FASCICULI ARCHAEOLOGIAE HISTORICAE 38: 2025
ISSN 0860-0007, e-ISSN 2719-7069
DOI 10.23858/FAH38/2025.003

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Livestock Burials from the 18th-century Semonice (Czechia): Insights from Zooarcheological Studies

Abstract

The study focuses on the findings of animal burials from the 18th century, which were excavated during archaeological research in the cadastre of the village of Semonice (Czechia). Ten pits contained more or less complete skeletons of cattle and horses, and two pits with superimposed parts of livestock skeletons. Most of them were adult and subadult animals, but in some cases, the remains of calves were also mixed in. No traces of butchering were recorded on the bones, and due to the high number of individuals recorded, it is hypothesised that these are animals that died during an epizootic. Hypothetically, it is possible to assume a connection between the cattle burials and the military camp that was located at the same site.

Received: 01.04.2024 **Revised:** 05.05.2025 **Accepted:** 30.05.2025

Citation: Sůvová Z., Drnovský P. 2025. *Livestock Burials from the 18th-century Semonice (Czechia): Insights from Zooarcheological Studies*. "Fasciculi Archaeologiae Historicae" 38, 65-74, DOI 10.23858/FAH38/2025.003

KEYWORDS
- animal burials
- cattle plague
- epizootics
- Modern Age
- Semonice
- Czechia

Introduction

The paper is devoted to the evaluation of the findings of cattle burials discovered during archaeological excavations in the village of Semonice (Czechia). One of the research goals is the presentation of detailed results of the archaeozoological analysis and an attempt to discuss the origin of this mass animal burial. In contrast to the usual situations (single burials), some cases characterise mass burials. The paper will thus evaluate the archaeological findings and animal skeletons in the context of the entire site. Our hypothesis is that these are burials of animals that died during an epizootic, although the death of cattle may theoretically be related to the proximity of an eighteenth-century military camp, the remains of which have also been excavated.

The Site and Methods of Archaeozoological Analysis

In 2017-2019, archaeological excavations were carried out near the village of Semonice near Jaroměř, Náchod District, Czechia (Fig. 1). The rescue investigations were triggered by the construction of the highway. The excavation area was divided into two parts - A and B. The features have several things in common, including their orientation in the south-east-northwest direction. The depth of most pits ranged from 30-60 cm (Fig. 2), and they were usually completely filled with the animal carcasses deposited in them.

The excavations revealed a total of eight pits clustered in two distinctive groups and four individual pits located further from the main concentrations. The largest group, comprising five features, was situated in section A of the site, southeast

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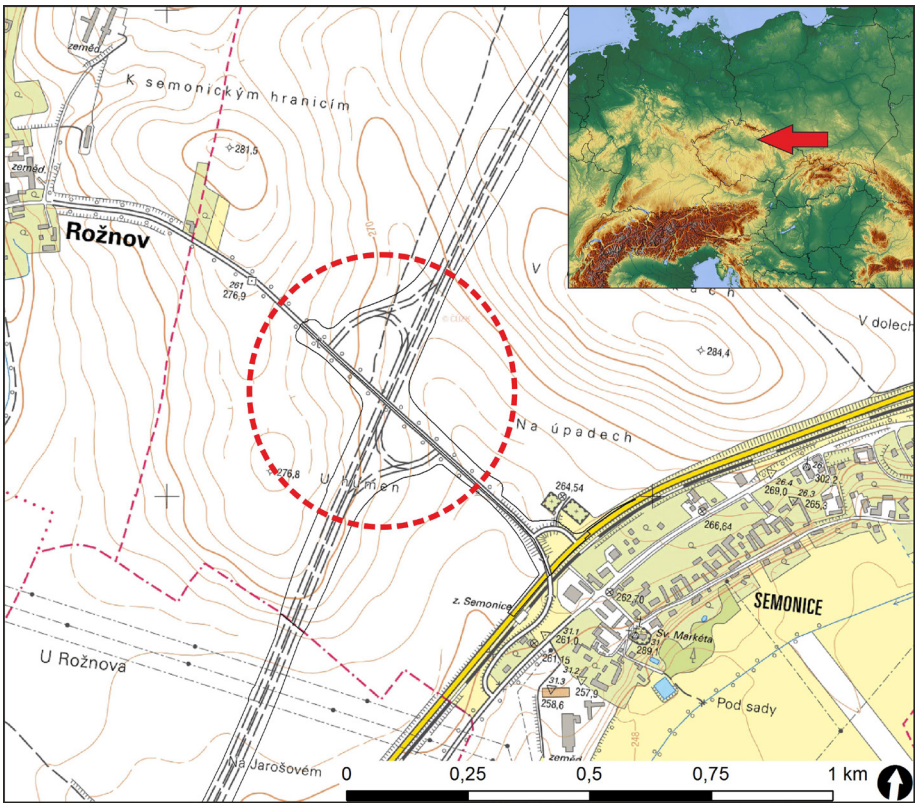

