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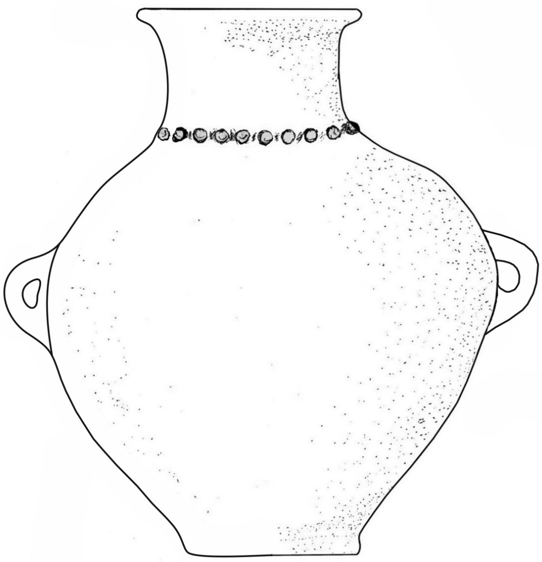

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Editura MEGA
Cluj-Napoca
2023

In Romania, the periodical can be obtained through subscription or exchange, sent as post shipment, from Museum Arad, Arad, Piata G. Enescu 1, 310131, Romania.
Tel. 0040–257–281847.

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Layout: Francisc Baja, Florin Mărginean, Victor Sava

DTP: Petru Ureche

ISSN 2392–8786

editura MEGA

Editura Mega | www.edituramega.ro
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Archaeozoological research in the civil settlement of Legion XIII Gemina of Apulum (St. Francis of Paola Ravelin, Alba Iulia, Alba County)*

Georgeta El Susi, Anca Timofan

Abstract: The faunal remains were collected in 2009 and 2010 while conducting an archaeological excavation in the southeast corner of legion XIII Gemina civilian settlement at Apulum (Alba Iulia, Alba County, Romania). The 840 animal bones were gathered from two buildings, the sector of a street that runs alongside two Roman structures and from an annex used for household activities. The sample, like other findings is dated between late 2nd century AD and first half of the 3rd century AD, with a final period of habitation after the first half of the 3rd century AD. As NISP, cattle prevail with 642 bones (78.39%), followed by pigs with 104 remains (12.7%) and sheep/goats with 56 (6.84%). Five pieces originate from horse (0.61%), one from donkey (0.12%), and two from dog (0.24%). Four fragments (0.49%) are derived from chicken. Cattle also have the highest MNI (54.72%), followed by pigs (19.81%), ovicaprids (15.09%), horses (2.83%), poultry (2.83%), and canids (0.94%). The wild species represent only 2.83%. The annex was also used for processing animal carcasses, in addition to other domestic tasks, according to the Chi^2-test used to analyse the distribution of the bones by body parts. 50% of the cattle used for the camp's supply were immature (less than 3.5-4 years old), with a small quota of animals under one year old. Others were culled at various stages, 32% as adults and 18% as mature/senile. Given the relatively small proportion of specimens slaughtered during the period of maximum economic efficiency (roughly one-third of the stock), we have a mixed economy focused on meat and dairy. Slaughtering of pigs begins at 16 months, with peaks at 18-20, 22-24 and 24-36 months. As a result, suckling piglets did not appear frequently on camp menus (soldiers), or if they did, they were in limited numbers. Animals that reached their optimal weight (between 1.5 and 2 years) prevailed. A third of sheep appear to have been slaughtered in their youth and sub-adult stages (for meat), with the majority kept for milk and wool. Approximately 57% of goats were slaughtered between the ages of 1-3 years (for meat), with fewer animals exploited for longer periods of time. The metric data indicate small and gracile specimens assigned to local, unimproved types.

Keywords: Alba Iulia; Roman civilian settlement; faunal remains; animal husbandry; hunting; age profiles.

The Archaeological Context

The faunal remains were collected in the 2009 and 2010 campaigns, during a systematic archaeological excavation conducted in the south-eastern part of the civilian settlement of legion XIII Gemina at Apulum (Alba Iulia, Alba County, Romania)[1]. The *St. Francis of Paola Ravelin Research Project* aimed to highlight the archaeological and historical potential around legion XIII Gemina's fortress[2]. The area inside the Vauban fortification includes the Roman military base and part of the civilian settlement (*canabae legionis*). The *canabae* developed after the construction of the first phase of the fortification, in its vicinity. Based on epigraphic records but also following the archaeological research carried out so far, it may be stated that the settlement expanded in the 2nd and 3rd c. AD around the legionary fortress. Part of this settlement or, according to other authors, the entire territory that the *canabae* spanned, evolved rapidly, so that in 197 AD it could achieve the first urban status, namely *Municipium Septimium Apulense*[3]. The construction of the Vauban-type fortification (Alba

* This work was supported by a grant of the Romanian Ministry of Education and Research, CNCS - UEFISCDI, project number PN-III-P4-ID-PCE-2020-0566, within PNCDI III.

