ARCHAEOFAUNAL REMAINS FROM THE ROMAN PERIOD SETTLEMENT PIT IN TRNAVA-HORNÉ POLE, SOUTHWESTERN SLOVAKIA

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Abstrakt: *Archeozoologické zvyšky zo sídliskovej jamy z doby rímskej v Trnave, poloha Horné pole, juhozápadné Slovensko*. Analyzované kosti zvierat reprezentujú sídliskový (potravný) odpad z objektu 13/99 z archeologickej lokality Trnava-Horné pole preskúmanej v roku 1999 pracovníkmi SNM–Archeologického múzea v Bratislave. Sprievodné artefakty datujú súbor do mladšej doby rímskej (2. stor. n. l). Relatívne zastúpenie kostí tura (*Bos taurus* L.), svine *(Sus domesticus* E.*)*, ovce (*Ovis aries* L.) a koňa *(Equus caballus* L.), ako aj veková a pohlavná štruktúra zabíjaných zvierat, svedčia o tom, že pre Germánov boli strategickým zdrojom mäsa domáce zvieratá. Kosti lovných zvierat identifikované neboli. Podobne ako na iných lokalitách z územia Slovenska aj nálezy z Trnavy indikujú preferenciu hovädzieho a bravčového mäsa v potrave miestneho obyvateľstva. Poskytujú doklady o prežívaní tradičných mäsiarskych postupov spracovania zvierat, ktoré sú typické pre prehistorické lokality. V súlade s osteometrickými dátami zo súvekých lokalít bola zaznamenaná zvýšená veľkostná variabilita u tura domáceho. V objekte boli identifikované aj kosti nadpriemerných jedincov, rozmermi porovnateľnými s rímskym dobytkom z provincionálnych sídlisk.

Key words: archaeozoology, bone remains, domestic mammals, Late Roman period, Trnava

Introduction

In 1999, the archaeological field prospection of the trench line Borová – Ružindol – Zvončín – Biely Kostol – Trnava has been carried out by the Museum of Archaeology of the Slovak National Museum in Bratislava (Bartík et al. 2000), during which 30 archaeological features were uncovered. Two of them, situated on the western bank of Parná River on the border of Zvončín and Trnava cadastre, in Horné pole location, are dated to the Late Roman period (Fig. 1). The fill of the feature number 13/99, described as irregular oval pit with unknown function, contained the Germanic and Roman-provincial pottery as well as the unique anthropomorphic clay sculpture and miniature vessels, most probably related with games or cultic activities at the site (Turčan 2015), and besides this an assemblage of animal bones.

The paper presents the full study of animal bones from the pit. The archaeozoological analysis includes taxonomic and anatomic identification, sex and age assessment, recording of morphometric traits and bone modifications, as well as the brief evaluation of finds in the context of current data from the territory of south-western Slovakia. The local diet, meat supply and the livestock breeding methods are also discussed/hypothesized.

The archaeozoological research suggested that the diet of Germanic (Quadi) populations living in the region from the 2nd to 4th century AD had been dependent on the primary products of domestic animals (e.g. Fabiš 2003, Šefčáková 2011, Fabiš and Bielichová 2014). Rare finds of bones of domestic poultry and wild animals indicated that their contribution

Fig. 1. Trnava-Horné pole: geographic location of the studied site. © geoportal.sk (edited)
Obr. 1. Trnava-Horné pole: geografická pozícia študovanej lokality. © geoportal.sk (upravené)

to the diet was negligible. The preference of beef and pork, with additional consumption of sheep and horse meat, has been evidenced. The metric data from the south-western Slovakia also provided some indications for the size increase and variability of Germanic livestock, compared to previous La Tène period (Fabiš 2003, Fabiš and Bielichová 2014), and initiated discussion on the possibility of local husbandry improvements and/or imports of cattle and sheep from the neighbouring Roman provinces (Pannonia, Noricum).

Material and Methods

The osteological material represents single assemblage from a single feature from the settlement with multiple occupational phases. Although the artefact dates the pit into the 2nd century AD, possible intrusion of bones from other time periods cannot be ruled out. The original function of the feature has not been clarified yet. In the field, animal bones were retrieved from sediments by hand, and no sieving or flotation methods had been used (Turčan, pers. com.). Bones have been washed and packed in a single paper box and forwarded to the specialist in 2015.

The analysed assemblage consisted of 170 bone specimens with the total weight of 5795.7 g. Its analysis covered the taxonomic and anatomic identification of specimens, sex and age assessment, taking of measurements (in mm) and registration of bone modifications with special regard to butchery marks, burning, or gnawing (e.g. Kolda 1936, Schmid 1972, Silver 1969, Driesch 1976, Habermehl 1975, Peške 1994, Lyman 1994). The osteopathology in cattle has been classified according to Bartosiewicz et al. (1997). Complete information on each specimen has been recorded into the database on animal bones from archaeological sites and evaluated in a special application of MS Access. The

withers height of a horse has been calculated according to the method of Vitt (1952), cattle according to Matolcsi (1969) and Calkin (1960) and pig according to Teichert (1969). Selection of finds has been photo documented with the digital camera Canon D70.

Results from Trnava-Horné pole are evaluated and presented by three quantification methods – number of identified specimens (NISP), weight of identified specimens (WISP) and minimum number of individuals (MNI). The calculation of the latter have been established on the basis of the most frequented skeletal element of known side with respect to the size, age and sex (if known). The general results are compared with the most representative assemblages of the Late Roman period analysed to date (Fig. 2) from Germanic (Quadi) settlements in Veľký Meder-Vámostelek (Varsik 2004, Fabiš and Bielichová 2014), Bratislava-Trnávka, location Zadné (Varsik 2011, Šefčáková 2011), Nitra-Chrenová, location Shell and Baumax buildings (Březinová et al. 2003, Fabiš 2003) and Cífer-Pác, location Nad mlynom (Kolník 1975, Ambros 1978). The assemblages from Nitra and Veľký Meder are dated to the 2nd – 4th century AD, while in Bratislava bones were divided into sub-assemblages following the chronology of the site and date to the 2nd century (assemblage A) and the 3rd – 4th century AD (assemblage B). Animal bones from Cífer-Pác are dated to the 3rd – 4th century AD and, in contrast to other settlements of probably rural character, originate from a noble residence of unknown Quadic chieftain. The NISP and MNI quantification methods were used in Bratislava-Trnávka and Cífer-Pác, while NISP and WISP were used in Veľký Meder and Nitra-Chrenová. For the purpose of comparison of the body size of animals, previously unpublished data from Cífer-Pác (Ambros 1976) and Veľký Meder (Fabiš, pers. com.) deposited in the author's archive were used in order to calculate the withers height of horses, cattle and pigs.

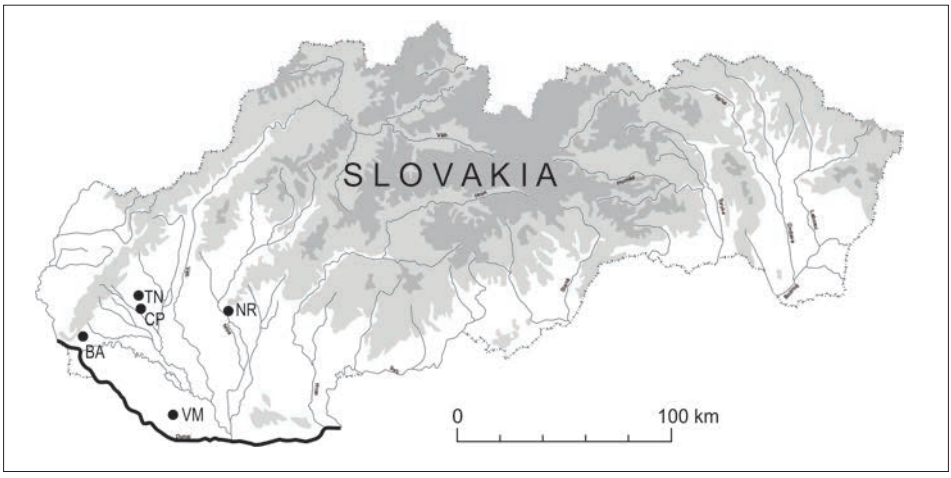

Fig. 2. Geographic location of the Late Roman period sites from Slovakia discussed in the text. TN: Trnava, location Horné pole, NR: Nitra-Chrenová, location Shell and Baumax, CP: Cífer-Pác, location Nad mlynom, VM: Veľký Meder, location Vámostelek, BA: Bratislava- Trnávka, location Zadné.