Fig. 1. Semonice. Site's location within the territory of Bohemia. Graphic design: P. Drnovský.

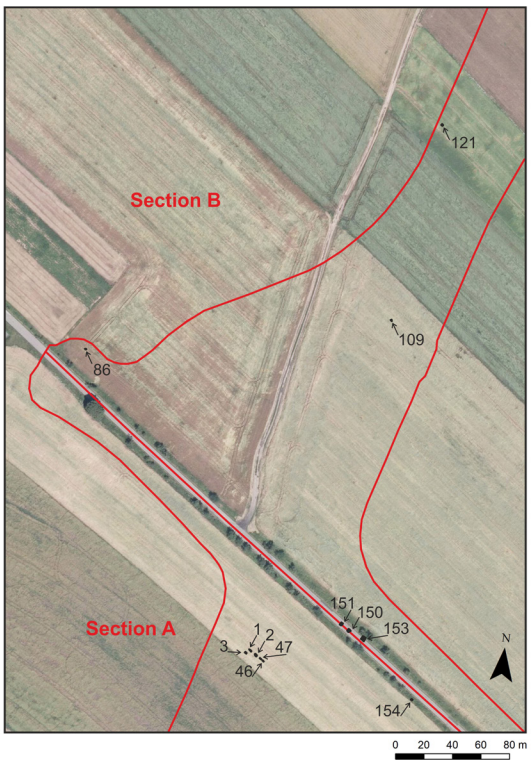

Fig. 2. Semonice. Location of the features and their identification, the borders of the excavations are marked with a red line. Graphic design: P. Drnovský.

of the road between Semonice and Rožnov. Features 2A-1, 2, 47, and 46 formed a line parallel to the Semonice-Rožnov road, while feature 2A-3 was located slightly to the southeast of the adjacent pit 2A-1. The second group consists of three features (2B-150, 151, and 153) that are also lined up along the same road, but much closer to it than the first group. In terms of relative chronology, it thus seems likely that the individual pits in each of the two clusters described above were dug within a short time period, since they don't overlap each other and are identically orientated along the same road (Figs. 3 and 4).

The analysis of animal bones was carried out according to standard archaeozoological procedures.[1] Usable dimensions were measured using a digital calliper, according to the dimensions proposed in the publication by A. Driesch.[2] The number of identified finds (NISP), the weight of fragments (g), and the minimum number of individuals (MNI) were used for the quantification of the assemblage.[3] The age of the individuals was estimated based on the development of their dentition and tooth wear and on the basis of the epiphyseal fusion.[4] The sex of the cattle was determined based on the different appearance and length-width indices of the metapodia,[5] while the shoulder-height of livestock was calculated based on the maximum lengths of the whole limb bones.[6]

Results

Summary of Findings and the Form of Deposition

In twelve archaeological features described above, archaeologists discovered a total of 2,640 bones of domestic cattle (*Bos taurus*) with a total weight

[1] Reitz and Wing 2008.
[2] Driesch 1976.
[3] More on quantification methods in Kyselý 2004.
[4] Schmid 1972; Levine 1982; Červený et al. 1999.
[5] Davis et al. 2012.
[6] Driesch and Boessneck 1974 for cattle; Eisenmann 2009 for horses.

Fig. 3. Semonice. Documentation of livestock skeletons. Author: P. Drnovský.

of 123,765.3 g and 418 bones of domestic horse (*Equus caballus*) with a total weight of 22,760.6 g. Moreover, due to the relatively poor depositional conditions, a substantial part of the material was highly fragmented. Thus, in addition to the identifiable bone remains, there were 2,380 undetermined bone fragments and countless bone grit with a total weight of 7.390.1 g. Summaries and short descriptions of the content of individual features can be found in Tables 1 and 2 (Table 2 with selected bone measurements /in mm, according to Driesch 1976/ is available online).