1 The systematic archaeological research carried out on the St. Francis of Paola Ravelin in 2009 and 2010 was organized by the National Museum of the Union Alba Iulia and coordinated by Dr. Anca Timofan, together with a team of master students with University *1 Decembrie 1918* in Alba Iulia.

2 CCA 2010, 24-26, no. 2; Timofan 2010a, 105-116; Timofan 2010b, 541-556.

3 Diaconescu, Piso 1993, 69; Ardevan 1998, 48-50; Ota 2012, 31-36.

Fig. 1. Location of the researched area inside the Vauban-type fortification at Alba Iulia (source image: Google Maps).

Carolina Citadel) in the 18th c., with its specific defence system, resulted in extensive destruction of the Roman buildings. Some of the typical elements of the fortification, such as the ravelins, were arranged by digging a defensive ditch, the remaining earth mass being reinforced with brick walls. Giovanni Morandi Visconti, the commander-in-chief of the fortification, proposed exterior works of terraced counterguard type in the area of St. Francis of Paola Ravelin, which would be transformed into a cavalier[4].

St. Francis of Paola Ravelin is located in the south-eastern area of the Vauban citadel between the Eugene of Savoy Bastion and Count Steinville Bastion, at 135 m south the *porta principalis dextra*[5] of the legionary fortress, enclosing an area of about 8346 sq.m (Fig. 1). The Roman habitation layer was preserved inside this ravelin, where the Habsburg constructions did not affect it, even if in 1765-1766 a reduit was planned to be built on the St. Francis of Paola, dominating Dealul Furcilor (the Forks Hill)[6]. The ravelin stratigraphic sequence is characterised by the presence of several habitation layers. The oldest archaeological features were dated to the Early Bronze Age[7]. This layer is followed by Roman date features (2nd and 3rd c. AD). The latest phase of Roman habitation is overlaid and partially affected by an Early Medieval layer (10th-12th centuries)[8]. The current shape of the ravelin dates to the 18th-19th century, when the Vauban-type fortification was built along with all its specific defensive elements.

The first systematic archaeological research campaign began there in the autumn of 2009 and continued in 2010 by investigating the north-western side of the St. Francis of Paola Ravelin (Fig. 2). Two Roman buildings (CI, CII) were identified there, whose walls were unearthed down at a depth between 40 and 60 cm after the removal of a substantial layer of Roman tiles that belonged to the collapsed roof. Also, a street pavement with large slabs of greenish sandstone was discovered along the

4 Goronea 2007, 71.
5 Moga 2005, 117-122.
6 Goronea 2007, 65.
7 Ciugudean 1988, 17-22.
8 Anghel 1968, 470-471.

Fig. 2. Orthophotoplan of the researched area on the north-western side of St. Francis of Paola Ravelin (A. Timofan)

two Roman buildings. They are narrow and elongated buildings that extend along the street, possibly laid on associated plots adapted to the building shape (Fig. 3). Their layout and architecture indicate it is most likely of the type of Roman houses specific to civilian settlements nearby the forts, both *vici militares* and *canabae*, the so-called "strip-houses" or "Streifenhaus".

It is a typical house-form found especially in the Gallo-Roman space, in the north-western Roman provinces, but also in the Danubian area. These houses were oriented with their narrow front sides either onto the streets leaving the fort's gates or on roads parallel to the fort's defences[9]. They had a typical inner division with shops and workshops at street front, a dwelling area in the backyard and domestic annexes. While discussing the occupation around the fort at Newstead, C. S. Sommer mentions that excavated extramural buildings are technically strip-houses. The author describes these elongated buildings as having their narrow fronts towards roads like the ones discovered in Apulum. Inside the houses, people both lived, produced, stored and sold various goods, and offered certain services[10]. The buildings could also accommodate various installations in the backyard as in the case of the cooking area between the two strip-houses investigated near legion XIII Gemina's fortress.

In Dacia, "strip-house" or "Streifenhaus" type dwellings were investigated in the military *vicus* at Tibiscum, buildings being organised on plots and having their fronts facing the street. They were provided with both living spaces and annexes for crafting activities like pottery workshops,

[9] Sommer 2012, 81.
[10] Sommer 2012, 82.

