

Settlement and Landscape

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Why was cattle-stalling introduced in prehistory?

The significance of byre and stable and of outwintering

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*Dedicated to Marta Hoffmann, Oslo,
in respect for her research on the byre*

Stable and byre were used in pre- and protohistoric times to house cattle during the winter (in the following, 'byre' will be used for both stable and byre and 'cattle' will include all domestic ruminants). They were, however, not the only places where farmers put their livestock. This paper will deal with the places where domestic animals were kept, taking into account that, in winter, cattle could be kept in the byre, in yards at the farm, or left outside throughout the year in forests, grassland or on fallow fields. Studying the different ways animals were held during the last millennium, as well as today, allows us to draw conclusions for more ancient times. Although domestic animals were smaller then, their vital needs were not significantly different. In another paper I will consider what is known archaeologically about the byre (Zimmermann 1999; see also Myrdal 1984), but in this, I will concentrate on why, in prehistory, the byre was introduced and maintained.

The terms for byre and stable

Eilert Sundt (1975, 77), the well-known Norwegian folklorist, described in 1869 the different housing tradition in Scandinavia and Northern Germany: 'Since the olden days custom was in these Northern countries to have separate buildings for people and for domestic animals; but just when you cross the old border between Denmark

and Germany ... you find it as an existing and age-old practice that every farmer's house combines under the same roof both people and livestock as well as the preparation of the meal, the barn, etc. Thus the farm's housing exists in only one big building. You enter through the animals' compartment; here you can see cows and horses, standing in two rows or on either side ... at other places in the room there are roosts, where the hens perch for the night. Small cattle and pigs have their pen in one of the farthest corners, but in the same room' (transl. from Norwegian).

Such different practice in the housing of animals is reflected by the terms used in the different languages. The English designations 'byre' for horned cattle and 'stable' for horses are mirrored by vernacular architecture. Generally, in England horned cattle and horses each have a separate building. The same holds true for the Norwegian *fjøs* from Old Norse *fjós* = *fêhûs*, which means 'cattle-house' (Jespersen 1931) and Norwegian *stall* = stable. In Norwegian vernacular architecture, there were usually two separate rooms under one roof. The same separation can be found for the Swedish *ladugård* for byre and *stall* for stable, and in the Finnish *navetta* for byre and *talli*, which comes from Swedish *stall* for stable. In contrast to this, Dutch *stal*, East-Frisian *stal* (Koolman 1884, 297), German *Stal*, Danish *stald* connote the combination of byre and stable; horned cattle and horses are together under one roof and mostly within

sight of each other. For the Danish *stald*, however, this is a later development: the word originally referred to a stable for horses, which is still shown by dialect words (Jespersen 1931; Berg 1982, 31). Only for the German and Dutch *stal(l)*, as well as for the French *étable* (from Latin *stabula*) can today's combined meaning as accommodation for large and small domestic animals be traced back with early references in different etymological dictionaries (e.g. Grimm & Grimm 1960). In time remote from this written evidence and therefore only to be used as a model, not as an explanation of continuity, is the following archaeological observation: on the Feddersen Wierde in Lower Saxony, Haarnagel (1979, 115) found evidence which suggested that horned cattle and horses were kept in the same room, the stalls for the horses being only somewhat larger than those for cattle.

As to how livestock was stalled, conclusions can be drawn also from dialect words (Jespersen 1931, 111). Only one example: on the Danish islands of Funen, Lolland and Bornholm, the byre is called *lade* = barn, *ladehus*, etc. This clearly demonstrates the connection of barn and byre in one building. A combined ethnographic, onomastic and archaeological study can thus help to reconstruct the evolution as well as different appearance of movable and immovable things such as the byre.

How far the separation recorded by the terms in Britain and Scandinavia can be traced back remains uncertain. Scandinavian and English written records document the use as byre and stable back to High Medieval time for these countries (Field 1966, 120). For prehistoric times, further knowledge is almost exclusively to be expected from archaeology, especially by investigations of dung and mites.

The etymological background of the words tells less about the matter. *Stall* goes back to a meaning like 'place, elevated surface' corresponding to the Old Engl. *steall* = place, thus the spot where the animals stand. Whether or not this was originally with or without a roof remains unknown. *Stable* comes from the Roman *stabulum* and this again from *stare*, 'to stand'. The meaning of *stabulum* is not limited, like the English *stable* but on the contrary broad; from 'stand, position, whereabouts of animals and low-class people', to 'byre for all large and small domestic animals', but also 'open cattle-yard, fold, public house', etc. The word *byre* is, to-

gether with *bouwer*, 'birdcage', related to *bur*, which we find from Iceland to Germany; the original meaning is 'house, chamber'.

Importance of cattle documented by written sources and popular belief

The importance of the houses for livestock in earlier times is demonstrated by what folklorists have collected about the popular belief regarding these buildings: we find that traditional imagination was connected with byre and stable more than with other parts of the house (Rantasalo 1938; Brøndegaard 1992). It was of great importance to ward off evil, as is the case with the traditional Latvian song (Bielenstein 1969, 127): 'I build for my young cattle a byre with needles, thatch the roof with scythes, that it might prick, that it might slit, the envier of my herd' (transl. from German).

Also, a great number of proverbs mention byre and domestic animals. Out of this wealth I would like to adduce a few German proverbs picturing the strong relation between cattle, and even their condition and manuring of the fields: 'Cattle breeding is the base and fundament of arable farming; fine cattle, fine litter, plenty of fodder give fat dung, a rich crop, much milk, a lot of cheese and butter; gaunt cattle give little dung, and where there is no dung, there is a poor harvest also for the most pious Christ' (transl. from German: Wander 1876, Vol. 4, Sp. 1630-32), or shortly the Irish proverb: 'Where there is muck there is luck' (Evans 1988, 101).