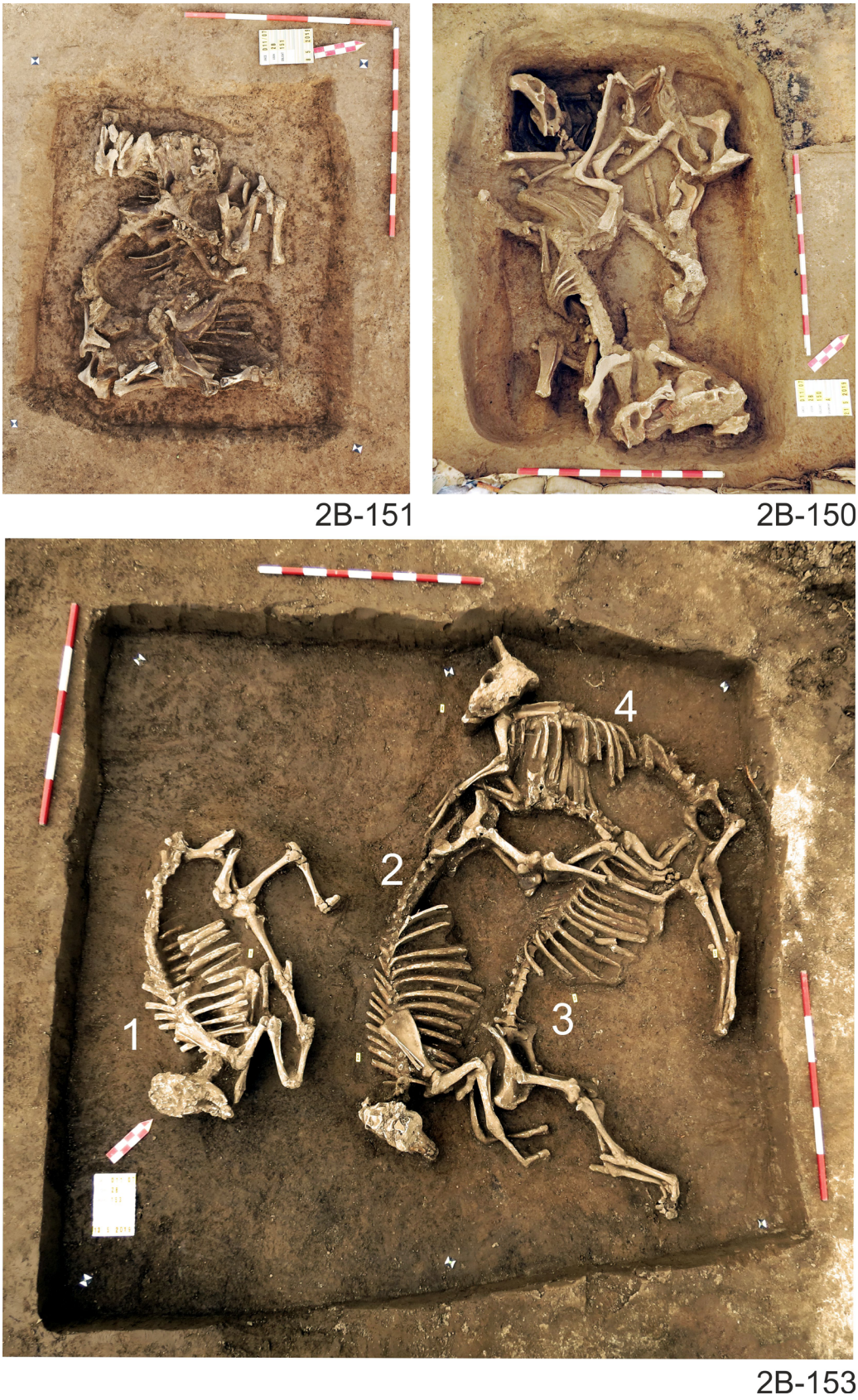

Fig. 4. Semonice. Documentation of livestock skeletons. Author: P. Drnovský.

The osteological remains did not contain traces of portioning, burning, or gnawing. Moreover, there were no visible signs of animal slaughter discovered on the bones. Several skeletons were preserved in their anatomical position; others were found in a more or less disturbed state. Some animals were represented only by individual bones mixed with almost complete or partial skeletons of livestock.