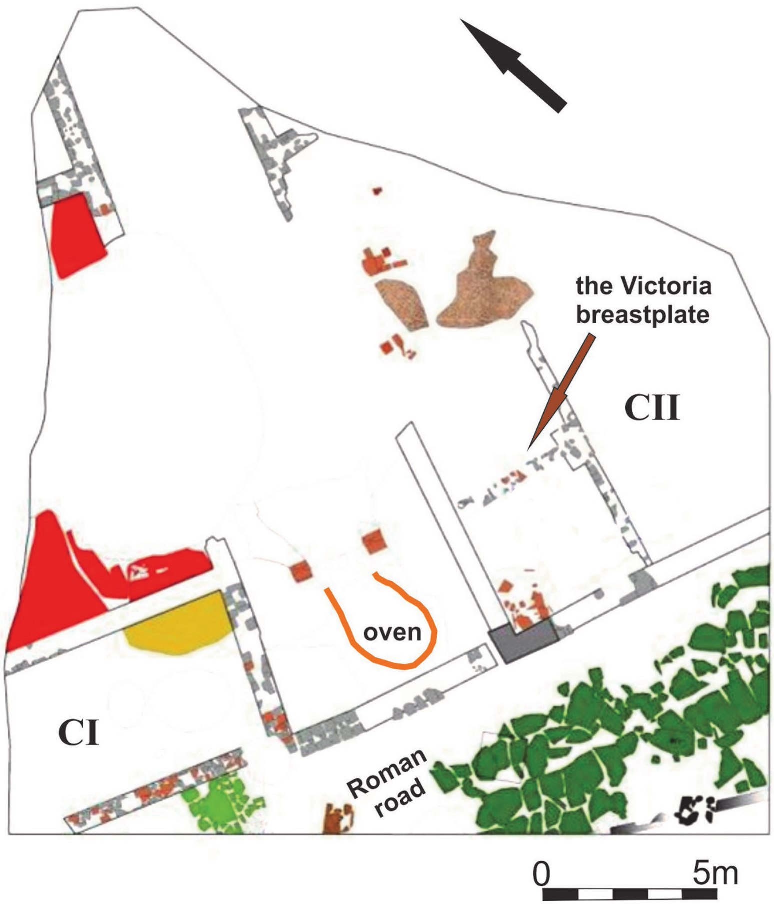

Fig. 3. Plan of the excavated area (2009-2010) (drawing by A. Timofan).

metalworking and glass workshops[11].

During the archaeological research on St. Francis of Paola Ravelin, several rooms were excavated together with the space between the two Roman strip-houses. This area was closed on street-side with a wall, probably functioning as an annex (Fig. 4-6). A circular trace of reddish clay of an oven with a diameter of about 2 m was discovered between the added wall and the two pillars which supported a roof over the cooking area. A thick layer of charred seeds and burning debris from the clay oven walls were found surrounding the pillar bases, corresponding to the stepping level inside building CI. Several fragments of a *dolium* were found in the same archaeological context. This type of vessel may be related to household activities carried out in the area nearby the legionary fortress.

The find of the oven and the *dolium* and the occurrence of millstone fragments in the same archaeological layer suggest that the buildings might have been used for domestic purposes during different phases in plant processing, some prior to cooking, for instance dehusking the hulled wheat[12]. The upper part (*catillus*) of a Roman millstone was found inside building CII together with a fragment of a *meta* (the lower part). The presence of numerous fragments of *mortaria* and a substantial amount of common ware used in

Fig. 4. View of the two strip-houses with the enclosed space and oven (A. Timofan).

[11] Benea 2004, 154-165; Benea 2016, 257, 260-262.
[12] Ciută, Timofan 2013, 193-196.

domestic and household activities evidence the production and storage of food resources and supply of the legionary fortress located nearby. Among the amphorae fragments used for wine storage and mostly for olive oil supply, one fragment bearing the painted abbreviation of legion XIII Gemina (*titulus pictus*), was found[13]. Other archaeological finds include as follows: the left side of a bronze armour set decorated with the representation of goddess Victoria[14], a pair of silver earrings, sewing needles, hair pins, lamps, fragments of terracotta statues depicting goddess Venus, a T-shaped fibula dating from the first half of the 3rd c. AD[15], *terra sigillata* wares, common wares and a large number of animal bones. The coins cover mainly the 3rd c. AD: *sestertius* of Antoninus Pius (AD 139), *denarius* of Iulia Maesa (AD 218-224), *denarius* of Elagabalus (AD 222), *denarius* of Sallustia Barbia Orbiana (AD 225-227), *denarius* of Severus Alexander (AD 233-235), *denarius* of Gordianus III (AD 241-243), *antoninianus* of Philippus I (AD 244-247), *antoninianus* of Cornelia Salonina (AD 257-258).

