively reserved for the horse, it is also observable for cattle, pig, and sheep. Examples of this representation across species is also known from the Continent, for instance, from Germany (e.g. Müller-Wille 2002,156).

The secondary animal represents a minor part of the deposits in comparison with the primary. The secondary animal can be of the same species as the primary, or it can be an animal of a different species. It is also clear that one deposit can contain several secondary animals. A slightly wider range of animals appears to function as secondary animals, such as roe deer, which the OE, III and EE deposits prove. Otherwise, the species represented are the same as the primary animal, namely all the common domesticated species, cattle, horse, sheep, goat, pig and dog. Of the 48 deposits, there are 28 variations of animal combinations, which means that most variations only occur once or twice. A few occur three or four times. Nevertheless, these deposits are still very different in appearance because the selection of body parts varies. Therefore, if the combination of species, body parts, and ages are included in the comparisons, no two deposits are alike. Apparently, no animal was considered "above" or "beneath" being a secondary animal. There is also nothing to indicate that the secondary animal was in any way less important than the primary animal. In comparison, the *suovetaurilia* tradition depends on the presence of all three animal species for the ritual to be successful (Bendlin 2013).

The primary-secondary phenomenon at other sites

A zoological review of animal deposits at several Danish sites was carried out in order to examine whether the phenomenon of primary and secondary animals is a local phenomenon of North Zealand, or if it is a more widespread phenomenon. The selection of sites is based upon different criteria: The sites had to be published with relevant details or the faunal material had to be accessible at the Quaternary collections and archive, so that information could be obtained. Furthermore, the location of the sites needed to represent both wetlands like Salpetermosen Syd and other types of areas, for us to investigate, whether the primary-secondary phenomenon is exclusively reserved for the wetland environments, or if it is a more general practice. Finally, to avoid the discussion of regionality, the sites needed to represent most of the Danish area (Figure 9 and table 2).

Bukkerup Langmose and Turup are both wetland sites from Funen, excavated in 1943 (Albrechtsen 1944; Gyldion Andersen 1993; Hatting 1993). Both sites are well known for the faunal deposits found here and are often used for comparison due to the uniformity of composition with deposits containing cattle limb bones, often found in combination with pottery, tethering poles, and rope. This uniformity was based on archaeological observations, but a later zoological analysis revealed a difference in terms of size and age of the animals (Hatting 1993,95). The uniformity of the deposits and the geographically close relationship between the two sites were used as archaeological arguments for detecting a regional leadership, which controlled the deposition practice (Gyldion Andersen 1993, 80; Gyldion 2009). The Bukkerup find consists of 13 closed finds, called "packages" (Gyldion Andersen 1993, 72). The presence of other species is only superficially mentioned: "*The sacrificed animal bones from Bukkerup are without exceptions from cattle. Although there is an extremity bone from horse and a shank from a pig, these should most likely be considered misplaced rather than parts of the sacrifices*" (Gyldion Andersen 1993, 76 -translated).

A renewed study of the Bukkerup finds has revealed a primary-secondary combination of species in three cases. Cattle were the primary animal in all three deposits, whereas the secondary animals were represented by pig, horse, and horse, thus each deposit consisted of two individuals. A similar review of the Turup site revealed a primary-secondary deposition practice in four cases. At this site, cattle are accompanied by sheep in three instances and pig in one. In two out of four cases, the deposits