The contents of the pits were not uniform – some pits contained disturbed partial skeletons of adult animals (2B-86, 2B-109, 2B-154), other contained a single skeleton of an adult or subadult individual

Table 1. Semonice. Summary of cattle and horse finds deposited in particular pits (NISP – number of identified specimens, g – weight in grams, MNI – minimum number of individuals, undet. – undetermined, mostly bone grit). Author: Z. Sůvová.

	Bos taurus			*Equus caballus*			undet.	
Feature	**NISP**	**g**	**MNI**	**NISP**	**g**	**MNI**	**g**	**Short description**
2A-1	246	12982.9	5	-	-	-	141.6	adult skeleton (7-10 years, F), 2 adult bones, juv. skeleton (ca. 6 months), juv. limb bones, 3 juv. bones
2A-2	111	6534.2	2	-	-	-	16.7	adult skeleton (7-10 years, F), 4 juv. teeth
2A-3	175	10675.0	1	-	-	-	57.0	adult skeleton (7-10 years, F) deposited in 3 parts
2A-46	106	9342.3	1	-	-	-	152.1	subadult skeleton (3-3,5 years, F/C)
2A-47	193	10774.1	1	-	-	-	168.9	adult skeleton (7-10 years, F)
2B-86	46	1598.6	2	-	-	-	233.3	adult partial skeleton (7-10 years, F), 1 adult bone
2B-109	78	5887.1	1	-	-	-	91.9	adult partial skeleton (7+ years, F)
2B-121	286	3121.6	2	-	-	-	71.7	adult skeleton (7-10 years, F), juv. partial skeleton (4-5 months)
2B-150	316	22905.6	9	339	18914.5	4	4883.6	partial skeletons of 13 cattle and horses mixed in one pit: 9 cattle (one 4-5 months, one 6-8 months, two 24-28 months, two 5-7 years/F, one 7-10 years/F, one adult postcranial (4+ years/ F), one juv. postcranial (1-6 months); 4 horses (one 10-12 years, one 13-15 years, two adult postcranials)
2B-151	272	11712.3	4	-	-	-	428.5	partial skeletons of 4 individuals mixed in one pit: one 5-7 years, one 7-10 years, 1 subadult postcranial, 1 adult postcranial
2B-153 (1)	212	6155.0	1	-	-	-	161.2	4 skeletons of cattle deposited in one pit (1: subadult, 24-28 month)
2B-153 (2)	204	8297.4	1	-	-	-	137.4	4 skeletons of cattle deposited in one pit (2: adult, 5-7 years, F)
2B-153 (3)	207	8366.1	1	-	-	-	168.2	4 skeletons of cattle deposited in one pit (3: adult, 7-10 years, F/C)
2B-153 (4)	188	5413.1	1	-	-	-	343.1	4 skeletons of cattle deposited in one pit (4: subadult, 3-4 years)
2B-154	-	-	-	79	3846.1	1	334.9	adult partial skeleton (7-10 years)
total	2640	123765.3	32	418	22760.6	5	7390.1	

(2A-3, 2A-46, 2A-47), while some contained a skeleton of an adult and an admixture of juvenile animals (2A-1, 2A-2, 2B-121). Furthermore, pit 2B-153 was filled with four complete skeletons of subadult and adult cattle, and there were two more features where partial skeletons from different individuals were superimposed (2B-150, 2B-151).

In the case of 11 more or less complete skeletons of adult and subadult individuals, it was possible to analyse the manner of deposition and the position of the buried animals. In 10 cases, lateral recumbency was detected, with the predominant right lateral recumbent position (7 versus 3). No pattern was found in the placement of bodies with regard to the cardinal directions: in six cases, the animal's head was directed to the east, and in three cases to the west. In one case, the animal was placed with its head to the north, and in one case, to the south. In the case of feature 2A-3, we can state that although the whole carcass was put into the pit, apparently it was already broken into several segments before deposition. The remains of adult animals in pits 2B-109 and 2B-154, as well as scattered finds of juveniles, were too disturbed to evaluate the original position of these individuals. Features 2B-150 and 2B-151 were probably used for the removal of already partially decomposed animal bodies, or rather their parts.