Domestic animals were a significant link in the whole chain of agricultural economy. They provided manure for the ploughland as well as the dung for heating. Oxen, cows and, since Medieval times, increasingly horses (Langdon 1986; Knittler 1993) were used for drawing plough and heavy wagon. Cows, sheep and goats supplied meat, wool, hides and milk. Until very recently, the main traction animals were oxen. In agrarian handbooks of the 18th and 19th cent. there is a lot of argument for or against horse and ox. The latter was a third slower than the horse. But oxen are more economical

to keep, have more staying power (Brøndegaard 1992, 92-93) and can finally be butchered. A chapter on the yoking of oxen is still to be found in modern handbooks on cattle-farming (e.g. Camenzind 1949).

Animal husbandry had a strong interaction with other agricultural activities. The number of livestock limited the arable land, for which the manure produced in the byre was necessary. Often, cattle seem to be kept more for producing dung than for their further benefits. But in fact, there was an interdependency, which is clearly outlined in the introductory sentence in one of the classical books on the byre, written by F. Engel (1877, 1): 'Under the agricultural conditions in Germany, arable farming without cattle-farming and cattle-farming without arable farming is, with minor exceptions, impossible; the manure unites both branches, because the field needs, in order to keep its productive capacity, the reduction of the majority of the harvested products to dung' (transl. from German). This interdependency applies not only to Germany, but to most agricultural areas of the world. It is the case for the whole time manuring was practised, which goes back to Pre-Roman or rather Bronze Age times (see below). During the last centuries, prospering agriculture was in urgent need of manure, which led to many solutions (van Bath 1960, 279-287). However, dung was used not only as fertiliser but also for burning. The latter we know not only from deserts or Southern Russia, but also from western Jutland and from the clay country stretching from Denmark to the Netherlands. All these areas have in common a lack of forest.

In regularly flooded and by that fertilised areas, dung was also available for building. This is true for the *wurten* in the North Sea clay district, which were raised partly with dung (Haarnagel 1979), and for dykes around hamlets in the Oderbruch and the Spreewald, both in Eastern Germany (Fontane 1994, 32, 33). Dung was an adequate protection against the ingress of water because, after it has settled, of its tough structure.

That the domestic animals were also of importance as a means of exchange, can be demonstrated with the original meaning of the German word *Vieh*, Got. *faihu* for 'cattle.' The Old Engl. *feoh*, for instance, meant 'cattle, herd, movable goods, prop-

erty, money, riches, treasure', and the composite words with *feoh* mostly connote money (Hall & Meritt 1996, 114, 115).

The early importance of milk and its products is still difficult to estimate. Finds of bog butter and the age of words like 'butter' (Jankuhn 1969, 268) attest its early use, but several older records (see Brøndegaard 1992, 80, 83; Bruckbauer & Sorge 1994, 44) leave the impression that the surplus of milk, apart from what was necessary for the calves, from the small and often underfed cows was minimal. During the last centuries, farming people were not used to drinking milk (Kaiser). On the other hand, the many solutions people found to prevent the cowsheds and especially the milking capacity of the cows from being bewitched, demonstrate how important the often meagre product nevertheless was.

In his *Germania*, Tacitus refers to various domestic animals. Most famous is the passage on horned cattle: 'Germania is rich in flocks and herds, but these are for the most part undersized, and even the cattle have not their usual beauty or noble head. It is number that is chiefly valued; they are in fact the most highly prized, indeed the only riches of the people's wealth'. This esteem of cattle is certainly mirrored by the byres excavated, which seem to be larger than they ought to be, considering the number of cattle kept there in winter (Zimmermann 1992a, 135). Further passages in *Germania* show that horses, too, were quite small. They had their significance also for religious purposes. In spite of their modest appearance, the animals, and first of all the horned cattle, meant prestige. Furthermore, as Tacitus writes, they were used for payment, donation, penance and tribute (quotations after Halsall 1996).

Though Central and Northern Europe lacks epics like the Irish *Táin Bó Cúailnge* (Kinsella 1969), records exist, beginning with Caesar and Tacitus (Much 1967, 233), hinting at the significance of customs and a cult of cattle raids (see the paper of N. Roymans in this volume on such customs in Ireland and Northern Africa). The early laws of Northern and Central Europe are important sources, demonstrating that theft of animals is an indicator of the domestic animal's high value. Hoff (1997, 247-248, 404-411; Schmidt-Wiegand 1975, 137-143) has put together the different records mentioning cattle in the Danish, Swedish,

Fig. 1. Svineherd with his hogs in a pen. From the masterpiece of a Lübeck painter: 'The rich man and the poor Lazarus', St. Annen Museum, Lübeck.



English, Irish, Frankish and German early laws. It is impressive how often cattle raids and other theft of animals is recorded, which under both the Danish and German laws carried the death penalty. As in the Early Medieval sources, cattle are also frequently covered by the High to Late Medieval common law. Here, cattle are also found as payment, in form of a fine as penance and manbote (Much 1967, 118). Many more sources attest the importance of domestic animals, such as one of the oldest Edda epics of presumably the 9th cent., the Hun's battle 'Hlòðskviða'. In this Hlòðr demands half of his heritage from his half-brother Angantýr with, in the first place, the enumeration of *kú oc af kálfi* (Hlòðskviða' 8,3).

The dung-yard, an alternative to the byre

An alternative to holding domestic animals is to keep them in an open fenced fold adjacent to the farm all year long or in winter (fig. 1). Only a weather-roof is provided. As shown by another term, *dung-yard*, it was, like the byre, important for collecting manure. Such yards had to be deeply littered with straw, in order not to lose any dung.

Areas uncovered during several settlement excavations, surrounded by a fence, could have been such pens. In another paper we describe the crew-yard, once relatively common in parts of England. The phenomenon is known from written sources as well (Zimmermann 1999, 140). Different from these permanent places are impermanent folds on the fallow fields. These were fenced in further away from the settlement to avoid transporting the dung over long distances. According to Zedler (1741a, 1375), the byre was three times more effective than the pens for collecting manure. As so often in older agrarian handbooks, there are also contrary views. But cattle were not only kept in an enclosure. In the Northwest-German *geest*-districts cattle roamed in the outfield without herding. This is often recorded, because many litigations resulted from this practice (Kaiser). In many cases, livestock had its pasture in forests like the Neuenburger Urwald (fig. 2), northwestern Lower Saxony. The farmers in three villages around had grazing privileges. In 1792, e.g., 284 horses, 861 heads of cattle, 660 pigs and 1292 geese were driven into the forest. To send goats into the forest was already prohibited at that time (Pott & Hüppe 1991, 79-94).