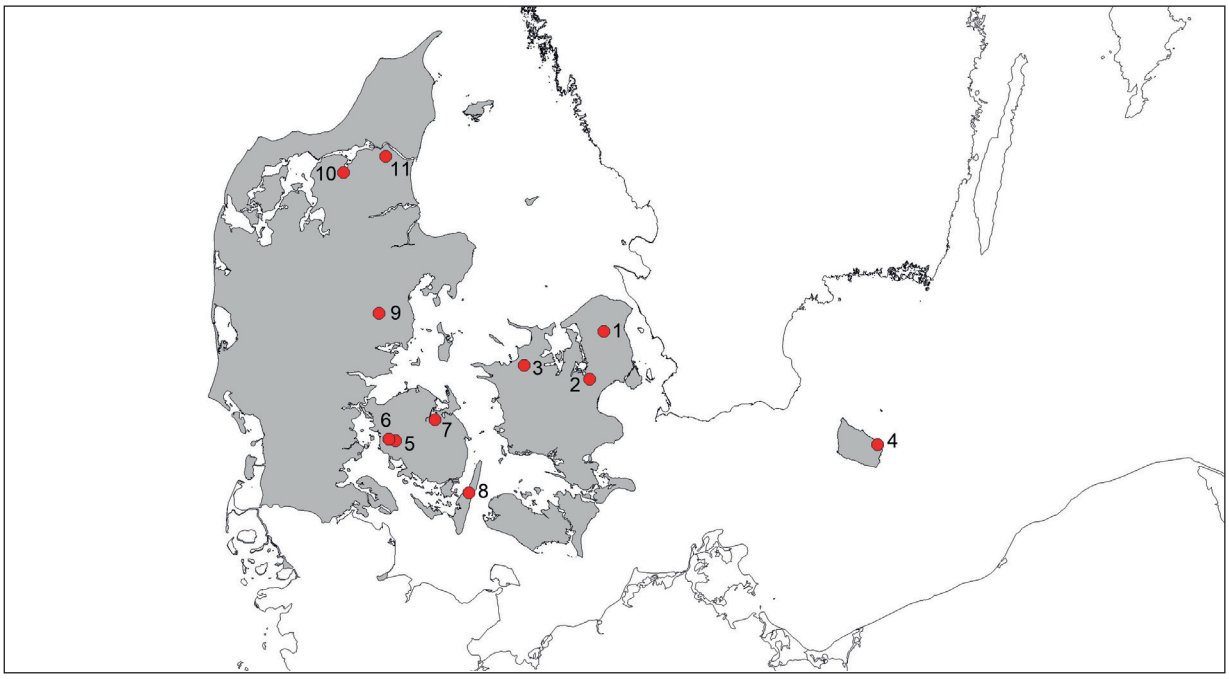

Figure 9. Map of selected sites where primary-secondary animal deposits have been identified. The map contains data from "Styrelsen for Dataforsyning og Effektivisering, Danmark 1:200.000, vektor".
1: Salpetermosen, 2: Lundbjerggård, etape 2, 3: Nordgårde, Svinninge, 4: Sorte Muld, 5: Bukkerup Langmose, 6: Turup, 7: Lundsgård, 8: Stengade Mose, 9: Forlev Nymølle, 10: Skørbæk Hede, 11: Nørre Hedegård.

consist of three individuals. Thus, the supposed clear uniformity of the deposits is again questionable from both an archaeological and a zoological perspective, due to clear differences in the primary-secondary balance.

Forlev Nymølle, is another wetland site, located in Jutland and excavated in 1966 (Lund 2002). The site is known for 10 concentrations of various finds in different combinations. In this study, concentrations II, III and IX are of particular interest, because they included animal bones. The site was in use from 200-50 BC, thus each deposit is not necessarily concurrent (Lund 2002, 163-167). Concentration II includes cattle as the primary animal represented by a substantial number of bones from across the skeleton. The secondary animals include the mandibles from horse and goat. All animals, both primary and secondary, are young: 6 months or younger. In concentration III cattle is also the primary animal and includes bones from across the skeleton. In this case, the secondary animals are a dog represented by mandibles and metacarpals, a goat represented by mandible, radius, and ribs. Finally, a human being is represented by a scapula. The inclusion of human remains into such deposits are not common. However, based on the above-mentioned definition of the primary-secondary phenomenon, the human bone is, in this case, defined as a secondary animal. Concentration IX includes three individual cattle as the primary animals. All are adults and represented by skull and vertebrae. Three secondary animals comprise two and a single bone from a dog and a sheep, respectively (Lund 2002, 159; Rosenlund 2001).

Nordgårde, Svinninge, on Zealand, is a cemetery excavated in 2001 (Wickman 2011, 259). One of the graves was a dog grave consisting of a complete dog accompanied by a miniature ceramic vessel and half a skull from a pig. The grave is dated to the late Roman Iron Age (Wickman 2011, 259).