Obr. 2. Geografická pozícia lokalít z mladšej doby rímskej a územia Slovenska, ktoré zahŕňa text príspevku. TN: Trnava, poloha Horné pole, NR: Nitra-Chrenová, poloha Shell and Baumax, CP: Cífer-Pác, poloha Nad mlynom, VM: Veľký Meder, poloha Vámostelek, BA: Bratislava-Trnávka, poloha Zadné.

Results and Discussion

Assortment and representation of species

In the assemblage, bones of four domestic mammals – horse (*Equus caballus* L.), cattle (*Bos taurus* L.), sheep (*Ovis aries* L.), and pig (*Sus domesticus* E.) have been identified (Table 1). According to the minimum number of individuals, 128 taxonomically identified specimens represent remains of at least 20 individuals – nine pigs, seven bovids, two sheep/goats, one sheep, and one horse. The goat was not clearly identified within the assemblage, although there are 13 specimens classified as sheep/goat bones (*Ovis/Capra*). Absent are also bones from the wild species. There are specimens classified as being of wild/domestic taxa (e.g. *Bos* sp., *Sus* sp., *Bos/Cervus*), but the preservation status (mostly fragments) and inaccessibility of necessary reference material did not allow species identification. Remaining portion of specimens were not identified by taxa, only by size of animal they might represent (e.g. large mammal).

As far as the relative representation of all specimens is considered (Fig. 3), cattle predominate by the number of specimens (40.6%) and weight (55.8%). Domestic pig dominates the assemblage by minimum number of individuals (45%). However, by number and weight of specimens, pigs do not reach the frequency of cattle (19.4% of NISP, 17.5% of WISP). A smaller portion of specimens belongs to sheep/goat (8.8%, 4.6%) and horse (6.5%, 7.4%). The predominance of cattle and pigs is visible also if transitional category of wild/domestic taxa are counted in. They represent 12.4% of NISP or 9.4% of WISP in total. Unidentified specimens create remaining portion of bones in the assemblage.

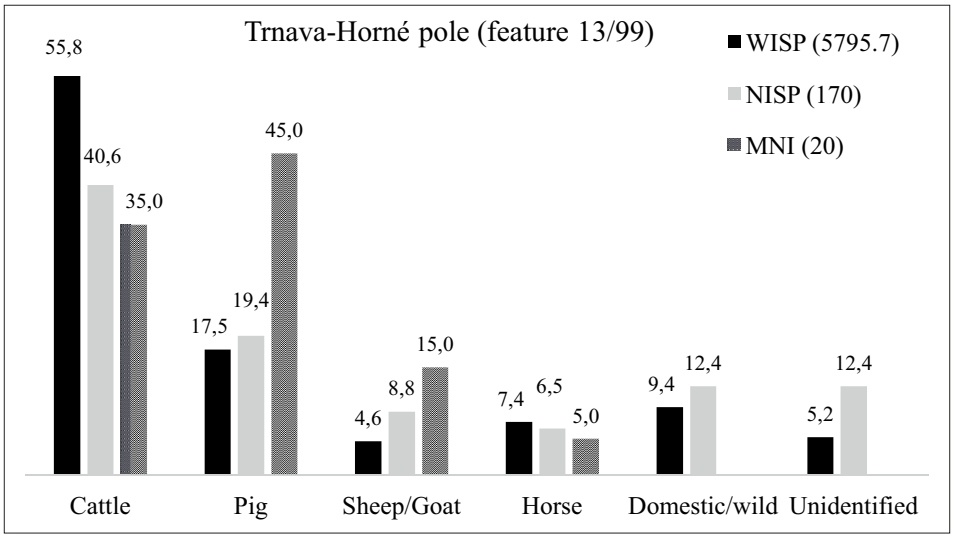

Fig. 3. Trnava-Horné pole: relative representation of animal taxa (after NISP, WISP, MNI).
Obr. 3. Trnava-Horné pole: relatívne zastúpenie živočíšnych taxónov (podľa NISP, WISP, MNI).

Domestic animals represent 85.9% NISP or 90.1% WISP of total. Such a predominance has been recorded also in other Germanic settlements from the south-western Slovakia, for example at Nitra-Chrenová (87.6% of NISP, 96.2% of WISP), Veľký Meder-Vámostelek (96.3% of NISP, 96.4% of WISP), Cífer-Pác (99.7% of NISP, 94.3% of MNI)

and Bratislava-Trnávka, location Zadné (assemblage A: 88.2% of NISP, 39.8% of MNI, assemblage B: 92.5% of NISP, 50% of MNI). As far as NISP and WISP values of the main meat suppliers are considered, the dominance of cattle bones is clearly evidenced not only in the studied assemblage but also in Cífer-Pác, Bratislava-Trnávka (phase A) and Veľký Meder (Fig. 4). At Nitra-Chrenová, cattle bones prevail, but their abundance is comparable with pigs and small ruminants. Similar implies for Bratislava-Trnávka (phase B), where the pig bones slightly surpass those of cattle. For MNI results, number of slaughtered cattle is the highest in Cífer-Pác, and in both assemblages of Bratislava-Trnávka the pigs are the most common animal to be slaughtered, like in the studied assemblage. Thus, regarding the contribution of main meat suppliers of Germanic diet, it seems that cattle and pigs were the most important domesticates. Cattle lead by the meat weight produced and pigs by the number of individuals slaughtered. The higher consumption of sheep (goat) meat is seen only at Nitra-Chrenová and Veľký Meder. As for the other species, like in the studied assemblage, a horse occurs sporadically, either in the form of articulated skeletons (e.g. in Nitra-Chrenová, feature 7, see Fabiš 2003, Janeczek et al. 2010) or isolated elements and their fragments. The cut marks or traces of smashing on some of the bones indicate their use for alimentary and/or craft purposes (Fabiš and Bielichová 2014).

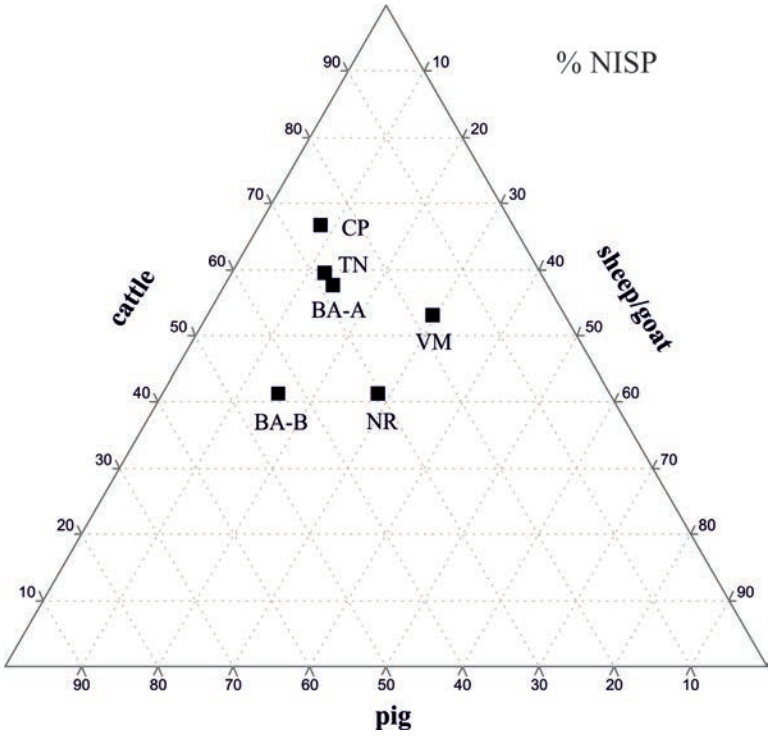

Fig. 4. Bone proportions (% of NISP) of the most important economic animals in the Late Roman assemblages from south-western Slovakia. For site names see Fig. 2.