Horses

The remains of horses were excavated in features 2B-150 and 2B-154. In the first pit (2B-150), there were parts of the skeletons of at least 4 adult animals, mixed with partial skeletons of cattle. The second pit (2B-154) contained one disturbed, partial horse skeleton. All horse remains belonged to adult animals. Based on the state of their dentition, it was possible to state the age of three individuals: 7-10 years (2B-154), 10-12 years (2B-150), and 13-15 years (2B-150). The other two individuals, discovered in feature 2B-150, were represented only by postcranial findings; thus, identification of their age was ruled out. Pathological changes related to workload were detected in two individuals: in one of them, they were rather weakly developed, while in the other case, on the contrary, they were very extensive and indicated an overloading on the back (i.e., a riding animal). Horse shoulder-height was

estimated in 9 cases and ranged between 143.6 and 166.2 cm. The average height of the individual from feature 2B-154 was 155.5 cm, and the average height value from feature 2B-150 was 152.5 cm.

Cattle

Cattle bones constituted the largest group of finds in all pits except for feature 2B-154. The total number of identified individuals was 32 animals of different ages: 18 adults, 6 subadults, and 8 juveniles. However, it is possible that the number of individuals was actually lower, and some skeletons were scattered among several features, as in several pits there were individual juveniles and adults' bones mixed with other skeletons.

The remains of calves are mostly preserved in the form of partial skeletons or individual bones in features 2A-1, 2A-2, 2B-121, and 2-B-150. In addition to the unfavourable depositional conditions, the poor preservation of the juvenile finds was also caused by their young age, which, according to the dentition or the size of the postcranial findings, was less than 6 months (apart from the bones of an individual ca. 12-18 months old from pit 2A-2). The skeletons of subadult individuals were discovered in pit 2A-46 (one individual) and in pit 2B-153 (four individuals). Parts of the skeletons of subadult individuals were also buried in features 2B-150 and 2B-151. As for the adults, mainly middle-aged and older animals were found. Individuals aged 5-7 years were discovered in pits 2B-150 (2 animals), 2B-151, and 2B-153 (individual 2). Animals aged 7-10 years were found in pits 2A-1, 2A-2, 2A-3, 2A-47, 2B-86, 2B-121, 2B-150, and 2B-151. In other cases, age could not be determined by dentition and was estimated only from the postcranial skeleton: individuals older than 3.5 years were found in pits 2B-150 and 2B-151, and individuals older than 7 years were discovered in pits 2B-109 and 2B-153 (individual 3).

In some cases, the remains of cornual processes were preserved – these were mostly short-horned individuals with horns turned diagonally upwards and forwards. If we focus on the sex of adults and subadults, females predominate as expected. In one case, in feature 2A-46, archaeologists discovered an individual whose metapodial index values ranged between those of females and castrated males. In the rest of the detected cases, the index values were in the range of females (2A-1, 2A-2, 2A-3, 2A-47, 2B-86, 2B-109, 2B-121, all adult individuals from 2B-150, individuals 2 and 3 of 2B-153). As for the shoulder-height, values ranged between 98.7 and 130.6 cm, while the average shoulder-height ranged from 108.1 cm (individual 3 in 2B-153) to 123.0 cm (2B-109).

Discussion

Mass Cattle Burials and Interpretative Challenges

Deposits containing cattle skeletons tend to be a popular research topic, especially in the case of prehistoric sites. For instance, such finds from Central Europe were the subject of publications by T. Horváth, A. Pollex, and E. Szmyt.[7] One of the research problems associated with 'burials' of cattle is the fact that it is often difficult to distinguish and decide whether they constituted a ceremonial disposal or a mere removal of the carcass. Understandably, in European post-medieval assemblages, the latter case is a more likely answer, especially in the case of deposition in a simple pit with no grave goods present and no other traces of ritual behaviour.[8]

When it comes to mass cattle deposits, disease outbreaks are certainly among the most probable causes of livestock deaths. Nevertheless, one should also consider other possibilities, such as natural disasters and related phenomena (floods, lightning, frost, starvation, etc.). Such unfortunate events were often recorded in local chronicles and other sources.[9] In many cases, however, written records only mention that there was a large cattle mortality, without naming a specific cause of the calamity. In addition, animal diseases were often not further distinguished and were referred to generally as cattle plague/murrain.