Lundsgård is a settlement site on Funen excavated from 1937-44 (Albrechtsen 1946, 12; Carlie 2004, 112). With the primary-secondary animals in mind, four deposits are of interest. Within house A, a near complete skeleton of a dog was deposited and accompanied by the astragalus of presumed cattle. The find is dated to the early Roman Iron Age. In house C, dated to the late Roman Iron Age, there was a deposit of burnt faunal remains consisting of seven individuals in total. In this case, three individuals of cattle represent the primary animals, whereas four pigs must be regarded as the secondary animals.

Context	Location	Primary species	MNE	MNI	Secondary species	MNE	MNI
Turup (reanalysis and Hatting 1993:95)							
Vessel 9	Wetland	Cattle	3	1	Sheep	1	1
					Cattle	4	1
Vessel 3	Wetland	Cattle	25	1	Pig	1	1
Vessel 2	Wetland	Cattle	33	2	Sheep	2	1
Unmarked	Wetland	Cattle	36	1	Sheep	4	1
Bukkerup Langmose (Hatting 1993, 95)							
17	Wetland	Cattle		1	Pig	1	1
South of 30	Wetland	Cattle		1	Horse	5	1
Next to 40	Wetland	Cattle		1	Horse	1	1
Stengade Mose (Becker, 1972)							
	Wetland	Cattle	11	1	Pig	2	1
Foerlev Nymølle (Rosenlund 2001)							
konc II/B	Wetland	Cattle		1	Horse	2	1
					Goat	1	1
					Hare	1	1
					Dog	6	1
konc III/C	Wetland	Cattle		1	Goat	5	1
					Human	1	1
konc IX	Wetland	Cattle		3	Dog		2
					Sheep		1
					Equid		1
Nordgårde (Wickman 2011, 259)							
	Cemetery	Dog	1	1	Pig	1	1
Lundbjerggård etape II (Winter in press; Magnussen 2021, 7)							
Anlæg K41 X852	Habitation	Sheep	c.109	3	Cattle	1	1
					Pig	1	1
Lundsgård (Carlie 2004, 112; Degerbøl 1943)							
House A	Habitation	Dog		1	Cattle (?)	1	1
House C	Habitation	Cattle	c.250	3	Pig		4
House F	Habitation	Sheep		2	Cattle	1	1
House E B1526	Habitation	Pig		3	Cattle		1
					Sheep		1
					Equid		1
Nørre Hedegård (Runge 2009, 44, 330)							
House A143 X3311	Habitation	Sheep		1	Pig		1
Skørbæk Hede (Carlie 2004, 323)							
House H	Habitation	Cattle		1	Sheep		1
Sorte Muld (Møhl 1957, 294, 302-03)							
House II Pit 3	Habitation	Horse		1	Cattle		3
					Sheep		1
					Dog		1

Table 2. Faunal deposits identified at other Iron Age sites in Denmark with primary-secondary animals.

In house F from the early Roman Iron Age, the primary animal is sheep represented by a near complete skeleton, age 6-24 months. The secondary animals are sheep with a juvenile ulna, and one metatarsal from cattle. Finally, a stone lined pit from house E contained the bones from three individual pigs (primary animals), which were accompanied by single bones from cattle, sheep, and horse. The secondary animal bones all derived from the skull (Albrechtsen 1946, 12; Carlie 2004, 112, Degerbøl 1943).

Nørre Hedegård is a settlement site in Jutland, excavated in 1998 (Runge 2009, 12). In house A143, there was a deposit of a near complete skeleton of an adult sheep (primary animal) accompanied by a near complete skeleton of a juvenile pig (secondary animal). House A143 belongs to phase 14, which is dated to period II.2 or around the 1st century BC (Runge 2009, 44, 330)

Skørbæk Hede is a settlement site in Jutland excavated in the 1930's (Hatt 1938, 119-166, 146; Carlie 2004, 323). The habitation is dated from the late Pre-Roman to the early Roman Iron Age. From house H, a ceramic vessel was found containing the burnt remains of cattle as the primary animal represented by skull and extremities. A burnt hind leg from sheep accompanied these.