Obr. 4. Zastúpenie kostí (% NISP) najdôležitejších domácich zvierat v súboroch z lokalít mladšej doby rímskej z JZ Slovenska. Pre názvy lokalít pozri obr. 2.

Assortment and representation of skeletal elements

The occurrence of skeletal elements in the assemblage (Table 2, 3) may be the result of several taphonomic factors including differential preservation of bones of animal taxa (e.g. mammals versus birds, large versus medium sized mammals, etc.) or food preparation and disposal practices of people living at the site. At Trnava-Horné pole, the most frequent are non-meaty bones of the forefoot and hindfoot (35.3% of NISP, 42.6% of WISP) including *metacarpus, metatarsus* and *phalanges*. Frequent are also head bones with fixed teeth represented by horn cores, occipital bone fragment, *praemaxilla, maxilla* and *mandibula* with fixed teeth (23.5%, 34.9%). Loose teeth were recorded less often (16.5%, 2.4%). The meaty skeletal elements such as *scapula, radius, femur* and *tibia*, or ribs with vertebrae were recorded in smaller proportions (18.2%, 16.8%). Into the group of meaty elements, we may also include taxonomically unidentified long bone shaft fragments (6.5%, 3.3%). Such results suggest that the studied pit contained bones discarded during butchering of slaughtered animals, with only a small portion (25% of NISP, 20% of WISP) of human food/kitchen refuse. The comparison of skeletal element representation of cattle, pigs and sheep/goats revealed differences in body parts exploitation. The non-meaty limb bones dominate in cattle, while partially meaty elements (e.g. mandible) prevail in pigs.

The quantification of identified skeletal elements have been yet published only for the assemblages of Bratislava-Trnávka (Šefčáková 2011) and Nitra-Chrenová (Fabiš 2003). It seems that cattle and pig bones from Bratislava (assemblage A and B) mostly include loose teeth, mandible, cranium, maxilla and phalanges. In Nitra, cattle is mostly represented by ribs, tibia, mandible, scapula and pigs by mandible, teeth and ribs. This means that in both sites more food or kitchen waste occurred. In addition, here all body parts of cattle and pig were represented which indicates that the animals had been slaughtered on site.

Proportion of sexes and age structure of the cull

The general assessment of sex has been possible in 33 (19.4% of NISP; Table 4) and age in 137 bone specimens (80.6% of NISP, Table 5). We presume that the horse mandible and loose teeth represent a single individual, in which occurrence of *dentes canini* clearly indicates a male (stallion/gelding?). In cattle, the determination of sex was limited due to higher incidence of immature animals with unfinished growth. In two complete metapodials with fused epiphyses, we suspect the female (specimen 1/69) and male individual (bull/ox, specimen 1/68, Fig. 5). On the basis of the breadth of diaphysis of remaining metapodials, it is possible to presume that also in the group of immature cattle, both sexes are present and thus, were slaughtered. In pigs, mandibles with preserved *canini* were diagnostic. Its character indicated a presence of both sexes in the assemblage, with the predominance of females, which is common feature mainly if older animals are considered. The predominance of female pigs was also reported from the Roman-provincial sites in Pannonia (Bökönyi 1984). In ither domesticates, the scarcity of finds prevented information on sex assessment.

It seems that the animals were slaughtered according to variable kill-off pattern. Approximately 24% of specimens represent immature (*neonatus-subadultus*) and 21% mature individuals (*adultus/maturus*). In 36% it was impossible to differentiate between subadult and adult category (*subadultus/adultus)* and in 19% of specimens the age was not possible to assess. The absolute age of a male horse has been determined on the basis of abrasion of *dentes incisivi* (after Bílek 1955). According to that this horse died

(or was slaughtered) in the high age, in its 17th – 23rd year of life. In cattle, 60 specimens were classified into the relative age categories (Table 5). The ratio of juveniles/subadults to adults is 23:83, so bones of adult animals prevail. The epiphyseal data (in total 21 specimens) indicate earliest slaughter in the age of a half year (1x), till 1.5 year (3x), till 2 – 2.5 years (5x) and 3.5 – 4 year (1x). Individuals older than 1.5 – 2 years (13x) were also registered. These data suggest that cattle was slaughtered only occasionally before reaching 1.5 years. For pigs, the ratio of juveniles/subadults to adults (after including the category *subadultus/adultus* in adults) is approximately 11:40. Thus the predominance of adults, like in cattle, is seen. The teeth provided more relevant data (Table 6) and indicated that pigs were slaughtered at the age of 6 – 12 months (1x), 12 – 16 months (2x), 16 – 22 months (1x), and around 2 – 2.5 years (6x). In a single case, bones of a very old pig, probably the male, have been recorded. The epiphyseal data of pigs suggest the major slaughter season during 2 – 2.5 year of the life (3x). According to Uerpmann (1973, 316), the ideal age for slaughter of pigs is around 1.5 year, that is little earlier than documented in the studied assemblage. The age data for small ruminants are scarce. The relative proportion of juveniles/subadults to adults is 2:15. Epiphyseal data showed that some individuals were killed at the age of 36 months (1x) or in the age of more than 20 months (1x). Dental data indicated slaughtering during 0.5 – 1.5 years (1x), 3 – 4 years (1x) and 4 – 6 years (2x).

Fig. 5. Trnava-Horné pole: cattle metacarpals – cow (above) and bull/ox (below), posterior view.
Obr. 5. Trnava-Horné pole: metakarpálne kosti tura – krava (horný) a býk/vôl (dolný), pohľad zozadu.

To date, relevant data on sex and age assessment have been published only for the assemblage of Nitra-Chrenová. Here, the slaughter of cattle seemed to start with the adulthood, even little later (at 3.5 – 4th year) than in Trnava-Horné pole, and was interpreted as the proof of secondary products oriented husbandry. However, no individuals young-

er than two years, suggesting milk oriented production were registered. The epiphyseal data from our assemblage suggest slaughter of juveniles and subadults, and also individuals in young adult age (in between 1.5 – 2.5 years), an ideal age for the cattle meat production. Based on these results, the mixed meat/milk exploitation of cattle at the site can be hypothesized. The kill-off pattern in pigs in the assemblage from Nitra-Chrenová showed the absence of slaughter before 1.5 years. Alike in the studied assemblage, the main slaughter occurred between 1.5 and 2.5 year, which supposed to be an ideal age for a meat production (Uerpmann 1973). The kill-off pattern of sheep and goats from this site pointed to the dual purpose herd managements. Majority of animals were killed as juveniles (up to 10th month) or adults (3 – 3.5 years). The age category of best meat production (1 – 2 years) was underrepresented. Similar kill-off pattern in sheep/goat has been observed in our assemblage too and, as argued by other authors (e.g. Fabiš 2003), can be explained either by selling/exporting the young adults (1) or keeping them alive for wool production (2).