In other areas, herding and tethering on grassland were widely used to manage livestock. Early



Fig. 2. Forest grazing in the Neuenburger Urwald, drawing from Julius Preller: the 1850s. Stadtmuseum Oldenburg.

archaeozoological reference exists to special types of herder dogs, and the term for 'to herd' = **poimen* is very old (Jankuhn 1969, 267). To tether cattle outside meant efficient use of small pasture areas. The practice is well described by Hansen (1962, 81-84). Tether-sticks came to light in bog finds, like the *tøirepæl* in Vimose, Denmark (Engelhardt 1869, 27). According to the Scandinavian laws (Hoff 1997, 227), tethering was prohibited on another man's field or pasture. The High Medieval Danish laws indicate decreasing or at least different pasture facilities in the areas of Denmark (Hoff 1997, 211-214): while the oldest laws do not treat grassland, there are only a few rules in the somewhat later laws. In the time of the most recent, however, regulating the grazing right had become important, like the maintenance of fences around the arable fields and the consequences when cattle had crossed these, and also that the animals should be marked.

Evidence for early examples of holding domestic animals in the settlement is given by pollen analysis. We refer here to the analyses from Flögeln, Lower Saxony (Behre & Kučan 1994, 147-152). In an older period, apparently the older Funnel Beaker Culture, there is no evidence for forest grazing, but pruning is indicated by a strong decrease of elm. Pruning made the elm susceptible to elm disease, which, in turn, is the reason for the elm decline. Consequently, leaf-fodder must have been cut to feed the animals. It is likely, but archaeologically not yet proven, that animals were held in folds. The reason why, in such an early phase, people had to gather fodder can perhaps be explained with security from predators and/or hostile people. In the following phase, belonging to the Funnel Beaker Culture as well, and subsequent phases, pollen analysis gives strong evidence for forest grazing.

Pen-like areas have been uncovered at several settlement excavations, such as Flögeln, but in most cases, the interpretation remains uncertain. One of the convincing finds has been made at the Early Medieval *wurt* Elisenhof, Schleswig-Holstein (Bantelmann 1975, 55, 56). Adjacent to the settlement, a high-lying area with a drinking-pond was bordered off by a ditch in the sides of which the lower ends of thorn-bushes were sticking. Such plants must have been transported over a great distance,

as they do not grow in salt marshes, which then covered the surrounding area. Bantelmann interpreted the construction as an entanglement, a fold to keep cattle in.

Roman references to byres

Columella describes byres and open yards in his 'twelve books about agriculture', dated to the 1st cent. AD (1,6, 4-6; after Ahrens 1972, 61): 'For the cattle, byres are built, which suffer neither from cold nor from heat; the working animals get two, one for winter and one for summer, the other cattle, which belong to the villa, have covered places or folds in the open air, fenced in with high walls, so they can rest there in the winter, here in summer, out of danger from predators. Byres are spacious and have to be constructed so that no moisture can soak in and that all the dampness which is collecting inside, will quickly dissipate; otherwise the wall foundations and the hoofs of the animals will suffer. The cattle stalls should be 10 or at least 9 feet wide; this dimension leaves plenty of space for the animals to lie down and the farmer to walk around the animals. The mangers may only be so high that cattle or draught animals can easily eat while standing' (transl. from German).

Both, byre and weather-roof are described by Palladius (1898) in his *Agriculturae = De Re Rustica* I, 21 and 22. This Roman writer on agriculture probably lived in the first half of the 5th cent. His agricultural calendar was widely read even until early modern times. The stable/byre (XXI De *Stabulis Equorum et Bovum*): 'The horse-stables and cattle-byres should in fact have a southerly aspect, but nevertheless not lack light from the north. This does no harm in wintertime, when the byre is closed, but, when open in summer, it brings a drop in temperature. The byres should be raised against moisture because of the animals' hoofs. Cattle are nicer to look at when there is a fireplace nearby, and they are turned towards the light. Eight feet are absolutely enough for the breadth of the stalls for one head of cattle, fifteen for two. In the horses' stalls there should be thick planks, so they have it soft while lying and hard while standing'.

The weather-roof (XXII De *Corte*): 'Against the warmth of summer, protective roofs should be

constructed of forked posts, poles and foliage, making it comfortable for the animals under them. The weather-roofs should be covered with shingles, or with tiles, when sufficiently on hand, or, to make things simpler, with reeds or broom' (transl. from Latin).

Roman and Early Medieval references on the relation between byre and climate

To understand the advantages as well as the disadvantages of the byre, the opposite, viz. outwintering, should be discussed initially. Generally, one considers that harsh winter climate forced man to invent the byre. This explanation is already found in Roman times, e.g. in Vergil's *Georgica, On Agriculture*: After having described the situation in Libya, where cattle stay out all year, he deals with the north, with 'Scythia', which for him means the 'unknown north', and areas along the Danube, on the Sea of Azov and in Bulgaria: 'There in byres they keep the cattle locked in, and you find no green on the field, no foliage on the trees, but the land lies distorted by walls of snow and thick ice, which towers seven yards high' (after Schönberger 1994, 95f.; transl. from German).

The close connection of climate, collection of winter fodder and stalling cattle in byres is used by Bede Venerabilis (1982, 27, 31) in his *Historia ecclesiastica gentis Anglorum* written in 731 AD as a means to recommend Ireland for its climate: 'Due to the moderate winters, nobody makes hay or builds byres for his cattle' (transl. from German).

Indeed, as I will state conclusively, one reason to introduce the byre is closely connected with climate, but, as will be seen further, there were more reasons for its introduction.