Sorte Muld is a settlement site from Bornholm, where excavations were initiated during the 1950's (Klindt Jensen 1957). A pit contained a complex ensemble of animal bones located close to house II and thus presumably connected to its use. Although Klindt Jensen focused on the horse (Klindt Jensen 1957, 83), several other animals were represented. The primary animal was a horse represented by the skull and extremities, but five individuals represented the secondary animals. There were bones from three young calves and a single bone from sheep and dog (Møhl 1957, 294, 302-03, Carlie 2004, 118). The pit is presumed to be related with house II, which is dated to the transition between the late Roman and early Germanic Iron Age, around AD 400 (Klindt Jensen 1967, 143). However, according to Finn Ole Nielsen from Bornholm's Museum the dating could be as late as AD 450-500 (Pers. communication).

The implications of the phenomenon and concluding remarks

Based on the above-mentioned examples, the combination of primary and secondary animals in a single deposit is not exclusively linked to Salpetermosen Syd, to wetland depositions alone, to a specific period, or to a specific region. Furthermore, there is no clear pattern as to which animals are primary or secondary, just as the choice of body parts appears to be liberal in the sense that the variation of selected body parts indicates that they were not subject to a specific doctrine. The combination of these observations with the detailed information from the deposits at Salpetermosen Syd, such as the exact position and distribution of bones and the presence of cut-marks, suggests that the bones represent different treatments prior to deposition. In some instances, the types of bone, the disarticulated nature of these, and the observed cut-marks suggest that the remains could represent food or leftovers of a meal. In other instances, they include heads and extremities and thus appear to represent the initial butchering and skinning process, if not a symbolic animal: an intact skin with feet and head still present. Finally, at times the near articulated appearance of the remains and complete lack of any cut-marks suggest the deposit of intact or near intact animals (Bangsgaard 2018). This pattern illustrates that the specific cut of meat, the treatment of it or even the species of animal used in the deposit could vary and were potentially not of as great importance as the very act of placing a deposit. However, based on the human-animal relations described by Hill (2013) it is possible that the variation described above, will also relate to the specific animal and the relationship between specific human and animal persons. This means that the choices made in connection with a deposit were relational and varied according to factors not measurable or detectable by the usual zoological categories such as species, bone, age or sex.

A closer look at animal deposits clearly demonstrates the complexity and variation of these in a Danish Iron Age context, but the current study also highlights some common traits seen across deposit and location. Furthermore, this article presents the phenomenon of primary and secondary animals within a single sacrificial deposit, where one

or more animals represented by a few bones each accompany a primary animal, often represented by a substantial number of bones. Such closed finds deserve to be studied carefully, as they may provide information regarding the combination of animal species, the number of individuals and body parts present, not to mention the treatment or actions prior to deposition. Combined, this information reveals a much more complex history of deposition practices. The specific combinations seem endless, and it appears that there is room for a very individual touch within a defined framework of ideas and narratives. Even though the ideas behind the phenomenon of primary and secondary animals are unknown, the complexity of the deposits leaves an impression of a set of visions, or narratives, which must have formed the basis of deposition practices. More importantly, these visions or narratives were not confined to a single geographical area, nor were they a result of a local custom. The ideas seem to have had a far greater prevalence across regions and extend beyond Denmark. Examples of primary-secondary animal deposits are also known from Sweden (e.g. Carlie 2004, 290-93, 302-11; Vretemark 2013, 56-57), the Netherlands (Lauwerier 1988, 112), and from Germany (Teichert 1974, 103; Müller-Wille 2002:155-157).

Another significant aspect of the primary-secondary phenomenon is that it is not restricted to wetlands, but can also be found on dryland locations. Finally, this phenomenon challenges the temporal aspects of deposition practices. Even though archaeology divides the Iron Age into different periods, the deposition practice regarding animals does not appear to alter considerably. Within the Danish area, this practice existed at least from the pre-Roman to the early Germanic Iron Age. That constitutes a Millennium from 500 BC to approximately AD 500. Nevertheless, it is possible that the phenomenon started even earlier, as some of the first Swedish examples are dated to late Bronze Age (Carlie 2004, 302, 311).

This in-depth study of the deposits from Salpetermosen Syd and the identification of other examples from across Denmark clearly illustrates the potential for a full faunal analysis of animal bones found in such closed contexts. An increasing body of evidence may help illuminate some of the questions that remain concerning the meaning and exact context of actions that surrounded the deposition event itself as well as adding to the discussion of the human-animal relationship.