Morphometric traits

The assemblage provided original metric data on horses (Table 7), cattle (Table 8), sheep/goats (Table 9) and pigs (Table 10). On the basis of well-preserved metacarpal bone of a horse, the withers height has been calculated for a single individual – 135.5 cm. This animal can be classified as smaller medium-sized horse, typical for Germanic sites in the Middle Danube area (Benecke 1994). The slenderness index of the metacarpal bone is 15.6, which classifies this animal into the mid slender category (Brauner 1916). We presume that the bone does not represent a castrated animal, since geldings are characterised by longer and more slender limbs (in geldings it should be more than 14 cm in *metacarpus*, Bökönyi 1984). If this metacarpal and the mandible with *dentes canini* belong to the same individual, we may presume that both represent a single stallion, with approximately 135.5 cm in the withers. Information on horses kept by Germanic tribes in the territory of Slovakia, are extremely rare. Fabiš (2003) and Janeczek et al. (2010) described the pathological changes in the hind limb of a horse found in Nitra-Chrenová site. According to Vitt's methodology (Vitt 1952) its withers height was 141 cm. The eroded surfaces of the second lower premolars and pathological changes observed on a ventral ridge of the mandible it has been argued that the animal represent a riding horse. The individual also showed advanced pathology on articular surfaces of the tarsal joint that caused immobilization of the leg and long period ("medical") treatment (Janeczek et al. 2010). Few previously unpublished metric data for horses of Cífer-Pác and Veľký Meder enabled to calculate the withers height from seven individuals of unknown sex. The average height of horses in Cífer-Pác was 137.7 cm (133.3 – 140.3) and 133.4 cm (127.4 – 138.5) in Veľké Meder. These results suggest that the Roman period horses from the south-western Slovakia were of medium or small medium size (Vitt 1952) and do not reach the average height of Roman horses known from provincial sites (cf. Benecke 1994). As higher than Germanic average may be considered the stallion from Nitra-Chrenová and two individuals from Cíf-Pác.

For cattle, a find of nearly completely preserved horn-core points to the short-horned (*brachyceros)* type of cattle, typical for Germanic or Celtic settlements in the Middle Danube area (Bökönyi 1974). On the other hand, second find of fragmentary preserved horn-core from the studied site probably represents a larger (longer) horn of a larger (male/castrate) individual. On the basis of two metapodials, the withers height was calculated in one cow and one male (probably ox, see above). The withers height of a cow was 118.3 cm (after Calkin 1960) or 119.4 cm (after Matolcsi 1970). The male/ox was 127.9 cm (Matolcsi

1970) or 128.8 cm (Calkin 1960) high in his withers. In average, the local cattle had 123.6 cm in the withers that represent individuals from the upper limit of a range recorded for cattle in other Germanic settlements of Slovakia. At the settlement in Bratislava-Trnávka, the average withers height of cattle slightly increased from 113.9 cm in the 2nd century AD to 117.3 cm in the 3rd-4th century (Šefčáková 2011, she does not report the used method of calculation). From Nitra-Chrenová, a single specimen points to an individual with very small withers height of 105.4 cm (after Calkin 1960). In Veľký Meder the average withers height of cattle (three cows, Calkin 1960) is 117 cm (Fabiš and Bielichová 2014, 177). The unpublished data from Cífer-Pác provided more measurable finds, according to which the average withers height of females was 108.9 cm (with range of 103.6 – 115.4 cm) and males 119.8 cm (with range of 113.6 – 123.2 cm). Regarding to sex assessment, individuals from the studied assemblage are significantly higher (ca 10 cm) than the average Germanic cattle of contemporaneous sites.

According to Bökönyi (1974), there were two types of cattle living in Pannonia during the 2nd century AD: the *brachyceros* with short horns and withers height of 100 – 120 cm, and the improved, *primigenius* type (imported from Italia) with long horns and withers height of 120 – 140 cm. It seems that our finds represent larger individuals, by size almost comparable to the latter group. The size variability has been observed in knuckle bones too (Fig. 6). When we compare their lateral length (Ll after Driesch 1976) with data from the Middle European Roman period sites (Benecke 1994), two specimens from our assemblage show bigger values than the average reported from the provincial sites, for example Tác-Gorsium (here the average Ll for knuckle bones was 67 mm). In villa rustica at Nickelsdorf (Austria) the imports of cattle and similarity with modern Chianina breed from central Italy was argued on the basis of metric data of complete Roman oxen skeletons (Pucher 2006). Our finds do not reach reported dimensions, although the length

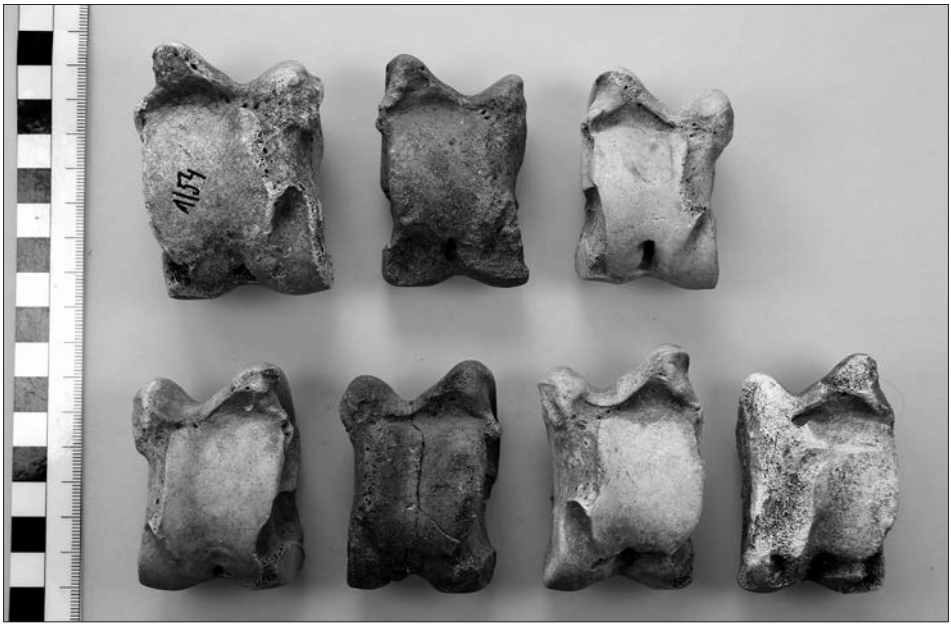

Fig. 6. Trnava-Horné pole: the size variability in cattle knuckle bones (*talus*).
Obr. 6. Trnava-Horné pole: veľkostná variabilita členkových kostí tura (*talus)*.

of metacarpal (see Table 8) is close to the length reported from Nickelsdorf (Gl=213 cm). Only very robust first phalanx of cattle/aurochs identified in the assemblage is comparable by dimensions with Roman animals from Nickelsdorf. Regrettably, our data are too fragmentary to discuss the size of cattle further.

In pigs, the withers height of a single individual has been calculated as a mean value from the third metatarsal (75.7 cm, after correction 76.2) and fourth metatarsal (68.2 cm, after correction 67.8). The individual was approximately 72 cm high (same after correction). This height, although calculated on the basis of problematic metapodials (see critical comments in Driesch and Boessneck 1974), correlates with the average reported from Germanic and Roman sites in the region (e.g. in Tác-Gorsium the pigs withers height is 73.36 cm, at Germanic sites ca 70 cm). Few unpublished data from Veľký Meder (metacarpals) suggest the average height of local pigs as 78.1 cm. A single calcaneus from Cífer-Pác represents smaller individual with the withers height 75.5 cm. We presume that animals from Trnava represent a similar type of pigs, typical by its primitive appearance, longer and slender limbs and slow maturation (Bökönyi 1974). This assumption supports also teeth and mandible dimensions, mainly the length of third molar and the M1-M3 molar row. Slightly bigger (longer) molar than Tác-Gorsium average has been recorded in specimen 105 (compare Table 10 and Bökönyi 1984, 53, tab. 13).

The scarcity of measurable bones caused the lack of information on the size or morphology of sheep (and goats). There were only two metatarsal bones with preserved shafts available. The smallest breadth of diaphysis (12 and 14.1 mm) revealed their differences in shaft robustness. Most probably, the bigger one represent the sheep.