One of the most lethal animal diseases of the past was certainly rinderpest, caused by the *Morbillivirus* (measles and canine distemper belong to the same group), which was the second disease, after smallpox, eradicated on our planet about 20 years ago.[10] The virus is of Asian origin but has been known in Europe for thousands of years. It is possible that in the 6th and 10th centuries *Morbillivirus* caused epidemics in early medieval Europe, affecting both humans and cattle, and it was only around the year 1000 AD that the genetic separation of measles virus from rinderpest occurred.[11]

Medieval records often mention murrains striking livestock, for instance the "Zbraslav Chronicle" (written in the 1st half of the 14th century) gives information about a cattle plague panzootic that occurred in Europe in the years 1318-1322.[12] The 18th century was particularly plagued by such disasters, while the 19th century seems to be more peaceful in this respect. Three large-scale waves

[7] Pollex 1999, 548-549; Szmyt 2014, 105-108; Horváth 2019, 21-24.

[8] Stallibrass 1993, 33.

[9] E.g., Šůla 2017, 173-179.

[10] E.g., Hamilton et al. 2017, 583-585.

[11] Newfield 2015, 4-8.

[12] Newfield 2006, 18-26.

of cattle plague swept through Europe during the 18th century, roughly in 1709-1720, 1742-1760, and 1768-1786.[13] The epidemic spread from Asia, where steppe cattle breeds were better adapted to it and could only transmit the disease asymptomatically.[14] The disease may also have run undetected in other domestic or wild artiodactyls. In the case of domestic cattle, the rinderpest of the 18th century had a very high morbidity (approaching 100%) and mortality (up to 90%) and is credited with the greatest number of livestock victims in this period. However, there were also other 'culprits', for example, anthrax, which posed a great threat not only to cattle, but also other animals and humans.[15]

During the 18th-19th centuries, several pandemics devastated most of Europe's herds and killed millions of animals – an estimated two hundred million cattle,[16] which caused major problems, *inter alia*, in the Netherlands,[17] the United Kingdom,[18] Denmark,[19] Sweden and Finland,[20] France.[21] These disease outbreaks did not avoid the Czech lands, either – during the 18th century, cattle 'plague' is mentioned repeatedly.[22]

Several authors stated that cattle plague in 18th-century Europe was a consequence of military campaigns and the diseases spread with imported cattle and their poorly treated hides.[23] As a rule, cattle epidemics were not the only blow to the population at the time – epizootic was often followed by human plague and *vice versa*. During this period, some areas suffered one disaster after another: wars, devastating floods, freezes, droughts, rodent infestations, and other pests.[24] Thus, it is suggested that a cattle plague in hard-pressed areas may have been aided by a previous calamity.

Undoubtedly, each epizootic had a profound impact on the socio-economic situation of the afflicted area. Peasants using cattle for field work and fertiliser were, of course, the most affected.[25] However, the whole population felt the consequences in the rising prices not only of livestock but also of beef, dairy products, hides, cereals and other crops grown without fertiliser. These adverse conditions were further exacerbated by the fact that in many European regions, this catastrophe occurred three times in some 60 years. Thus, if this phenomenon was compounded by other disasters, the desperate situation often led to local famines and riots.

Hard-hit countries were forced to develop measures to deal with epidemics, which improved with each subsequent wave of 'cattle plague', such as slaughter and removal of infected herds, compensation for culled animals, regulation of livestock transport, health certificates, reduction of taxes and rent, quarantines, or the first successful attempts at inoculation.[26] Furthermore, during catastrophic epidemics, desperate times called for desperate measures and more expensive (and more prestigious) horses began to be used instead of draft oxen.[27]

Interpretation of Dating

To determine the chronology of the group of animal burials discussed in this paper, we must look closely at feature 2B-150, which is superimposed on the stratigraphically older feature 2B-152. Feature 2B-152 was one of the relics of a field military camp. Specifically, it was a building used as a field kitchen.[28] On the basis of the analysis of the stratigraphy, discovered artefacts, and the research of historical data, it is possible to identify the camp site with the Prussian army encampment from 1745, or with the Austrian army camp from 1758 and 1778.[29] Therefore, features with animal burials can be dated at the earliest to the mid-18th century.

Given the high number of individuals and the number of pits and their location in farmland, it is clear that these are not animal burials associated with normal farm operations. It can be assumed that the dead animals from the farm were usually removed to an area designated for this purpose – the scavenging area. The fact that the excavated animal burials were located directly in the field and not on the outskirts of the village or outside the valuable ploughland suggests the unusual nature of the event(s).