References

Albrechtsen, E. 1944. Et fynsk offerfund fra den ældre romerske jernalder. *Fynske Minder*, 241-265.

Albrechtsen, E. 1946. Fyns bebyggelse i den ældre jernalder. *Aarbøger for Nordisk Oldkyndighed og Historie*, 1-71.

Backe, M., Edgren, B. and Herschend, F. 1993. Bones Thrown into a Waterhole. *Journal of European Study Group on Physical, Chemical, Biological and Mathematical Techniques Applied to Archaeology*. Pact 38. Sources and Resources. Studies in Honour of Arrhenius, 327-342.

Bangsgaard, P. 2018. *Salpetermosen Syd 10-1/2, MNS50010. Den samlede zooarkæologiske gennemgang af et stort knoglemateriale fra yngre romersk jernalder*. Natural History Museum of Denmark.

Becker, C. J. 1972. Mosepotter fra Danmarks Jernalder. Problemer omkring mosefundne lerkar og deres tolkning. *Aarbøger for Nordisk Oldkyndighed og Historie 1971*, 5-60.

Behm Blancke, G. 2003. *Heiligtümer der Germanen und ihrer Vorgänger in Thüringen – Die Kultstätte Oberdorla*: Teil I & II. Weimarer Monographien zur Ur- und Frühgeschichte Vol. 38,1.

Bendlin, A. 2013. Suovetaurilia. *In*: Bagnall, Brodersen, Champion, Erskine and Huebner, eds. *The Encyclopedia of Ancient History*. Wiley. https://doi.org/10.1002/9781444338386

Boyd, B. 2017. Archaeology and Human-Animal Relations: Thinking Through Anthropocentrism. *Annual Review of Anthropology* 2017, 46(1), 299-316. https://doi.org/10.1146/annurev-anthro-102116-041346

Carlie, A. 2004. *Forntida byggnads kult: tradition och regionalitet i södra Skandinavien*. Stockholm: Riksantikvarieämbetets förlag.

Cederholm, E. A., A. Björck, K. Jennbert, A.-S. Lönngren, eds. 2014. *Exploring the Animal Turn. Human-Animal Relations in Science, Society and Culture*. The Pufendorf Institute of Advanced Studies, Lund: Lund University.

Chaplin, R. E. 1971. *The Study of Animal Bones from Archaeological Sites*. London/New York: Seminar Press.

Degerbøl, M. 1941-1943. Series of letters describing the faunal material from Lundsgård, Åsum ZMK 105/1941: The Quaternary Collections archive, Copenhagen: Natural History Museum of Denmark.

van Dijk, J. 2016. Iron Age animal husbandry in the wetlands of the Western Wetlands. *Environmental Archaeology*, 21(1), 45-58. https://doi.org/10.1179/1749631414Y.0000000060

Ferdinand, J. and K. Ferdinand 1961. Jernalderofferfund i Valmose ved Rislev. *Kuml*, 47-90.

Gotfredsen, A. B., L. Boye, P. Ethelberg, U. L. Hansen and P. Bennike. 2017. *Wealth and Prestige 2. Animal sacrifices and Deposits in inhumation Graves of the Roman Iron Age in Zealand and Funen, Eastern Denmark*. L. Boye, P. Ethelberg and U. L. Hansen, eds. Taastrup: Kroppedal Museum.

Gyldion Andersen, Aa. 1993. Et religiøst center i Båg herred – i perioden mellem sen førromersk jernalder og begyndelsen af yngre romersk jernalder. *Fynske Minder*, 65-84.

Gyldion, Aa. 2009. Tradition kontra impuls. Kollektiv offerskik i ældre jernalder på Sydvestfyn. *In*: A. Carlie, ed. *Järnålderens rituella platser*, *Femton artiklar om kultutövning och religion från en konferens i Nissaström den 4-5 oktober 2007.* Halmstad: Stiftelsen Hallands länsmuseer, Kulturmiljö Halland, 67-80.