Osteopathologies and anomalies

We registered few examples of naturally deformed bones in the assemblage. Some may be connected with the exploitation of animals for labour, although distinct cases of bone exostoses or enlargement of articular areas in limbs indicating draught use (in the sense of Bartosiewicz et al. 1997) were not recorded. The enlargement of proximal articular area (plip=1-2) and formation of *exostosis* in the area of articulation (dex=1-2) has been recorded on first phalanx of cattle (specimen 60) and these changes may be hypothetically related to draught exploitation of individuals. Additionally, arthritic changes were observed on the articular surface of *processus condylaris* in the mandible of cattle (specimen 28). A case of dental developmental anomaly – rotation of lower premolar P4 – has been recorded in pig (specimen 118).

Bone modifications

Extent of material fragmentation can be expressed as a proportion of complete bone elements within the sample or the average weight of a single specimen. In studied assemblage, complete or nearly complete elements formed 33% of the total NISP. A higher portion of bones, however, is preserved in fragments (43%), or is moderately fragmented. The average weight of a single specimen is 34.1 g or 36.9 g if only identified are counted.

The character of inspected material suggested that the extent of reduction and modification of bones was in majority influenced by anthropogenic activities such as butchery, food preparation/consumption, and waste disposal practices. However, cut and chop marks, as clear evidence of carcass and meat processing at the site, present in the assemblage only sporadically. The only recorded were marks on the bone elements of cattle – first phalanx (specimen 57), centrotarsal bone (specimen 44) and ramus of

a mandible (specimen 28). All three represent the shallow and short cuts, made most probably by the metal implement with sharp cutting edge (small knife?). Possible traces of cuts were registered also on the knuckle bone of a cattle (specimen 54) and the pig mandible (specimen 117). Location and intensity of recorded marks suggested their origin - a primary butchery, most probably skinning and separating the non-meaty limbs from the rest of the carcass. A clear example of traces related with carcass portioning or filleting the meat, usually classified as secondary butchery, was not identified. On the other hand, large portion of bones from the pit have been smashed in order to exploit the marrow (22.4% of NISP, Fig. 7).

Other taphonomic processes that shaped the assemblage are indicated by carnivore (most probably dog) gnawing, observed on 15% of NISP. Gnawing marks were usually located around the bone breakages and on joints of the long bone epiphysis. Waste disposal activities or food preparation practices are illustrated by burning. This type of modification has been present in four cattle specimens (2.4% of NISP). Two metapodials, a knuckle bone and the shaft fragment were burnt into dark brown-black or blue-black which indicates the contact of dry (defleshed) bone with an open fire with the temperature of 350 – 550 °C (after Lyman 1994). Hypothetically, elements not covered by flesh might have been burnt during the preparation of meat, while roasting or baking on fire.

To sum up, the combination of taphonomic data enables to evaluate the assemblage as mixed, butchery and kitchen waste, with the predominance of primary refuse (dry

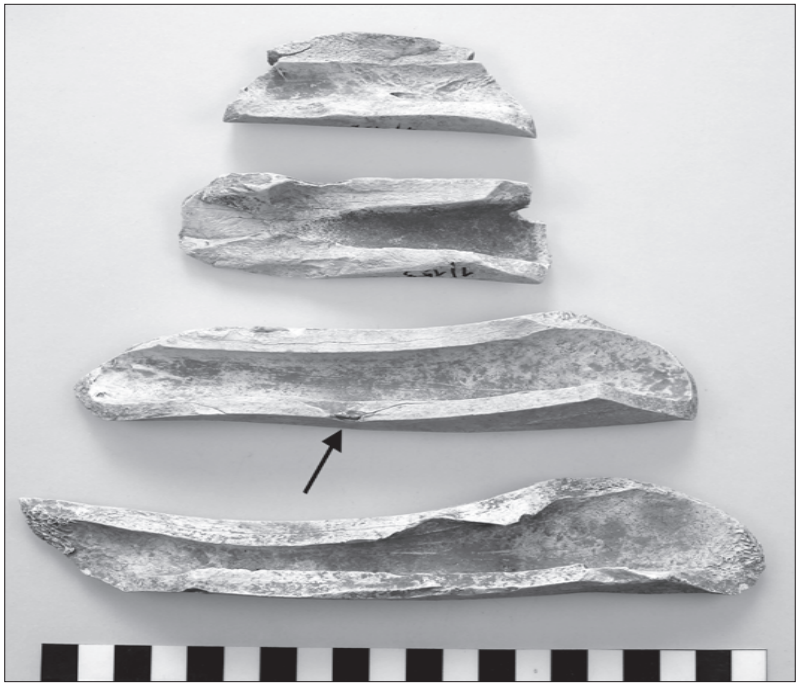

Fig. 7. Trnava-Horné pole: bones intentionally smashed (to obtain marrow?) with visible impact mark (arrow).

Obr. 7. Trnava-Horné pole: zámerne rozbité kosti (kvôli špiku?) s viditeľným miestom zásahu (šípka).

parts of the skeleton, see above). The presence of human food remains is also suggested. It seems that after consumption of edible parts by people, bones were partly available for carnivores (dogs?) and afterwards, they were deposited within the studied pit which at that time probably functioned as a rubbish pit. As far as the butchery practices concerned, the low proportion of cut and chop marks on studied bones, as well as the absence of filleting/chopping marks (common in assemblages from large Roman settlements with urban character, see e.g. Seetah 2004), suggest the persistence of traditional, "prehistoric" ways of animal carcass exploitation. This assumption is also supported by often occurrence of smashed bones, in order to get the marrow.

Conclusions

A relatively high proportion of complete skeletal elements (33% of NISP), sporadic finds of cut and chop marks (2.9%), the extent of carnivore gnawing (15%), and the prevalence of non-meaty limb bones suggested that analysed assemblage represents a secondary deposit of mixed household waste, including the "butchers" primary waste as well as remains of human and dog food.

The taxonomic identification made in 149 specimens (87.7%) indicates that cattle and pigs were the main meat-suppliers for the diet of local Germanic inhabitants. The pig dominated the sample by the minimum number of individuals (MNI), while cattle dominated by the number and weight of specimens (NISP and WISP). Sheep (goat?) and horse bones were presented in low numbers (NISP, MNI) that suggest their small importance in the meat supply and perhaps other way of exploitation. The anatomy of preserved skeletal elements showed the prevalence of dry, non-meaty bones in the assemblage, however also the culinary valuable carcass parts occurred but in smaller numbers. In cattle, non-meaty elements predominate, while in pigs the meaty ones prevail which can be the result of different slaughter and food preparation practices, but also the unequal access of locals to the meat. The data on sex and age are scarce, but its assessment for at least nine pigs and seven cattle provided an insight into the local kill-off pattern. According to the analysis, pigs were mostly slaughtered at the ideal age for meat production – between the first and second year of the life. Bones of juveniles (0.5 – 1 year) as well as mature individuals occurred in the sample which suggest the local breeding of pigs. Sex assessment indicated the prevalence of females in the cull which is expected when meat production is in focus (females are kept alive for breeding). In cattle, the epiphyseal age suggested slaughter taking place only after reaching the second year, mostly in between 2nd and 4th year. Similar to pigs, it is typical pattern for beef producing husbandry. According to sex assessment, the beef had been provided by cows as well as oxen. Possible consumption of veal meat, however, has been evidenced too by the presence of juveniles (before first year), most possibly the male offspring. In sheep (goat?), the slaughtering of juveniles and adults is indicative of consumption the lamb/mutton meat. Except meat, the fat (lard) of animals have been certainly used. Its exploitation is evidenced by number of intentionally smashed bones and variety of long bones fragments, some with impact marks of a man-made implements.

Few burnt bones did not provide a reliable information on the local food preparation practices. In addition to meat and fat, skinning has been documented by specifically located cut marks on the cattle phalanges. The exploitation of animals for secondary products like milk can only be speculated on the basis of cows, calf and lamb bone representation. The absence of advanced osteopathologies avoid any interpretations regarding the use

of animals for work (draught cattle?). The high age of horse (stallion?) may indirectly indicate such purpose (riding animal?).