Reasons for the Identification of the Epizootic

With this number of buried individuals, we assume that they were victims of some kind of disaster. Looking at several possible hypotheses, we rule out some unlikely causes, such as a hard winter and frost or a lack of fodder and death by starvation in the winter season. It is hard to imagine people digging so many pits in the frozen ground. Secondly,

[13] Cole 2021, 39-52.
[14] Vallat 2012, 344.
[15] Mohylnyi 2018, 44-52; e.g., Witkowski and Parish 2002.
[16] Widenberg 2020, 9.
[17] Sundberg 2015.
[18] Broad 1983.
[19] Pedersen 1992.
[20] Widenberg 2020.
[21] Vallat 2012.
[22] Šůla 2017, 173-179.
[23] Broad 1983, 104; Pedersen 1992, 81-86.
[24] Sundberg 2015, 323-329.
[25] Pedersen 1992, 83-84
[26] E.g., Widenberg 2020, 26-27.
[27] Sundberg 2015, 71-72.
[28] Drnovský et al. 2021, 117.
[29] Drnovský et al. 2021, 133-137.

according to eighteenth-century sources, livestock herds were usually slaughtered before winter, if the farmers did not have enough fodder for the cattle to see it through.[30] However, we can safely assume that in such a case the animals would have been consumed and otherwise exploited, which is not the case in our assemblage, which shows no traces of cutting, removal of tendons or skinning on the bones.

On the contrary, the absence of traces of portioning, even though the subadult/adult animals showed a good nutritional status, indicates that the animals could have fallen victim to a panzootic or other disaster (hypothetically, for example, a flood) that prevented their consumption or other uses, and were buried away from the village to stop further spread of the disease. The history of recurring epizootics in the 18th century directly supports this hypothesis.[31]

Given that we are dealing with groups of smaller pits rather than one large communal trench dug to remove all carcasses in one go, this implies that cattle deaths occurred over a longer period and the pits were filled in gradually.

Search for the Origin and Cause of Epizootic

Accurate identification of the disease is, of course, a difficult task. We can certainly include rinderpest and anthrax among the probable culprits, since these were the most fatal cattle diseases of that time – for example, in Sweden during the 18th century, 69 cases of fatal cattle diseases were recorded, of which 35 were identified as anthrax, the rest probably were rinderpest episodes. Other cattle diseases, such as the well-known BSE or foot-and-mouth disease, are not as contagious or do not have such a high mortality rate. In this context, it seems likely that the disease that may have caused death of the animals discovered during our archaeological excavations in Semonice was anthrax, which, unlike rinderpest, affects both cattle and horses.[32] Of course, we cannot rule out the option that the cattle succumbed to rinderpest and the horses were victims of another calamity, as misfortunes tend to accumulate and multiply their consequences.[33] It is also possible that these are two consecutive epizootics – rinderpest in one group of structures (2A-1, 2A-2, 2A-3, 2A-46, 2A-47) and anthrax in the other group of pits (2B-150, 2B -151, 2B-153).

Nonetheless, given the fact that the features in group 2B-150-151-153 contained whole or partial skeletons of multiple adult or subadult individuals, while other pits contained single skeletons of adult or subadult individuals with some possible admixtures of other animals, we can also speculate that all pits are evidence of a single epidemic. In this scenario, the pits with a single adult/subadult individual may have been filled during the strike of the disease, whereas pits with the remains of multiple adult/subadult skeletons (i.e., 2B-150, 2B-151, 2B -153) served to remove dead cattle found after the epizootic, for example, in an abandoned military camp.

As for the origin of the diseases, one can only speculate that the epidemic was introduced into the region by soldiers. While the character of cornual processes and the size of the cattle correspond well with the most widespread short-horned breed of the time, the Czech Red Cattle,[34] it is possible that the army brought with it imported livestock, and this manner of spreading 'cattle plagues' is mentioned as typical for the 18th century.[35] However, only one feature (2B-150) shows an indirect connection with a military camp: it is cut into the stratigraphically earlier feature identified as military filed kitchen.[36] As we have mentioned several times, the osteological material does not correspond to the character of the kitchen waste. However, it seems probable that the area damaged by the army, which was rendered unsuitable for farming, was used by the villagers to remove dead livestock after the withdrawal of the army.

In addition, as part of the same rescue excavations, archaeologists discovered a burial ground located outside the contemporary 'regular' cemeteries (in the northwestern part of the excavated area), containing the burials of a total of 66 people, some of whom lay in mass graves.[37] Based on the grave equipment and anthropological analysis, it was determined to be a burial of victims of an epidemic and was related to one of the aforementioned military camps (from 1745, 1758 or 1778). In this case, we can speculate about an indirect connection with the cattle skeletons discussed in this paper, as human and animal epidemics often followed each other (Fig. 5).