Hansen, J. 2006. Offertradition og religion i ældre jernalder i Sydskandinavien – med særligt henblik på bebyggelsesofringer. *Kuml*, 117-176.

Hatt, G. 1938. Østerbølle. *Aarbøger for Nordisk Oldkyndighed og Historie*, 119-266.

Hatting, T. 1993. Oksefund fra Bukkerup og Turup. *Fynske Minder*, 93-98.

van den Helm, P. and J. van Dijk 2017. Iron Age burial rituals: Animal matter(s). Archaeozoological inventory on the use of animals within burial contexts. *In*: S. Arnoldussen, A. Müller and E. Norde, eds. *Metaaltijden 4. Bijdragen in de studie van de metaaltijden*. Leiden: Sidestone Press, 107-117.

Hill, E. 2013. Archaeology and Animal Persons. Toward a Prehistory of Human-Animal Relations. *Environment and Society: Advances in Research,* 4, 117-136. https://doi.org/10.3167/ares.2013.040108

Jennbert, K. 2011. *Animals and Humans: Recurrent Symbiosis in Archaeology and Old Norse Religion*. Vägar till Midgård 14. Lund: Nordic Academic Press.

Jennbert, K. 2014. Certain humans, certain animals. Attitudes in the long term. *In*: E. A. Cederholm, A. Björck, K. Jennbert, A-S. Lönngren, eds. *Exploring the Animal Turn. Human-Animal Relations in Science, Society and Culture*. The Pufendorf Institute of Advanced Studies, Lund: Lund University, 183-192.

Johannesen, K. 2016. *Rituals of Common Things The ritual and religion of the mixed wetland deposits in the early Iron Age of Southern Scandinavia*. Ph.D. thesis, Aarhus: Aarhus University.

Klindt Jensen, O. 1957. *Bornholm i Folkevandringstiden og forudsætninger tidlig jernalder*. Nationalmuseets Skrifter. Copenhagen: National Museum of Denmark.

Klindt Jensen, O. 1967. Hoved og hove. *Kuml*, 143-150.

Kveiborg, J. 2019. Dyreknogler. *In*: M. Løvschal, R. Birch Iversen and M. Kähler Holst, eds, *De dræbte krigere i Alken Enge*. Jutland Archaeological Society, Aarhus: Aarhus University Press, 105-122.

Lund, J. 2002. Forlev Nymølle. En offerplads fra yngre førromersk jernalder. *Kuml*, 143-195.

Magnussen, B. 2021. Lundbjerggård/ROM3469, Et bestemmelse af dyreknoglerne fra Lundbjerggård. ArchaeoScience vol. I, Globe Institut, Copenhagen University.

McCormick, F. 2009. Ritual feasting In Iron Age Ireland. *In*: G. Cooney, K. Becker, J. Coles, M. Ryan and S. Sievers, eds. *Relics of old decency: archaeological studies in later prehistory. Festschrift for Barry Raftery.* Dublin: Wordwell, 405-412.

Monikander, A. 2010. *Våld och vatten. Våtmarkskult vid Skedemosse under järnåldern*. Stockholms Studies in Archaeology 52. Stockholm: Stockholm University.

Morris, J. 2011. *Investigating Animal Burials. Ritual, mundane and beyond*. BAR British Series 535. https://doi.org/10.30861/9781407308128

Müller-Wille, M. 2002. Offerplatser på Kontinentet. Några exempel från förkristen tid. *In*: K. Jennbert, A. Andrén and C. Raudvere, eds. *Plats och Praxis. Studie av nordisk förkristen ritual*. Vägar till Midgård 2. Lund: Nordic Academic Press, 135-166.

Møhl, U. 1957. Zoologisk gennemgang af knoglematerialet fra jernalderbopladserne Dalshøj og Sorte Muld, Bornholm. *In*: O. Klindt Jensen, *Bornholm i Folkevandringstiden og forudsætninger tidlig jernalder*. Nationalmuseets Skrifter. Copenhagen: National Museum of Denmark, 279-314.

Nilsson, L. 2009. Häst och hund i fruktbarhedskult och blot. *In*: A. Carlie, ed. *Järnålderens rituella platser. Femton artiklar om kultutövning och religion från en konferens i Nissaström den 4-5 oktober 2007*, Halmstad: Stiftelsen Hallands länsmuseer, Kulturmiljö Halland, 81-99.