To reconstruct appearance of the local livestock, new data on withers height and the morphology of cattle, horse and pig have been collected. The horse (stallion?) represents a small medium-sized animal of 133.5 cm in the withers and slender forelimbs (index=15.5). The presence of short-horned type of cattle was evidenced by a single well-preserved horn-core of an adult. Another but larger horn-core might represent castrated animal or a different type (breed) of cattle. The average wither height of local cattle was calculated (123.6 cm) and points to the large individuals. The keeping (or breeding) larger cattle at the site has been also presumed on the basis of metric data comparison with contemporaneous Germanic/Roman settlements in Middle Danube area. We presume that it either indicate the local breeding improvements and/or the imports of already improved (Roman?) cattle. On the other side, the withers height of a pig (72 cm) correlates with yet published Roman period data.

At the end it can be concluded that despite its small sample size the analysis of bones from Trnava-Horné pole (pit 13/99) contributed to the knowledge about animal husbandry at the Roman period settlements. Definitely, the most valuable are new original metric data that again provided the evidence of previously recorded trends – an increase of morphometric variability of cattle in the region of the south-western Slovakia, and supported the idea of contacts of autochthonous inhabitants with the Roman-provincial world and the Romanization.

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Abbreviations used in figures and tables:

a – *anterior*
A – *adultus*
BA – Bratislava-Trnávka, location Zadné
Bc – breadth of tooth crown
Bd – distal breadth
BFd – breadth of *facies articularis distalis*
BFp – breadth of *facies articularis proximalis*
Bos – cattle/aurochs
Bp – proximal breadth
c – castrate
CD – smallest circumference of *diaphysis*
CP – Cífer-Pác, location Nad mlynom
cent – *centrotarsale*
Dd – distal depth
Di – depth of *mandibula*
Dl – depth lateral
DLS – greatest length of base
Dm – depth medial
Dp – proximal depth
sa – *subadultus/adultus*
aa – *adultus?*
ado – *adultus/maturus*
f – female
g – gracile
GL – greatest length
GB – greatest breadth
H – heigth
i – *inferior*
Lc – length of tooth crown
Ld – dorsal length
Ll – lateral length
Lm – medial length
m – male/medium sized
M – molar
MBS – middle breadth of base
maxd – *maxilla et dentes*
mdb – *mandibula*
mdbd – *mandibula et dens*
MNI – minimum number of individuals
ms – medium-sized
mtc – *metacarpus*
mtt – *metatarsus*
NISP – number of identified specimens
NR – Nitra-Chrenová, location Shell a Baumax
p – *posterior*
ph – *phalanx*
pri – *primigenius*
P2P4ia – length of alveolar row from premolar 2 to 4
r – robust
s – small/*superior*
SB – smallest breadth
str – moderately built
ta – *talus*
TN – Trnava, location Horné pole
v – large
VM – Veľký Meder, location Vámostelek
vs – medium-sized to large
vv – very large
WISP – weight of identified fragments

Taxa	Latin name	NISP	WISP (g)	MNI
Cattle	*Bos taurus*	69	3235.5	7
Pig	*Sus domesticus*	33	1013.8	9
Large mammal	-	17	277.4	-
Pig/Wild boar	*Sus* sp.	15	374.6	-
Sheep/goat	*Ovis/Capra*	15	268.6	3
Horse	*Equus caballus*	11	428.4	1
Medium sized mammal	-	4	25.6	-
Cattle/Aurochs/Bison/Horse	*Bos/Equus*	3	112.3	-
Cattle/Aurochs	*Bos* sp.	2	58	-
Cattle/Red deer	*Bos/Cervus*	1	1.5	-
Sum		170	5795.7	20

Tab. 1. Trnava-Horné pole: representation of animal taxa.
Tab. 1. Trnava-Horné pole: sortiment živočíšnych taxónov.

Skeletal element	*Equus caballus*	*Bos taurus*	*Ovis aries*	*Ovis/Capra*	*Sus domesticus*	*Bos* sp.	*Bos/Equus*	*Bos/Cervus*	*Sus* sp.	Large mammal	Medium mammal	Sum
processus cornualis	-	2	-	-	-	-	-	-	-	-	-	2
occipitale	-	-	-	-	1	-	-	-	-	-	-	1
praemaxilla	-	-	-	-	1	-	-	-	-	-	-	1
maxilla+dens	-	-	-	-	-	-	-	-	1	-	-	1
mandibula	-	9	-	-	4	-	-	-	1	1	-	15
mandibula+dens	1	-	-	3	13	-	-	-	3	-	-	20
caninus superior	-	-	-	-	-	-	-	-	2	-	-	2
molar 1 superior	-	-	-	1	-	-	-	-	-	-	-	1
molar 2 superior	-	-	-	1	-	-	-	-	-	-	-	1
molar 3 superior	-	-	-	1	-	-	-	-	-	-	-	1
incisivus 1 inferior	2	-	-	-	1	-	-	-	-	-	-	3
incisivus 2 inferior	2	-	-	-	-	-	-	-	-	-	-	2
incisivus 3 inferior	2	-	-	-	-	-	-	-	-	-	-	2
canine inferior	2	-	-	-	1	-	-	-	4	-	-	7
premolar 2 inferior	-	-	-	-	1	-	-	1	-	-	-	2
molar 2 inferior	-	-	-	1	-	-	-	-	-	-	-	1
molar 3 inferior	-	-	-	1	-	-	-	-	-	-	-	1
molar	-	-	-	-	-	-	-	-	2	1	-	3
premolar	-	-	-	-	-	-	-	-	1	-	-	1
molar/premolar	-	1	-	-	-	-	-	-	-	-	-	1
scapula	-	2	-	-	-	-	-	-	-	-		2
radius	-	-	-	-	-	-	-	-	-	-	1	1
costae	-	-	-	-	-	-	-	-	-	2	-	2
vertebra sacralis	-	-	-	-	-	-	-	-	-	1	-	1
femur	-	4	-	2	4	-	-	-	1	2	1	14
tibia	-	6	-	2	1	-	1	-	-	-	1	11
metacarpus	-	10	-	1	-	-	-	-	-	-	-	11
metacarpus 3	1	-	-	-	1	-	-	-	-	-	-	2
metacarpus 4	-	-	-	-	2	-	-	-	-	-	-	2
carpale 2+3	-	1	-	-	-	-	-	-	-	-	-	1
metatarsus	-	9	1	1	-	-	-	-	-	-	-	11
metatarsus 3	-	-	-	-	1	-	-	-	-	-	-	1
talus	-	7	-	-	1	-	-	-	-	-	-	8
centrotarsale	-	4	-	-	-	-	-	-	-	-	-	4
metapodium	-	2	-	-	1	1	2	-	-	-	-	6
phalanx 1 aterior	1	4	-	-	-	1	-	-	-	-	-	6
phalanx 1 posterior	-	2	-	-	-	-	-	-	-	-	-	2
phalanx 1	-	2	-	-	-	-	-	-	-	-	-	2
phalanx 2	-	2	-	-	-	-	-	-	-	-	-	2
phalanx 3	-	2	-	-	-	-	-	-	-	-	-	2
?	-	-	-	-	-	-	-	-	-	10	1	11
Sum	11	69	1	14	33	2	3	1	15	17	4	170

Tab. 2. Trnava-Horné pole: the representation of skeletal elements (NISP).
Tab. 2. Trnava-Horné pole: zastúpenie elementov kostry v súbore (NISP).