Fig. 5. View of the strip-houses with their fronts towards the street (A. Timofan).

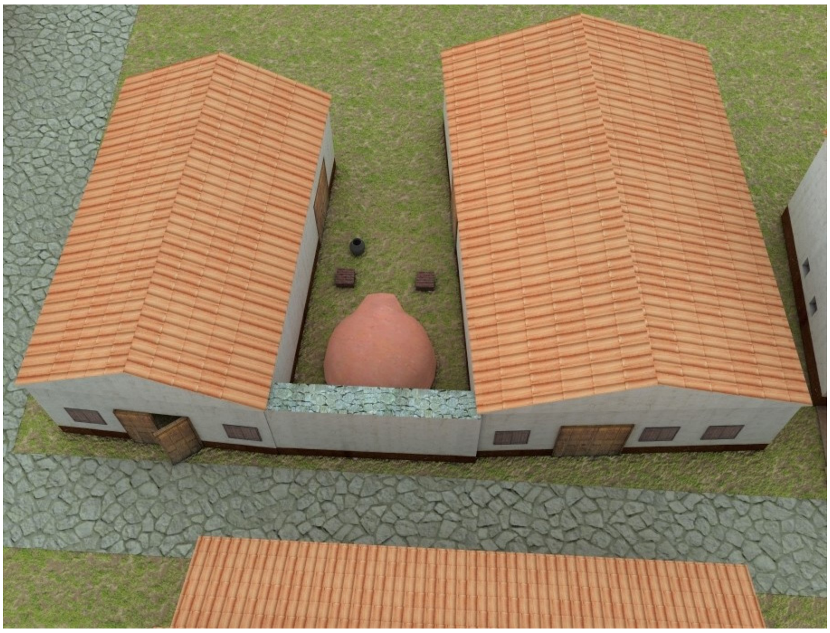

Fig. 6. Digital graphic reconstruction of the two "Streifenhaus" type dwellings and the oven area (T. Muntean, A. Timofan).

Based on the stratigraphic sequence, building techniques and specificities of the archaeological artefacts, the two Roman strip-houses discovered in the civilian settlement of legion XIII Gemina may be dated beginning with late 2nd c. AD and the first half of the 3rd c. AD, with a last phase of habitation after the first half of the 3rd c. AD.

Dispersion of bones at the site, skeletal distribution

In the 2009-2010 campaigns, 840 animal bones were collected, of which 819 were determinable. As number of remains (NISP), cattle prevail with 642 fragments (78.39%), then pig with 104 remains

[13] Timofan 2012, 102-103; Egri *et al.* 2021, 189.
[14] Gui *et al.* 2020, 217-254.
[15] Cociș 2004, 150.

Table 1: Distribution of species as NISP and MNI in the site

Context	Room 1	Room 2	Room 4	House 1 area	House 2 area	Road sector	Annex	Layer	NISP	%	MNI	%
Bos taurus	5	11	2	55	2	413	115	39	642	78.39	58	54.72
Sus domesticus	3	5	3	12	1	55	18	7	104	12.7	21	19.81
Ovis/Capra				3		31	14	8	56	6.84	16	15.09
Equus caballus			1			2		2	5	0.61	3	2.83
Equus asinus						1			1	0.12	1	0.94
Canis familiaris						2			2	0.24	1	0.94
Gallus domesticus			1		1	1	1		4	0.49	3	2.83
Domestics	8	16	7	70	4	505	148	56	814	99.39	104	97.16
Lepus capensis			1				1		2	0.24	1	0.94
Sus scrofa						2	1		3	0.37	2	1.89
Wilds			1			2	2		5	0,61	3	2.83
Determined	8	16	8	70	4	507	150	56	819	100	106	100
Flakes				4			10	7	21			
Total sample	8	16	8	74	4	507	160	63	840			

(12.7%) and ovicaprids with 56 (6.84%). From horse there are five pieces (0.61%), a molar was ascribed to donkey (0.12%) and two remains to dog (0.24%). Four bones were assigned to chicken (0.49%). Five fragments belong to wild mammals, of which two from hare, and three from boar, totalling 0.61%. As minimum number of individuals (MNI), cattle prevail by 54.72%, then pig (19.81%), ovicaprids (15.09%), horse (2.83%), hen (2.83%) and canids (0.94%). Wild species represent only 2.83% (Table 1, Fig. 7).