Outwintering livestock

The amount of tolerance of weather conditions like cold, heat and wind and the endurance of light still show the provenance of the domestic animals: the wild horse coming from open areas like steppe, the wild horned cattle from glades and the edge of forests, and the wild pig from the forests themselves. Put simply, the horse still stands cold, heat,

wind and light best, horned cattle suffer only from heat, the pig from all of these (Haiger et al. 1988, 150). Yet it is not only a question of origin but also of size. According to Bergmann's rule (Bergmann 1848; Bezzel & Prinzinger 1990, 238), larger animals loose less heat than smaller ones. The reason for this is that, when a volume rises by the third power, the surface area rises only by the second power. Therefore horned cattle and horses appreciate lower temperatures more than sheep and pigs do. We also have to take into account that prehistoric domestic animals were far smaller than today, but the relative differences between the species were about the same and, as early breeds, they had a far thicker coat similar to what some traditional breeds show today. Of all these animals, only the young are sensitive to cold. They will have been taken into the living area of the houses, as is mentioned in many references from later times.

Traditional outwintering domestic animals

Since prehistoric times, the byre was certainly more widely distributed than archaeology has hitherto revealed. But in regions where archaeological finds of byres are known, mostly no other kind of cattle management is discussed in the literature. By dealing with outwintering, we therefore wish to stress here that cattle in the byre during winter was only one, albeit important, solution. Even at the same time, some of the livestock could have been in the byre and another part could have been outwintering. That all traditional forms of livestock can stand outwintering, that it even has its advantages, can be shown with traditional and recent practice.

Outwintering smaller domestic animals

Provided with some meagre protection, not only the larger, but also the smaller domestic animals can stay out in wintertime and would not need a byre. This can be demonstrated with records on outwintering in historical time and today. It holds true even for pigs: Hennings writes in 1770 (after



Fig. 3. Christian David Gebaur: *Wild stud at Frederiksborg Castle, Zealand, painting of 1821*. Statens Museum for Kunst, København, Inv. No. 1245. Photo by Hans Petersen.

Bloch 1902, 171, 172; see also Brøndegaard 1992, 145) about central Zealand: 'pigs that shall outwinter spend the whole winter in field and forest. The farmers build a kind of byre for them out there, where they provide them with only a little fodder. I have seen many giant barrows, grave-monuments, which were used for this purpose' (transl. from Danish). Bloch (1902, 172) refers to another account in a different paper of Hennings where he describes the excavation of a megalithic grave. A rectangular cobblestone pavement was installed as the floor of such a pigstye. Near Horsens, hollow oaks were used as styers. Since in other parts of Denmark, pigs were held in forests over winter or at least until Christmas, too, a forest law promulgated in 1781 prohibited the keeping of pigs in the forest after 30th November (Brøndegaard 1992, 145).

Sheep are very hardy with respect to low temperatures, but because they are quite sensitive to

humidity, they also need shelter. With that, they can be kept outside all through the year, even in a harsh climate as in the Faeroes, where they survive also when they become snowbound. On several occasions, however, as during the second half of the 18th cent., a heavy and prolonged snow-cover resulted in heavy losses of sheep, more from starvation than cold. There was no housing except for shelters, mere holes in hillocks, scattered in the outfield (Joensen 1979, 108; Brøndegaard 1992, 183). On Southern Iceland, sheep stayed out all year, too, having as shelter circular shielings called *fjārborg* (Falk 1919). In the Northwest German *geest*-districts, sheep were herded also in winter-time, except when snow was so heavily frozen that they could not get at the fodder (Kaiser). A forerunner of the recent open byre is the sheephouse depicted 1411-1416 in the French manuscript *ms. lat. 1284 fol. 2v, Chantilly, Musée Condé* (Hansen

1984, fig. 27). In the fenced farmyard, the sheep are kept under a weather roof that in its lower half is provided with wattle walls (Kaiser).

Also goats can stay out well in frost and snow, but they damage forests even more than other domestic animals (Brøndegaard 1992, 207).

Feral horse herds, an originally common practice to ensure after-growth

While the working horses were in the stable, breeding horses were often gathered in herds, which at many places in Europe, North America and Australia, lived in a feral state. This means that they are descendants of domestic animals that have reverted to a wild or semi-wild state. Already Tacitus speaks in his *Germania* of horses, living in forests: 'Kept ..., in ... woods and groves, are white horses, pure from the taint of earthly labour ...'. Today there are still some of these herds. Well known are those from England, like the feral ponies from Exmoor, Dartmoor, the New Forest, the Dales and the Fell, which, according to Hall & Clutton-Brock (1995), have lived in these moorlands and forests in England for hundreds or rather thousands of years. These English horses have owners, for some farms have kept their old rights to graze ponies, cattle and sheep. An early recorded reference to the Dartmoor ponies is in the will of the Saxon bishop Aulfwold, who died in 1012 AD. In the New Forest, which has been a Royal Chase since 1079 AD, 3,000 ponies and 2,000 cattle today roam free in the wood- and heathlands by ancient right, and the horses also stay out in wintertime. There are several more areas in England with feral animals such as the Chillingham White Cattle and feral goats in the Cheviot Hills, both near Wooler, Northumberland, as well as in some areas of Wales. Even more often, 'tame' herds of all kinds of livestock in the uplands and lowlands are kept outdoors through the winter.

Of the many feral horse-herds formerly found in all Scandinavian countries, there are today to my knowledge only the so-called 'Russen' on Gotland and the feral Icelandic ponies left. Obviously, nowhere are there so many feral horses as on Iceland, where of the whole stock of about 65,000 horses, nearly half are feral. Especially for Denmark, the

written tradition on the topic is quite rich (Ene-mark 1981). In studs, the so-called *stod*, nobility and clergy kept semi-wild horses. At least twelve mares and one stallion lived in fenced-in and often forested areas or on small islands and promontories, of which Denmark has so many. In Valdemar II's *jordebog* from about 1231, for instance, such *stod* are named from the islands: Birkholm, Lyø, Strynø, Siø, Hjortø and Drejø. Nearly every year, wild horses, mostly foals, were sold at Gedesby, Falster. At the beginning of the 19th cent., there was still a wild *stod* in Dyrehaven, near Copenhagen (Brøndegaard 1992, 14, 17). Hennings writes in 1770 (after Bloch 1902, 171, 172) about central Zealand: 'In these extensive forests, the richer farmers had a sort of stud with wild horses. These animals were now totally abandoned to nature, and they only find shelter in the village with the most severe frost, when the soil is covered with snow and nothing can serve them as fodder. Only with great effort can the farmers catch these horses' (transl. from Danish). Horses living out the whole year, with only make-do shelter, are also reported from Sweden by Berg (1982, 31-32). According to Ropeid (1982, 274), the same was true for West Norway and Southern Iceland (Falk 1919). In 1800 semi-wild horses are reported from Karmøy, West Norway (Tuff 1982).