Skeletal element	*Equus caballus*	*Bos taurus*	*Ovis aries*	*Ovis/Capra*	*Sus domesticus*	*Bos* sp.	*Bos/Equus*	*Bos/Cervus*	*Sus* sp.	Large mammal	Medium mammal	Sum
processus cornualis	-	101.8	-	-	-	-	-	-	-	-	-	101.8
occipitale	-	-	-	-	34	-	-	-	-	-	-	34
praemaxilla	-	-	-	-	7.6	-	-	-	-	-	-	7.6
maxilla+dens	-	-	-	-	-	-	-	-	31.9	-	-	31.9
mandibula	-	499.7	-	-	98.1	-	-	-	74	7.4	-	679.2
mandibula+dens	170	-	-	126.9	678	-	-	-	192.4	-	-	1167.3
caninus superior	-	-	-	-	-	-	-	-	17	-	-	17
molar 1 superior	-	-	-	2.2	-	-	-	-	-	-	-	2.2
molar 2 superior	-	-	-	8.6	-	-	-	-	-	-	-	8.6
molar 3 superior	-	-	-	6.7	-	-	-	-	-	-	-	6.7
incisivus 1 inferior	10.8	-	-	-	2.8	-	-	-	-	-	-	13.6
incisivus 2 inferior	15.8	-	-	-	-	-	-	-	-	-	-	15.8
incisivus 3 inferior	14.9	-	-	-	-	-	-	-	-	-	-	14.9
canine inferior	13.3	-	-	-	4.8	-	-	-	25.4	-	-	43.5
premolar 2 inferior	-	-	-	-	0.4	-	-	1.5	-	-	-	1.9
molar 2 inferior	-	-	-	-	-	-	-	-	-	-	-	-
molar 3 inferior	-	-	-	8.2	-	-	-	-	-	-	-	8.2
molar	-	-	-	-	-	-	-	-	2.7	1.4	-	4.1
premolar	-	-	-	-	-	-	-	-	0.7	-	-	0.7
molar/premolar	-	4.1	-	-	-	-	-	-	-	-	-	4.1
scapula	-	64.1	-	-	-	-	-	-	-	-	-	64.1
radius	-	-	-	-	-	-	-	-	-	-	9.1	9.1
costae	-	-	-	-	-	-	-	-	-	23	-	23
vertebra sacralis	-	-	-	-	-	-	-	-	-	8.2	-	8.2
femur	-	326	-	41.3	122.2	-	-	-	30.5	51.9	5.7	577.6
tibia	-	213.9	-	18.8	11.7	-	39.4	-	-	-	8.1	291.9
metacarpus	-	860.2	-	17.1	-	-	-	-	-	-	-	877.3
metacarpus 3	152.1	-	-	-	8.5	-	-	-	-	-	-	160.6
metacarpus 4	-	-	-	-	21.3	-	-	-	-	-	-	21.3
carpale 2+3	-	13.1	-	-	-	-	-	-	-	-	-	13.1
metatarsus	-	373.9	18.2	20.6	-	-	-	-	-	-	-	412.7
metatarsus 3	-	-	-	-	9.9	-	-	-	-	-	-	9.9
talus	-	399.1	-	-	12.4	-	-	-	-	-	-	411.5
centrotarsale	-	95.7	-	-	-	-	-	-	-	-	-	95.7
metapodium	-	37	-	-	2.1	11	72.9	-	-	-	-	123
phalanx 1 aterior	51.5	92.7	-	-	-	47	-	-	-	-	-	191.2
phalanx 1 posterior	-	40.9	-	-	-	-	-	-	-	-	-	40.9
phalanx 1	-	41.3	-	-	-	-	-	-	-	-	-	41.3
phalanx 2	-	29.6	-	-	-	-	-	-	-	-	-	29.6
phalanx 3	-	42.4	-	-	-	-	-	-	-	-	-	42.4
?	-	-	-	-	-	-	-	-	-	185.5	2.7	188.2
Sum	428.4	3236	18.2	250.4	1014	58	112.3	1.5	374.6	277.4	25.6	5795.7

Tab. 3. Trnava-Horné pole: the representation of skeletal elements (WISP, g).
Tab. 3. Trnava-Horné pole: zastúpenie elementov kostry v súbore (WISP, g).

Assessment of sex	*Equus caballus*	*Bos taurus*	*Ovis aries*	*Ovis/Capra*	*Sus domesticus*	*Bos* sp.	*Bos/Equus*	*Bos/Cervus*	*Sus* sp.	Large mammal	Medieum mammal	Sum
female	-	1	-	-	3	-	-	-	3	-	-	7
female?	-	3	-	-	4	-	-	-	1	-	-	8
male	-	-	-	-	-	-	-	-	3	-	-	3
male/castrate	9	-	-	-	-	-	-	-	-	-	-	9
male?	-	2	-	-	2	-	-	-	1	-	-	5
castrate	-	1	-	-	-	-	-	-	-	-	-	1
?	2	62	1	14	24	2	3	1	7	17	4	137
Sum	11	69	1	14	33	2	3	1	15	17	4	170

Tab. 4. Trnava-Horné pole: sex assessment (NISP).
Tab. 4. Trnava-Horné pole: určenie pohlavia (NISP).

Assessment of sex	*Equus caballus*	*Bos taurus*	*Ovis aries*	*Ovis/Capra*	*Sus domesticus*	*Bos* sp.	*Bos/Equus*	*Bos/Cervus*	*Sus* sp.	Large mammal	Medium mammal	Sum
neonatus/juvenis	-	2	-	-	-	-	-	-	-	-	-	2
juvenis	-	8	-	1	3	-	-	-	-	-	-	12
juvenis?	-	-	-	-	-	-	-	-	-	-	1	1
juvenis/subadultus	-	10	-	1	5	-	-	1	2	-	-	19
subadultus	-	1	-	-	3	-	-	-	-	-	-	4
subadultus?	-	2	-	-	-	-	-	-	-	-	-	2
subadultus/adultus	-	34	-	6	12	1	3	-	3	2	-	61
adultus	1	-	1	4	2	1	-	-	4	-	-	13
adultus?	2	3	-	1	1	-	-	-	3	-	1	11
adultus/maturus	8	-	-	-	2	-	-	-	1	-	-	11
maturus	-	-	-	-	1	-	-	-	-	-	-	1
?	-	9	-	1	4	-	-	-	2	15	2	33
Sum	11	69	1	14	33	2	3	1	15	17	4	170

Tab. 5. Trnava-Horné pole: age assessment (NISP)
Tab. 5. Trnava-Horné pole: určenie veku (NISP).

Dental age	Months	Age category	Male?	Female?	Unknown
m, M1 abrasion	6-12	D	-	-	1
m, M1, M2 erupting/just erupted	*	E	-	-	-
m, M1, M2 abrasion	12-16	F	-	-	2
M3 erupting/just erupted	16-22	G	-	-	1
M3 abrasion of first half	*	H	-	1	5
M3 mid abrasion	*	I	-	-	-
M3 strong abrasion	*	J	-	-	-
M3 very strong abrasion	*	K	-	-	-
M3 abrasion up to the roots	*	L	1	-	-

Tab. 6. Trnava-Horné pole: dental age in pigs (NISP, after Peške 1994)
Tab. 6. Trnava-Horné pole: dentálny vek u sviní (NISP, podľa Peške 1994).

Specimen	Element	Sex	Age	GL	Ll	Bp	BFp	Dp	SB	Bd	BFd	Dd	CD	P2P4ia
17	mdbd	m	A	-	-	-	-	-	-	-	-	-	-	87.6
12	mtc3	?	aa	215.6	208.2	48	-	32.4	33.6	47.4	-	21.6	93	-
13	ph1a	?	aa	78.5	-	52.5	47.1	33.9	32	43.3	41.2	-	-	-

Tab. 7. Trnava-Horné pole: osteometric data for horse (mm). For abbreviations see the list.
Tab. 7. Trnava-Horné pole: osteometrické údaje pre koňa (mm). Pozri zoznam skratiek.