Few bones were collected from the rooms of the two buildings, consisting of teeth, metapodials, ribs, generally small elements. Likely, spaces were regularly cleaned, so that bone remains did not accumulated. Thus, from the room no. 1 a pig rib and five bones of cattle over 11 years old were collected. These consisted of dental remains, radius, pelvis breakage, and metapodials. Three ribs, a tooth, and a scapula from a 16-20 month pig were collected from room no. 2 in the first building. We have five ribs, three distal metapodials, and three scapulas from cattle, all from at least three individuals. Eight pieces of hen (ulna), hare (ulna), horse (astragal), pig (three ribs), and cattle (rib, scapula) were collected from room no. 4 in the second building.

The majority of the bones were collected from various depths along the Roman road. The 507 fragments are from the area between the two pavement sides and the thickness of the road's culture layer. Among particular materials we mention a dog skull and related mandible, recovered from a 1.40 m depth (Fig. 23). The distribution of bones by species along the road reveals a predominance of cattle (81.46%), pigs, and small ruminants (10.85% and 6.11%), respectively.

In order to systemize data regarding the skeletal distribution of bone elements we used the following

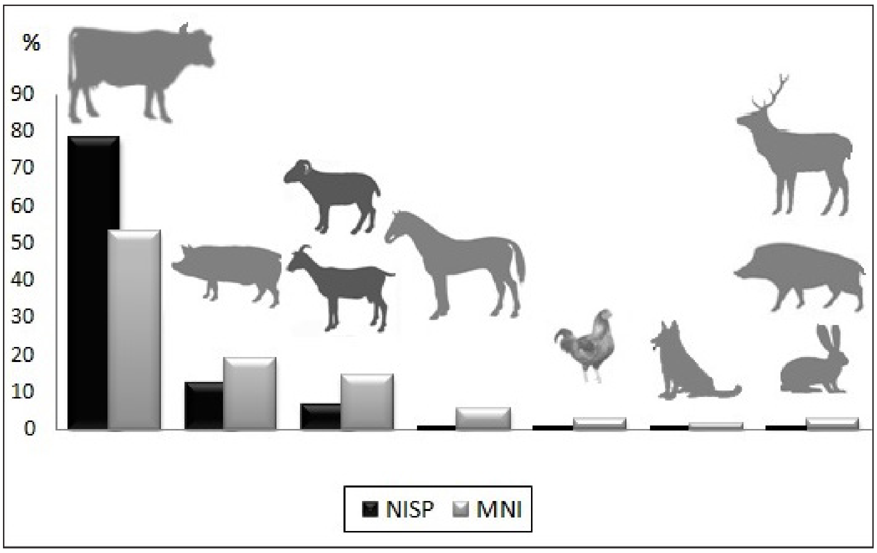

Fig. 7. Distribution of species as NISP and MNI in the site.

clasification: skull (class A), spine (B), shoulder girdle and proximal parts of the forelimbs (C), pelvic girdle and proximal parts of the hind limbs (D) and feet (E). Classes A and E refer to body parts with low nutritional value, while classes B-D refer to regions with high nutritional value. The distribution of cattle bones according to classes A-E in the road sector indicates the following statistics: ribs breaks total 36.8%, dental remains 24.21%, distal ends 13.81% and only 25.18% the rich carnate limb parts. In pig, 65.45% are cranial elements, 16.36% spine elements, 10.92% extremities and only 7.27% from fleshy parts. In small ruminant skeletons, teeth also prevail in a proportion of 38.71%; ribs total 25.81%, the parts with food value of the limbs, 29.03 and distal extremities only 6.45% (Table 2, Fig. 8).

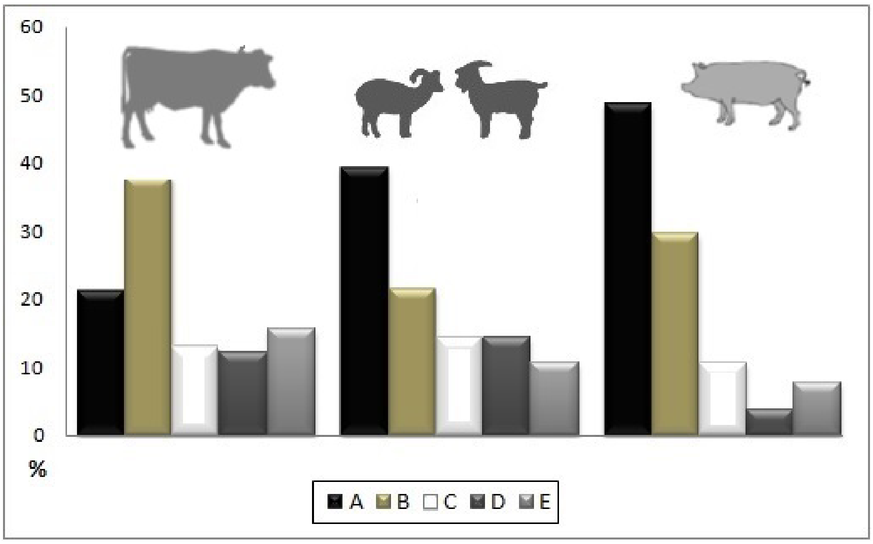

Fig. 8. Distribution of the skeletal remains in the site.