Of several such herds on the Continent, apart from those in the Camargue, one with currently 300 horses survived in Germany: of originally 40 sq. km an area of 3.5 sq. km (today 4.5) was made a reservation in the 1840s. in the Merelder Bruch near Dülmen, Westphalia (Fig. 3; Späh 1939 and references, provided by R. Knoke). A first written record about these horses dates from 1316 AD. This is an agreement which directed grazing rights for *the wild horses* and other livestock, fisheries, etc. In some later sources, too, the wild horses are mentioned.

Some of the one-year-old horses were and still are caught annually to be used as work-horses. In the time of Zedler (1741b, 1382), feral herds of horses were obviously quite common in Continental Europe: 'According to its nature the horse is either wild or tame. The wild are in the forests and fields under the open sky, young and grown up, untended, and they themselves find their grass in summer and winter, until they are caught in a

peculiar way, broken in with great effort, and made efficient for man's use little by little. Such things are found in the Forest of Atholl and Badenoch highland, both in the Grampian Mountains of Scotland as well as in Ethiopia, Persia and other distant countries. There are wild stallions as well in the Unterpfalz (on both sides of the Rhine south of Mainz) in the Düsseldorf district; moreover in the Hungarian mountains, in the Oldenburg district and elsewhere ... The foals are caught at an age of three or four with agility and slyness, broken in with hunger and thirst with much trouble ... Horses grown up in the wilderness and caught there are called *Wildfänge*' (transl. from German). The word is still known in Langenscheid (1978, 1804): 'animal, such as horse, born in the wild state, but afterwards captured and tamed'. Brockhaus (1846, 137) refers a century later to feral horses in Europe, living in vast numbers around the River Don and in the Ukraine. But still in the early 19th cent. there were many studs with feral horses spread over Germany. As in Denmark, there existed a special market-place for those that were caught in Crange, today Herne, Westphalia (Späh 1939, 10-13; Ueckermann 1993). From the legal point-of-view, these were treated as *Wildbahnen* = hunting-grounds. Mostly these were forest and heath areas where also the farmers' livestock was sent during the warmer periods of the year.

Späh mentions several written records, as well as place- and field-names, as early evidence. King Pepin demanded in 758 AD 300 feral horses as tribute. In Lower Saxony the nobility had their share of such studs. The donation of Bishop Bernhard of Paderborn to the new monastery of Hardehausen included the third part of his untamed mares. In the Westphalian public peace of 1381, the feral horse's security and peace were guaranteed. This enumeration could be continued.

How common such studs were can also be demonstrated by the fact that the settlers in North America took this old practice over to their new homeland. Some herds still exist. The feral horses on the island of Assateague off the Maryland and Virginian coast trace back to the 17th cent. settlers' practice of grazing their horses, cattle, sheep and goats on the barrier islands (Jauch & Points 1997). The vast mustang herds, ranging the great plains during the period 1600-1850, go back to the horses

the Iberian settlers brought with them. In some of these cases, only with very heavy snow, was fodder, and in the Merfelder Bruch, still is, supplied.

Ropeid (1982) considers that the situation with feral horse herds may be generalised for Norway. His argument is, however, true for the whole of Europe. Though the early source in Tacitus' *Germania* does not imply proof of continuity, the extensive records with in some cases Medieval references make it likely that studs with feral horses were originally a common way of keeping horses. Possibly this went back to before the Middle Ages, but here research is required.

To let horses grow up in a feral state had the advantage that the horses were better off, they were governed by natural selection, and during the first years neither care nor fodder was necessary. Because they were frugal and hardy, enthusiastic voices of the early 19th cent. spoke of a 'fountain of youth' for the horses, and there was a great demand for them. However, this practice was only possible there, where there was plenty of space, and it declined as land became in increasing demand.

Thinking of herds of feral ruminants, perhaps this practice was also common for other domestic animals.

Outwintering cattle

Generally, horned cattle, like other livestock, can be outwintered in Central and even Northern Europe. In parts of Europe this practice has been adhered to until Medieval times (Benecke 1994, 162). In Poland, for instance, the byre was, according to Dembinska (1975, 224), introduced at the end of the 10th cent. This must, however, be an exception, because on the evidence of archaeological investigations in Eastern Germany (Donat 1980, 131), where as in Poland Slavonic tribes settled, no byres have hitherto been found. In other areas, some or all cattle were outwintered until recently. This is true even for areas with a continental climate, which means very cold winters as in the Gouvernement of Minsk, White-Russia, where, in winter, cattle were kept in pens until the end of the last century. In Latvia the same was true until some centuries ago (Bielenstein 1969, 134). According to Engel (1877, 2), the cattle stayed out in winter-

time in the south of Russia. Völtz and Kirsch (1928; cited after Brohmann 1957, 25) give an account from Finland, where cattle left the byre also with very low temperatures around -30°C . During winter in the landnam period of Iceland cattle left the byre in daytime to search for fodder (Lárusson 1964). Although in Denmark popular belief held that horned cattle should be stalled before they came in with snow on their backs, young bovines stayed out in mild winters until after Christmas (Brøndegård 1992, 105).

In the far more clement Great Britain (Zimmermann 1999, 137-40), horned cattle were outwintered in most parts of England until the end of the Medieval period, while small numbers of cattle are still outwintered today. While cattle remained in the fields and forests during the Middle Ages, a specialisation of pastoral farming took place at the end of this period. Cattle then stayed in the so-called *crew-yards*. The different distribution pattern of long-houses for both people and animals on the one hand and the crew-yards on the other depends on climatic conditions and on the availability of bedding straw.