Specimen	Element	Sex	Age	Morphology	GL	Ll	Lm	Bp	SB	Bd	Dd	GB	CD	DLS	Ld	MBS	Dl	Dm
69	mtc	f	sa	s	197.9	-	-	53.7	29.9	54.2	20.8	-	87	-	-	-	-	-
70	mtc	f?	sa	ms	-	-	-	51.3	27.8	-	-	-	-	-	-	-	-	-
71	mtc	m?	sa	vs	-	-	-	-	-	65.6	-	-	-	-	-	-	-	-
68	mtc	c	sa	v	208.6	-	-	61	33.5	60.3	23.4	-	96	-	-	-	-	-
80	mtt	f?	?	s	-	-	-	-	-	56.4	23.2	-	-	-	-	-	-	-
81	mtt	-	sa	vs	-	-	-	-	-	56.4	24.4	-	-	-	-	-	-	-
83	mtt	-	sa	vs	-	-	-	43.5	-	-	-	-	-	-	-	-	-	-
43	cent	-	sa	-	-	-	-	-	-	-	-	47	-	-	-	-	-	-
44	cent	-	sa	-	-	-	-	-	-	-	-	49.6	-	-	-	-	-	-
45	cent	-	sa	-	-	-	-	-	-	-	-	49.4	-	-	-	-	-	-
49	ta	-	sa	ms	-	66	60.2	-	-	41.2	-	-	-	-	-	-	37	-
50	ta	-	sa	str	-	62.3	58.7	-	-	41.7	-	-	-	-	-	-	35.4	36.8
51	ta	-	sa	s	-	67.5	61.9	-	-	42.8	-	-	-	-	-	-	36.8	38.6
52	ta	-	sa	ms	-	59.1	55.8	-	-	38.2	-	-	-	-	-	-	33.5	33.5
53	ta	-	?	ms	-	63.7	59	-	-	40.4	-	-	-	-	-	-	33.2	-
54	ta	-	sa	v	-	69.7	64.1	-	-	46.4	-	-	-	-	-	-	40	41.7
59	ph1p	-	sa	-	-	-	-	23.9	18.9	-	-	-	-	-	-	-	-	-
60	ph1a	Bos	A	pri	70.1	-	-	36.5	30.9	35.7	-	-	-	-	-	-	-	-
61	ph1a	-	sa	v	62.4	-	-	28.5	25.3	29.4	-	-	-	-	-	-	-	-
62	ph1	-	sa	vs	60.8	-	-		22.4	29.4	-	-	-	-	-	-	-	-
63	ph1a	-	sa	ms	53.2	-	-	27.4	23.2	26.3	-	-	-	-	-	-	-	-
64	ph1a	-	sa	ms	54.8	-	-	25.6	21.7	24.8	-	-	-	-	-	-	-	-
65	ph1p	-	sa	ms	55.3	-	-	25.8	21.8	23.4	-	-	-	-	-	-	-	-
56	ph2	-	aa	vv	43.1	-	-	32.8	25.9	29.5	-	-	-	-	-	-	-	-
47	ph3	-	sa	-	-	-	-	-	-	-	-	-	-	75	55.5	26.3	-	-

Tab. 8. Trnava-Horné pole: osteometric data for cattle (mm). For abbreviations see the list.
Tab. 8. Trnava-Horné pole: osteometrické údaje pre tura (mm). Pozri zoznam skratiek.

Specimen	94	96	110	95	104	105	106	108	111	115	19	127	132	133
Species	ssx	ssd	ssx	ssx	ssx	ssd	ssx	ssd	ssd	ssd	ssd	ssd	ssd	ssd
Element	maxd	mdb	mdb	mdbd	mdbd	mdbd	mdbd	mdbd	mdbd	mdbd	femur	talus	mtt3	mtc4
Sex	-	f?	f	-	-	-	f?	-	f	-	-	-	-	-
Age	A	ado	sa	A	A	A	A	ado	sa	S	sa	sa	sa	sa
Morphology	v	-	-	-	r	v	m	-	-	-	-	-	-	-
GL	-	-	-	-	-	-	-	-	-	-	-	-	81	77.1
Ll	-	-	-	-	-	-	-	-	-	-	-	36.6	-	-
Lm	-	-	-	-	-	-	-	-	-	-	-	40.2	-	-
Bp	-	-	-	-	-	-	-	-	-	-	-	-	17	16
SB	-	-	-	-	-	-	-	-	-	-	18	-	12.9	13.2
Bd	-	-	-	-	-	-	-	-	-	-	-	-	16.2	19
M1sLc	-	14.5	-	-	-	-	-	-	-	-	-	-	-	-
M1sBc	-	13	-	-	-	-	-	-	-	-	-	-	-	-
M1iLc	-	-	-	-	15.6	-	14.6	14.2	-	16.7	-	-	-	-
M1iBc	-	-	-	-	11.3	-	10.6	10.1	-	11.3	-	-	-	-
M2sLc	20.4	-	-	20.7	-	-	-	-	-	-	-	-	-	-
M2sBc	16.4	-	-	16.5	-	-	-	-	-	-	-	-	-	-
M2iLc	-	-	-	-	20.4	17.7	19.1	-	-	22	-	-	-	-
M2iBc	-	-	-	-	13.3	12.7	13.1	-	-	14.2	-	-	-	-
M3sLc	33.1	-	-	36.9	-	-	-	-	-	-	-	-	-	-
M3sBc	16.9	-	-	19	-	-	-	-	-	-	-	-	-	-
M3iLc	-	-	-	-	31.1	34.5	30.9	-	-	-	-	-	-	-
M3iBc	-	-	-	-	14.9	15.7	14.7	-	-	-	-	-	-	-
M1M3ia	-	-	-	-	64.8	-	-	-	-	-	-	-	-	-
HmdbP2	-	-	46.4	-	-	-	-	-	40.2	-	-	-	-	-
HmdbM1	-	-	-	-	38.5	37.4	-	-	-	-	-	-	-	-
HmdbM3	-	-	-	-	-	36.7	-	-	-	-	-	-	-	-

Tab. 9. Trnava-Horné pole: osteometric data (mm) of domestic (ssd) and domestic/wild pig (ssx). For abbreviations see the list.
Tab. 9. Trnava-Horné pole: osteometrické údaje (mm) pre sviňu domácu (ssd) a sviňu domácu/divú (ssx). Pozri zoznam skratiek.

Specimen	10	11	4	7	8	3	1	2
Species	oc	oc	oc	oc	oc	oc	oa	oc
Element	mdbd	mdbd	m1s	m3i	m2i	mtc	mtt	mtt
Age	A	A	sa	A	A	aa	A	sa
Morphology	-	-	-	-	-	g	g	g
Bp	**-**	**-**	**-**	**-**	**-**	**23.4**	**-**	**-**
SB	-	-	-	-	-	13.8	14.1	12
Bd	-	-	-	-	-	-	24.2	-
Dd	-	-	-	-	-	10.2	10.2	9.9
CD	-	-	-	-	-	43.2	-	38
M1sLc	-	-	14.2	-	-	-	-	-
M1sBc	-	-	8.9	-	-	-	-	-
M1iLc	11.8	11.4	-	-	-	-	-	-
M1iBc	7.7	7.7	-	-	-	-	-	-
M2iLc	15.5	15	-	-	14.3	-	-	-
M2iBc	8.4	8.2	-	-	7.6	-	-	-
M3iLc	22.3	21.6	-	-	-	-	-	-
M3iBc	8.1	7.6	-	8	-	-	-	-
M1M3ia	49.9	50.2	-	-	-	-	-	-
P2P4ia	22.5	-	-	-	-	-	-	-
P2M3ia	74.7	-	-	-	-	-	-	-
HmdbP2	19.2	-	-	-	-	-	-	-
HmdbM1	25.9	21.2	-	-	-	-	-	-
HmdbM3	37.4	37.8	-	-	-	-	-	-
Di	39.4	-	-	-	-	-	-	-

Tab. 10. Trnava-Horné pole: osteometric data (mm) of sheep (oa) and sheep/goat (oc). For abbreviations see the list.

Tab. 10. Trnava-Horné pole: osteometrické údaje (mm) pre ovcu (oa) a ovcu/kozu (oc). Pozri zoznam skratiek.

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