160 bones were collected from the annex sector, which is located between the two buildings, of which 115 belong to cattle (76.67%), 18 to pig (12%), 14 to ovicaprids (9.33%), a hare rib, and a boar canine (Table 1). The distribution of cattle remains by anatomic parts evidences the prevalence of ribs and vertebrae with 50.43%; this suggests that part of the carcasses of the slaughtered animals were processed in respective area. There are fewer cranial elements (14.78%), but there are also horns, which are most likely related to carcass processing; 26.95% is the proportion of the upper parts of the limbs and only 7.84% of the extremities. Possibly, the latter were discarded in an unexplored sector the reasons stated by the archaeologist in the introduction.

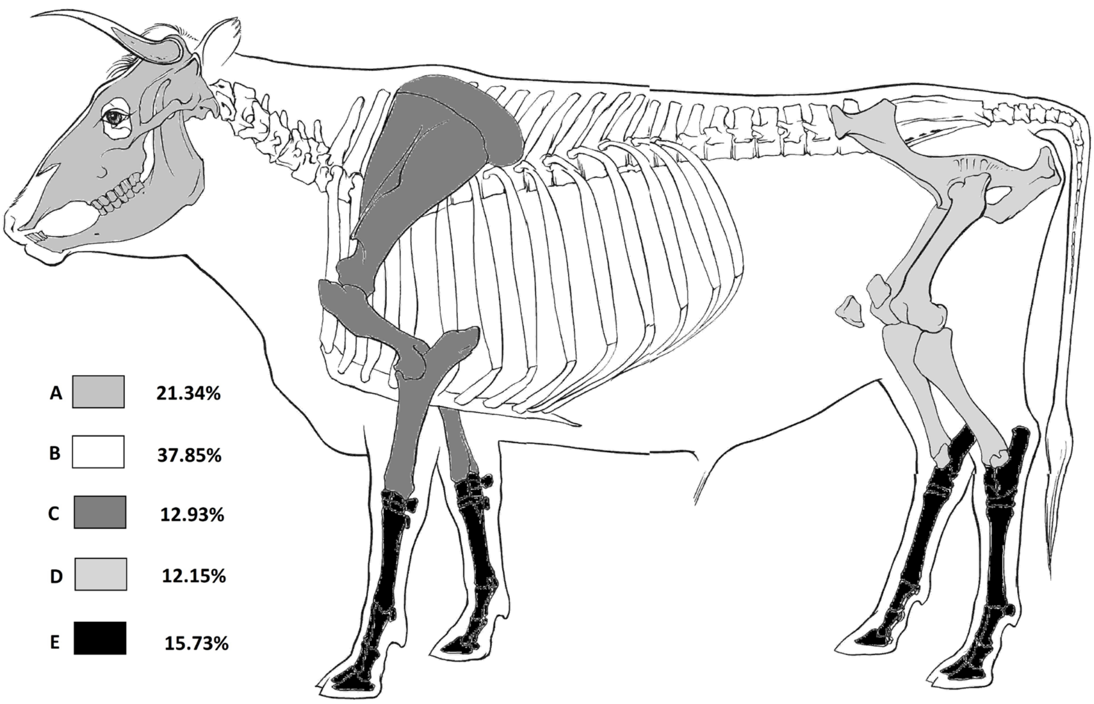

Fig. 9. Frequency of skeletal remains on a cattle skeleton.

Table 2: Distribution of skeletal remains in different contexts

Context	**Room 1**		**Room 2**		**Room 4**					**Road sector**			**Annex sector**				
Species	Cattle	Pig	Cattle	Pig	Cattle	Pig	Hen	Hare	Horse	Cattle	Pig	Sheep/g	Horse	Dog	Cattle	Pig	Sheep/g
Neurocranium										10	1	2		1	4	1	
Viscerocr.										59	11	2			7	3	1
Dentes sup.										1	1	1					2
Mandibula	1	1	1	1						27	19	7		1	6	1	1
Dentes inf.										3	4					1	
Vertebrae										30		1			12		
Atlas										3		2					
Axis										3		1			2		
Costae		1	3	3	1	3				116	9	4			44	5	
Scapula			3	1	1					49	1	2			11	1	2
Humerus										3	2	1			1	1	1
Radius	1									1		1			1	1	1
Ulna							1	1			1				1		
Metacarpus	2		1							8	3	1			4		2
Pelvis	1		1							48					12	2	
Femur										2					3	1	
Tibia		1								1		5	1		2		3
Talus									1	1	1	1			1		1
Calcaneus										1					1		
Tarsalia										2						1	
Metatarsus			2							19	1				3		
Metapodalia											1						
Phalanx 1										17			1				
Phalanx 2										8							
Phalanx 3										1							
Total	5	3	11	5	2	3	1	1	1	413	55	31	2	2	115	18	14