Conclusions

The study focuses on the evaluation of mass animal burials, specifically the remains of cattle and horses discovered during archaeological excavations near the village of Semonice between 2017 and 2019. A total of twelve features containing skeletal remains of domestic animals – primarily

[30] Šůla 2017, 173-179.
[31] E.g., Broad 1983, 113-115.
[32] Widenberg 2020, 20.
[33] E.g., Sundberg 2015.
[34] Šmídková 2007, 15-16.
[35] E.g., Broad 1983, 108.
[36] Drnovský at al. 2021, 110.
[37] Drnovský and Průchová 2021, 425-426.

cattle (*Bos taurus*) and, to a lesser extent, horses (*Equus caballus*) were discovered and analysed. In some cases, complete or nearly complete skeletons were recovered; in others, only fragments of individuals of varying ages were found. In contrast to typical individual burials, these represent exceptional instances of mass carcass deposition.

The zooarchaeological analysis followed standard methodologies and confirmed that the animals had not been slaughtered or consumed – there were no traces of cutting, butchering, or burning. Given their good nutritional condition and the absence of carcass processing, an epizootic event, such as rinderpest or anthrax, appears to be the most likely cause of death. This hypothesis is further supported by the discovery of a nearby 18th-century military camp (likely dating to 1745, 1758, or 1778), the remains of which were also uncovered. Military movements and the import of infected livestock may have served as the source of the disease outbreak, aligning with historical records of the spread of epizootics across Europe during this period.

At least thirty-two cattle individuals of various ages, from calves to older cows, were identified in the burial pits. Morphological analysis of the bones indicated a predominance of females. In the case of horses, remains of at least five adult individuals were recovered, displaying skeletal changes consistent with long-term strain from riding. The location of some of the pits is spatially associated with the former military encampment, making it likely that the epidemic was brought by soldiers. An indirect link may also be drawn to a human burial ground in the same area, as epidemics affecting both humans and animals frequently co-occurred. Overall, the findings reveal a previously undocumented case of a large-scale epizootic event in the territory of Bohemia, the course and extent of which likely had a significant impact not only on the regional economy but also on the local community.

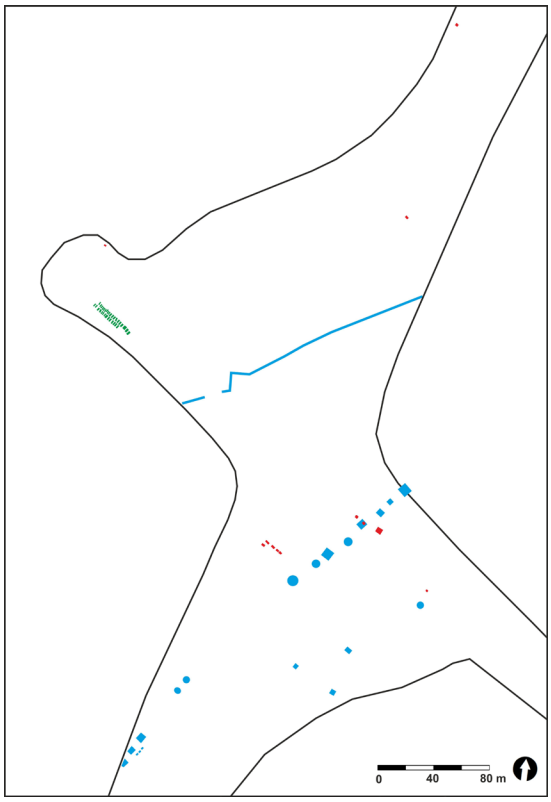

Fig. 5. Semonice. The relative position of the features of the livestock skeletons (marked in red), the military camp (marked in blue) and the infirmary burial ground (marked in green). Graphic design: P. Drnovský.

Online Supplementary Materials

To access the supplementary materials associated with this article, please visit journals.iaepan.pl/fah and select the Supplementary Materials: https://doi.org/10.23858/FAH38/2025.003.

Acknowledgement

The publication of a portion of the contribution by author E. Sůvová was facilitated by the student grant competition project of the Faculty of Arts, University of West Bohemia in Pilsen (SGS-2025-031 – Archaeological expeditions, landscape archaeology and interdisciplinary research).

Disclosure statement

No potential conflict of interest was reported by the author(s).

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