Per Kalm (1892, 132, 133), too, regarded the climatic differences as a reason for the existence or non-existence of the byre. Under the headline: 'What advantages an English farmer has over a Swedish one', the well-known Finnish botanist writes in 1748, referring to the south of England: 'It is well known that the winters in England can in no way be compared with our Swedish ones. I here refer especially to the southern parts and around London, for farther north in England also, they are sharper. The snow seldom lies more than two or three days on the ground. Cows, horses, sheep and other animals here go out all winter, and feed on the grass which stands verdant throughout the year'.

While visiting Swedish and Finnish emigrants in North America, Per Kalm (after Kerckonen 1959, 210) observed disadvantages of outwintering cattle. They sometimes froze to death, when frost followed rain. The close relation between arable farming and cattle dung is again documented with Kalm's (1937, 55, 56) observations: 'Manure is very difficult to obtain and therefore people rather leave the fields uncultivated. In the interval they are covered with all sorts of plants ... and a fallow or never ploughed piece of ground is culti-



Fig. 4. Cattle outwintered today in the low mountain range at Rellichausen, Solling, Lower Saxony. Photo by F. Wallbaum, Monheim.

vated. The cattle here are neither housed in winter nor tended in the fields, and for this reason a sufficient quantity of dung cannot be collected.'

The illustration common in Medieval art of the 'Stable of Bethlehem' is indeed not a byre or stable, but only a weather-roof, as described by Palladius (see above; Zimmermann 1998a). The fact that instead of a byre of today's understanding, a shelter is depicted, might mirror the common situation of the first millennium in the Mediterranean. Though such weather-roofs are widely known for summer use all over Europe until today, they cannot be taken as a model for the more Northern parts of Europe, because they can be traced back to antique presentations in Italy. Even in the Mediterranean, the weather-roof was not the only building. There existed proper byres (as described by Columella and Palladius; see above).

We suppose that an intense study of older records could reveal outwintering to have been common practice in other parts of Europe as well.

Recent experiments with outwintering

Though we can refer to the fact that outwintering was also practised during the last centuries, the general doctrine was that the byre had to be warm (fig. 4). In 1579 M. Sebiz wrote: 'The byres should be at the warmest place of the whole farm', and in 1720-38 Frisch demands: 'a warm byre, into which

the cold cannot penetrate' (both after Grimm & Grimm 1960, 598). According to Zedler (1744, 1047), the byre had to be warm and airy. Many agricultural handbooks repeat suggestions like these. In 1857 Mechi advised: 'Let us keep our cattle warm and dry and well fed, and we shall seldom feel the cramp in our pockets' (Charles 1994, 5). The reason for this advice, that livestock need less food when kept warmer, is a valid one. But warmth, especially for horned cattle, can become more problematic than cold. The range from -5°C to $+16^{\circ}\text{C}$ is best for horned cattle. When it gets too warm, milk yield is reduced. In fact, the vernacular Lower-German byre cum dwelling-house was ideal because it provided the range of temperature cattle prefer (Kaiser 1980). According to McBride et al. (after Charles 1994, 21), adult horses are probably thermoneutral from -10° to $+10^{\circ}\text{C}$. The more recent byres with better isolation, however, corresponded to the needs of the people, not of the animals. This was, why, with first beginnings in the late 19th cent. and intensely after 1950, experiments were started in several parts of the world to dispense with a byre and provide only some shelter, but also to have open byres, either where horned cattle could go in and out, or with partly open walls (Ohl 1953). Today, this is practised for all traditional domestic animals with good results, even for milch cows. Outwintering in particular improves the animals' health. In the northwest of Lower Saxony, for instance, several farmers leave horned cattle out during the whole winter or at least leave byres open. If possible, these animals stay outside, lying on frozen ground without harm; only with rain and too much wind do they use the shelter provided. If farmers revert to housing the animals again, this is due only to the increase in number of cattle, which damages the grassland in wintertime too much to be offset by the advantages. The strongest argument against outwintering has to be seen in the farmer's attitude to his cattle, i. e. the aspect of not being under one roof with the cattle is a psychological problem, not a real one. So the often quoted argument for the introduction and maintenance of cattle-housing, that this was a necessity in winter because of climate, or that the byre's 'warmth increases the yield of milk' are oversimplifications or even incorrect. As early as 1939, Evans (210) wrote that 'it was tenacious tradition rather

than poverty which determined the long survival of the custom' to have cattle in the byre.

Comparing the recent experience with outwintering to the situation in prehistoric times, one has always to take into account that the early horned cattle were much smaller and received less nutritious fodder. In experiments in 1955, concentrated feed caused horned cattle not to eat more when it was getting colder, while consumption of traditional maintenance fodder would have gone up strongly with lower temperatures (Brohmann 1957, 31, 42). Also according to Wallbaum (1996, 9), summarising the results from various literature, the consumption of forage generally increases with outwintering, since livestock need more energy for maintenance of body temperature. Experiments with 19th cent. adult horned cattle, which are more closely related to the animals of today than to the prehistoric ones, but with fodder that might be nearer to prehistoric fodder, gave the following values (Engel 1877, 75, 76). The consumption of animal fuel, fodder, increased by $+7.5\%$ with every degree from 10°C down to 0°C . It decreased by $+3\%$ with every degree from 10°C up to 16°C .

According to Brohmann (1957, 24), horned cattle stand low winter temperatures with no health problems, if there is enough time to get used to those conditions. Milch cows were found to thrive best between 4 and 16°C . Above 21°C , temperature became critical. In an upland region of southern Lower Saxony an experiment was done outwintering different kinds of beef cattle (Wallbaum 1996). No differences as to behaviour could be observed between robust cattle like Galloway crossbreds and others like Limousin Friesian crossbreds, 26% of both types of animals making use of weatherproof shelters. Very low temperatures restricted movement. Dry, if possible straw, bedding with a windbreak was necessary.

Increasingly, also sows stay out in the winter. As shelter, they have simple tent roofs or Nissen huts, open at one end.