The Chi2-test[16] on the distribution of cattle bones according to the five classes (A-E) from the road sector and the annex yielded statistically significant differences (p=0.03) between observed and theoretical values (Table 6). More specifically, in the road area, more cephalic remains (A) accumulated and fewer from spine (B) than in the annex. Thus, the hypothesis according to which the annex was an area allocated to domestic activities, including the processing of animal carcasses is confirmed. In the other body classes, there are no statistically significant variations. Testing the cattle material from the two locations did not yield significant differences in the distribution of classes A-E (p=0.2). The Chi2-test applied on pig material (p=0.007) suggested that in the road sector teeth prevailed, less meaty parts' bones. On the other hand, there are fewer dental remains and more limb skeleton remains in the annex. Likely, some domestic pig was processed in the annex as well, possibly for the building inhabitants.

Table 6: Chi^2-test on cattle and pig anatomical components in the road and annex sectors

Cattle	**Road**		**Annex**	
Values	observed	expected	observed	expected
A	**100**	**92**	**17**	**25**
B	**152**	**164**	**58**	**46**
C	53	52	14	15
D	51	53	17	15
E	57	52	9	14
Chi^2: 10.826	p=0.03	df-4		
Pig	observed	expected	observed	expected
A	36	31	6	11
B	9	10	5	4
C, D	4	8	6	2
Chi^2: 9.76	p=0.007	df-2		

The per site statistics of bone distribution by skeletal regions pinpoints the following: in cattle, the cranial elements sum up 21.34%, limb and belt parts only 12-13%, and extremities 15.73% (Fig. 9). The majority elements belongs to the axial skeleton (37.85%). Most ribs represented larger fragments or contained insertion heads; therefore, we included these among determinable materials with the risk of somewhat "inflating" the cattle percentage. This suggests that at least part of cattle was culled and carcasses processed in the perimeter of the civil settlement. It is possible that the settlement inhabitants used especially spine parts for food. On the other hand, the small weight of C, D classes would entail that the beef supply of the soldiers in the legionary fortress consisted mainly of limbs and belts. In this case, accumulation of bone elements in classes C, D would be found in the legionary fortress area. In addition, one should not neglect that only part of the civil settlement could be excavated. A similar situation, with small percentages of classes B-D, yet much clearer was encountered in the *vicus* of the fort at Războieni[17].

In domestic pig, the percentage representation of skeletal elements is as follows: cranium bones represent 48.57%, spine bones represent 29.52%, anterior limbs 10.48%, posterior limbs 3.81% and bones from extremities represent 7.62%. In this case as well, it seems that most animals were slaughtered and cut within the perimeter of the civil settlement, the parts with nutrition value being supplied to the legionaries. "Hams" were supplied with distal limb parts included. In case of small ruminants, statistics evidence 39.29% in class A, 21.43% (B), only 28.56% in class (C+D) and 10.71% extremities. It seems that the same rule applies as in case of pig. Horse samples include dental remains, tarsal bones, a proximal phalanx and only one fragment of distal tibia, practically "scattered" elements. Of hen come three fragments of tibiotarsus and an ulna from exemplars consumed in the civil settlement. From dog comes a skull and related mandible, elements from a skeleton likely buried in the site's area. The sample of hunted species includes an ulna and a rib from a rabbit and three fragments from at least two boars, namely a distal radius from a robust male and two canines, the inferior with processing traces.

Carcass butchering and processing

Because the entire cattle material exhibits cutting traces, we allotted a small subchapter to this subject. According to detailed studies on the slaughter and processing of animal carcasses, several

[16] Hammer 1999-2016, 78-79.
[17] Personal information.

Fig. 10. Cut-marks on cattle bones: horn; b-axis; c-Ph1; d-mandible.

stages were proposed[18]. There is a methodology with slight differences from a species to another, more specifically; there are differences between the slaughter and processing of large and small size animal carcasses. We attempt to see below to what extent such phases apply on the material here. The first phase represents the stunning/slaughter. In cattle, this was performed by two methods: the frontal area of the skull was hit with a heavy object (axe type) or a blood vessel at neck level was cut with a knife[19]. In the first case, an indentation is visible on the frontal area, but in the second case there are no traces on bones and appear only in rare cases if hyoid bones are touched; even then, hyoid bone cuts cannot be necessarily taken into consideration as the results of slaughtering. None of the slaughtering methods above could be identified on the material here, in fact it includes no skulls, but only skull bone breaks.