Pantmann, P. 2020a. *Defining Wetlands. New perspectives on wetland living with case studies from early Iron Age in North Zealand, Denmark*, unpublished Ph.D. Thesis. Copenhagen: Copenhagen University.

Pantmann, P. 2020b. Lyse sten – et udfordrende arkæologisk fænomen. *Gefjon,* 5, 52-83.

Pluskowski, A., ed. 2012. *The Ritual Killing and Burial of Animals. European Perspectives*. Oxford/Oakville: Oxbow Books. https://doi.org/10.1111/1467-9655.12058_6

Reichstein, H. 1991. *Die Fauna des Germanishen Dorfes Feddersen Wierde*. Stuttgart: Franz Steiner Verlag.

Rosenlund, K. 2001. Detailed list of bones from each context for Foerlev Nymølle ZMK156/1960, in the Quaternary Collections archive. Copenhagen: Natural History Museum of Denmark.

Roymans, N. 1999. Man, cattle and the supernatural in the Northwest European Plain. *In*: C. Fabech and J. Ringtved, eds. *Settlement and landscape*. Proceedings of a Conference in Aarhus, Denmark, May 4-7, 1998. Jutland Archaeological Society, Aarhus: Aarhus University Press, 291-300.

Runge, M. 2009. *Nørre Hedegård. En nordjysk byhøj fra ældre jernalder*. Jysk Arkæologisk Selskabs Skrifter 66. Aarhus: Aarhus University Press.

Rüther, P.L., I.M. Husic, P. Bangsgaard, K. Murphy Gregersen, P. Pantmann, M. Carvalho, R.M. Godinho, L. Friedl, J. Cascalheira, M.L.S. Jørkov, M.M. Benedetti, J. Haws, N. Bicho, F. Welker, E. Cappellini, and J.V. Olsen. Submitted. SPIN – Species by Proteome Investigation, *BioRxiv.*

van der Sanden, W. 1999. Wetland archaeology in the province of Drenthe, the Netherlands. *In*: B. Coles, J. Coles and M. Schou Jørgensen, eds. *Bog bodies, sacred sites and wetland archaeology*. Exeter: WARP – Wetland Archaeology Research Project, 217-224. https://doi.org/10.1007/0-387-32216-7_12

Salzani, C. 2017. From Post-Human to Post-Animal. Posthumanism and 'the Animal Turn'. *Lo Sguardo – Revista di Filosofia*, 24, 97-109.

Stjernquist, B. 1997. *The Röekillorna Spring. Spring-cults in Scandinavian Prehistory*. Skrifter utgivna av Kungl. Humanistiska Vetenskapssamfunet i Lund. LXXXII. Stockholm: Almqvist & Wiksell.

Stolt, C. 2001. Fragment av en svunnen föreställningsvärld. *In*: B. Hårdh, ed. *Uppåkra. Centrum och Sammanhang*. Uppåkrastudier 3. Acta Archaeologica Lundensia series in 8, no 34, Stockholm: Almqvist & Wiksell, 29-42.

Teichert, M. 1974. *Tierrreste aus dem Germansichen Opfermoor bei Oberdorla*. Weimar: Museum für Ur- u. Frühgeschichte Thüringens, 1977.

Thilderkvist, J. 2013. *Ritual Bones or Common Waste. A Study of Early Medieval Bone Deposits in Northern Europe*. Groningen: Barkhuis. https://doi.org/10.2307/j.ctt2204s6c

Vretemark, M. 2013. Evidence of animal offerings in Iron Age Scandinavia. *In*: G. Ekroth and J. Wallensteen, eds. *Bones, behaviour, and belief. The zooarchaeological evidence as a source for ritual practice in ancient Greece and beyond.* Stockholm: Svenska Institutet I Athen, 51-59. https://doi.org/10.4000/kernos.2250

Wickman, N. 2011. The Roman Iron Age in Svinninge, west of Holbæk. *In*: L. Boye, ed. *The Iron Age on Zealand – Status and Perspectives.* Copenhagen: The Royal Society of Northern Antiquaries, 259-262.