Advantages of 20th cent. outwintering

The amount of literature on outwintering is legion. It is sent as information to farmers, and even on the Internet it is constantly discussed. Outwin-

tering is being recommended for beef cattle and for young cattle, but also milch cows profit more and more from it. From these references, which I cite vicariously (Hansen & Kromann 1996; Arbeitsgruppe 'Rinderhaltung' 1997; and for the area around the Great Lakes in North America: Owen 1995) and my own conversation with specialists (see: Acknowledgements) and with farmers in Northern Germany, I summarise the advantages and disadvantages.

Advantages are: outwintering cattle are healthier; they are hardier and definitely cleaner; they have dryer hair than byre cattle (except in the rain); the cleaner and dryer hair is a better insulator; there are no heavy expenses with buildings, a simple weather-roof with litter or some tall vegetation as a windbreak being sufficient; feeding is easier in winter, since hay is brought only weekly. Here we also have to draw attention to the disadvantages of the prehistoric byre (see below).

Disadvantages of outwintering are as follows. In some instances, it means a rather large consumption of fodder; with mothercow-herds there is more parasitic infestation; grassland is damaged by the animals' hoofs. This is less on hard but heavy on soft ground. Total destruction occurs, where, as in areas that are marshy and boggy or that have a high watertable, the soil is waterlogged in winter-time. At such places in North America, concrete areas are offered, which stresses the cows, but cows recover faster than damaged pasture.

In all these discussions, the advantages of outwintering far outweigh the disadvantages. Behaviour of cattle is described in these accounts as follows. Cattle used shelter only in heavy rain, more so in combination with storm and heavy night-frost. The place where food and water was provided was more important for the animals' whereabouts than weather conditions. Low temperatures, snow, even snowstorms did not matter in any way, and with wind they only went leeward.

By comparison, it is important to state that during the recent outwintering, cattle were fed as in the byre, or special grasses were sown, such as *Festuca arundinacea*, which, unlike most grass species, will grow in winter and can stand grazing. The main reason why animals have to be fed nowadays is today's great number of animals, but neverthe-

less this means that under early conditions, large pasture areas were needed and these were consequently severely damaged.

Why was the byre introduced and maintained? Its advantages and disadvantages

A burdensome disadvantage of a byre and also of an open yard next to the farm was that people were forced to gather winter fodder. This was also necessary for outwintering animals, but only at times of heavy snow, and the effort was much less. Collecting leaf- and grass-hay for the stalled animals took up a large part of the farmer's work during the year, the amount of winter fodder he could gather limiting the number of domestic animals he could keep. Many written sources tell us that, in spite of all efforts, winter fodder was often so scarce that the animals died, or that they had to be carried out in early spring to the grassland, weak as they were. In Southern and Northern Germany, the expression *Schwanzvieh* (= tail-cattle) was used for such weak animals, which had to be pulled up by the tail and often had to be driven to grass (Bruckbauer & Sorge 1994, 44; Prior 1995, 158). Often the domestic animals gave only meagre profits, and in wintertime little or no milk. It always had to be considered how large a part of the herds would have to be slaughtered in autumn and how the scarce fodder would have to be divided to ensure that breeding stock survived, and how working animals could also fulfil their task in winter. A situation, as reported from the eastern states of the USA, will have been normal in previous times: the side aisles of the 'Dutch Barns' were used as byres. Blair (1990, 2) 'added his touch of ancient Montgomery County [north of Washington DC] knowledge that old-time farmers there didn't milk cows in winter ... They had no silage, only dry corn, and that made poor fodder for the cows so the cows dried up ... They purposely dried the cows up at the start of winter. There was no market for raw milk and too cold to make cheese or butter. Mid winter they added a bit of good grain to their feed so the cows would be able to produce a healthy calf

in the spring and produce milk to feed it ... The cow, on good pasture, could feed her calf and produce a surplus of milk ...' This sounds somewhat contradictory, but clearly shows how scarcity of fodder and planning of calving had to be weighed up against each other. According to experiments in the fifties and earlier, the cows' milk yield decreased strongly with temperatures below 0° C (Brohmann 1957, 28-40, 174), while temperatures above 25° C had the effect of a slow, but continual decrease. These values, which vary from one source to the next, cannot be taken as a model for prehistoric times, but the numbers determined under extreme conditions, for instance from Russia, give us some idea that no or only little milk could be obtained in wintertime. The relatively low values are a result of the lack of fodder and the condition of the cows.

Another disadvantage of the byre was that stalling and tethering domestic animals in byres prevented them from having the necessary social contacts. The difference between natural life in a herd, close to wildlife (Haiger et al. 1988, 161-65), and tethering livestock indoors is extreme. Better for animals is not merely a question of fodder and temperature but also of animal behaviour.

Until recently, stalling meant big problems with vermin, for several of which chances were better inside than outside the byre. This is, for example, true for houseflies (*Musca domestica*). These 'do not place their eggs in cowpats' (Troels-Smith 1984, 22, 23), therefore the fly's larvae develop almost only in the byre. Archaeologically, in dung from byres often a wealth of pupae are found. Flies mean constant stress for the cattle, for people a hazard to health. According to Kaiser (1999), at Cloppenburg, closed alcove beds were introduced because of the plague of flies.

Almost a legend: 'The cow keeps the house warm'

Although we almost classify it as a legend, we have to discuss one point, often quoted as an advantage. The Irish proverb: 'The cow keeps the house warm' and that the byre's 'warmth increases the yield of milk' (Evans 1939, 210) mirrors a belief which was

and still is accepted as a fact. One example: F. Heiglin writes in his 1793 book, *Letters about Graubünden* (after Huwyler 1996, 38): 'On top of the byre the owner lives with his family, and he saves many a billet of wood by the warm exhalation of his underground neighbours'. Perhaps this was true for these well-built Swiss houses, because indeed domestic animals, and above all horned cattle, are strong heaters. Thus, in modern byres, problems arise because, as mentioned above, horned cattle cannot stand high temperatures. But these problems arose with today's capacity to insulate buildings. Before this, in many of the vernacular and even more so the prehistoric byres, warmth dissipated because the buildings were not sufficiently insulated. That the warmth did not reach people, even when they were living in the same room, could be testified by temperature measurements in vernacular houses as well as in archaeological experiments. With a small group of people, Harsema (pers. comm.) stayed in the same room with young horned cattle, similar in size to prehistoric ones, in a reconstructed Pre-Roman Iron Age house at Orvelte, Drenthe, in wintertime (Harsema 1982). Thermographs, fixed at different places inside and outside the house recorded that both the warmth of the hearth and that of the cattle did not reach very far, and certainly the cattle's warmth did not reach the living-area. In a vernacular Lower-German byre cum dwelling-house at Visbek, Ldkr. Vechta, Lower Saxony, Kaiser (1980, 32-37 and pers. comm.) carried out comparable temperature measurements. The building was still a smokehouse when the experiment took place from Dec. 1974 to March 1975. As in Orvelte, thermographs were placed in- and outside the house. In both cases, warmth of cattle and fireplace did not contribute much to the mean temperature in the house, which was almost entirely dependent upon outside temperatures, with only a few degrees' difference. The easily penetrating frost could kill cattle. While they can stand very low temperatures when overwintering, their resistance to frost when tethered in the byre is far lower. A sunken byre (Zimmermann 1992a, 150; 1992b, 211; 1999) however, filled with dung, was a good insulation against frost which came in more through the ground than through walls and roof.

Thus the proverb ‘The cow keeps the house warm’ is not true for most older timber buildings. It must find its explanation in the psychological affection of man towards his cattle. An exception might be found in log-built buildings, for with these, insulation is far better than in the other types of earthfast or non-earthfast timber structures.

Even though draught takes off the warmth, the animals’ dampness did spread in the house, and more so, when the dung was taken out (Kaiser 1980, 33). Because of the high humidity and the warmth just between the cows, the byre was a preferred place in Norway for textile work such as spinning (pers. comm. M. Hoffmann, Oslo).

Dependence of the cattle’s winter feeding on production of biomass

The seasonal production of biomass differs from the north to the south of Europe. In the north, the effect of the light summers is a high production, while during the dark winters, it is very low. On the other hand, in the Mediterranean most biomass is produced in winter and spring, and during the dry summers it is low. But even with low biomass production, overwintering was practised, as is documented by horses being out in Scandinavian winters (see above).

The main argument used some centuries ago for introducing the whole year’s indoor feeding, that far less green-fodder is spoiled in the byre than with cattle on grassland (Assion 1988), is even more convincing for byre feeding during winter-time. Because the outside resources are in large parts of Europe then limited, only a few animals could survive outside. To feed with only small areas of grassland, more cattle meant making use of the surplus of the summer’s biomass; therefore hay, straw, leaf-hay, etc., were stored. Thus introduction of the byre could be an answer to more demand on agrarian ground, resulting in a denser population of cattle and in reducing fertility. That such a pressure can be observed quite far back in time is, for instance, demonstrated by the early summer use of alpine pasture/ seter in Scandinavia and the Alps since Bronze Age times.

Reasons for introducing and maintaining the byre

What were the advantages of the byre, why was it introduced and maintained over centuries or even millennia when today’s cattle can be overwintered to good effect? We can sum up some major causes or perhaps more. These were certainly of varying importance in different regions, according to climate, soil, people’s further economic needs, their faith and the social value of domestic animals, etc. The arguments are except for d and f more or less equally valid for the open yard, so that the question of why the byre won over the yard is still an open one. Between several of the topics, there are interdependencies.

- a. Extension of livestock: By using the surplus of the summer’s biomass for winter feeding, more cattle could be held in byre or yard. Only a few animals could still remain outside to use the meagre resources remaining.
- b. Manuring: Collecting dung was best effected in the byre and in dung-yards, less so on fallow fields and not at all in the outfield.
- c. Cold and wet climate: The effect of climate is more indirect than direct, being related to the production of biomass (a) and of snow cover rather than to temperature. Arguing for this is the fact that the Anglo-Saxons, who did have byres on the Continent, rarely built them in England (Zimmermann 1999).
- d. Saving fodder by stalling in the byre: Though horned cattle can stand cold better than heat, and staying out in colder temperatures can even be advantageous, body heat will remain the same, but because the body expends too much heat in the cold, cattle have to eat disproportionately more.
- e. Preventing damage to forests and grassland: Damage was prevented by the yard and byre, because cattle damage trees in winter far more than they do in summer, as they are forced by snow and less grass to eat bark. Also grassland was kept from destruction, when waterlogged in wintertime.
- f. Security: Protection against predators and

cattle-raids by hostile neighbours was best in the byre, less in the yards and even less or non-existent outside the settlement, depending on whether herding was practised.

- g. Mental attitude of man towards domestic animals.
- h. For daily purposes like milking, having draught animals at hand, or to separate sick animals, it was more practical to keep the livestock in the byre or crew-yard. Especially the draught animals had to be closely looked after by the farmer so that they gradually got used to the draught and other work situation.

Prospect

Disciplines covering archaeology, history, ethnography, onomastics, etc., have collected information on the early byre. Several statements of farmers in early handbooks can also throw light on earlier conditions. However, there still remain many more questions concerning the byre's evolution, use and distribution. We have to query what the percentages were of animals under and not under cover, and how the situation is to be understood in Western, Central and Eastern Europe, where hitherto scarce archaeological evidence exists. To what extent were byres here also a common part of a farm? In view of the different practice as to how cattle have been held in recent times in byres, the customs were certainly not generalised in prehistoric times either. Therefore in future research the matter has to be treated regionally.

On the background of different records of how livestock was held during this second millennium, I have tried in this paper to work out the byre's significance. That most livestock was under cover in winter, I take for granted. My main emphasis lay on the scarcer but nevertheless widespread evidence on outwintering. I used this as an argument that man in prehistoric and early historic times did not have the byre as his only choice, which is normally assumed by archaeologists and agricultural historians. The wide distribution of the byre, documented by laws, etc., in Early Medieval times, makes it likely that even earlier the housing of livestock was more widespread than archaeology could show. But proof of byres does not say how

common or exceptional they were. Only if phosphate mapping (Zimmermann 1998b) becomes a standard method on settlement excavations, will more thorough knowledge will be gained.

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