The following phase in animal slaughtering is the primary butchering, which involves in turn three sub-stages: decapitation, removal of distal limb extremities and skinning[20]. The traces appearing on bones as a result of decapitation may be identified on occipital condyles, atlas and axis. Horizontal cuts identified on caudal and cranial parts of the atlas and axis likely represent the decapitation. One should not neglect cuts on occipital condyles, which evidence the same. In the case here we mention four axes, of which one has cut tooth and three strong cuts (by chopper, axe?) on tooth (Fig. 10/b) under the cranial face or midway the body. Only one atlas has a quarter of the distal extremity cut. We also mention an atlas with successive cuts on the caudal side edge, likely in order to detach it from the axis. Occasionally, decapitation was done at higher level, there is one case of injured occipital condyles. Removal of legs was likely done in the half or distal third of the metapodials (Fig. 11), phalanges being kept intact.

The skinning occurred before or during the removal of the head and legs; sometimes, these parts were left in the skin during the cutting process. Still during this phase horns were removed by cutting

[18] Knight 2002
[19] Knight 2002, 67.
[20] Knight 2002, 68-69.

Fig. 11. Metapodials from cattle with cut-marks.

at base level or above it (Fig. 12/c). It is likely that this operation took place before the removal of the skin, as the skinning process could be carried out more easily this way. Horizontal traces could be identified at the point where skinning begins, either by the metapodials or higher, possibly with longitudinal marks across the lower parts of limb bones. Head cuts may be deemed skinning marks if located in less meat areas, such as the frontal part[21]. Unfortunately, we could not identify fine skinning incisions on the cattle bones discussed here.

The third phase in the processing of the slaughtered animal is represented by the preparation and portioning of the carcass. This consists of the following sub-stages: the removal of the organs, cuts through the bone or ligaments to divide the carcass into necessary sizes, disarticulation and filleting[22]. The removal of organs is normally invisible archaeozoologically; only eye extraction may cause nicks around the orbit, while brain removal may be suggested by the existence of slit skulls. The cuts to remove the brain could be similar to those for the portioning of skull, so this type of cuts is not reliable. In this material, the marked fragmentation of skulls and existence of almost all their components are indirectly indicative of brain extraction operations from cattle skulls.

On mandibles there are many cuts made during removal from the skull. Cuts on the sideway part of mandible, under the teeth, may be due to filleting the cheek meat. However, their location, towards the anterior part of the head, where there are fewer muscles, suggests that the operation was likely made during skinning. It is possible that the marks on the mandible angle were caused during the filleting of meat from the lateral part of the head. In our case, we identified cutting traces on the ascending ramus during the separation of mandible from the skull. We identified 20 mandible joints with cutting traces on the ascending ramus, under the joint condyle, most often apophyses being removed (Fig. 12/a, b). The sample also contains a series of vertebrae with cross-sectional apophyses

[21] Knight 2002, 68.
[22] Knight 2002, 69-71.

Fig. 12. Cattle bones: a, b- mandibles with cut-marks; c, d- horn cores.

cut, for the removal of the ribs. Most ribs are broken into large fragments. In some cases, the ribs exhibit horizontal and oblique cuts, in order to obtain smaller pieces (Fig. 13/a-e). Only one lumbar vertebra displays a strong cross-sectional cut on the body, in order to cut the spine. In some cases, cuts

Fig. 13. Cut-mark pig ribs (a-d); cut-mark cattle ribs (e, f); boar canine (g, h).

are superficial, likely emerging during filleting and removal of organs. One atlas, nine chest vertebrae and two lumbar vertebrae display longitudinally cut bodies or touched side edges, appeared during the longitudinal cutting of the carcass[23].

Most cutting traces were noted on the appendicular skeleton, following disarticulation and meat removal. The 69 scapulae present a variety of cutting traces, on the same piece even. Some scapulae have survived almost complete with only the upper part damaged and with fine cuts medially (Fig. 14/d), possibly as a result of detachment from body. Scapula interventions were aimed at the scapular spine, acromion, and the edges of the glenoid cavity or the scapula head. Some of the scapulae

Fig. 14. Cattle scapulae with cut-marks.

[23] Knight 2002, 69-71.

Fig. 15. Cattle scapulae with cut-marks.

exhibit horizontal or oblique cuts on both faces and/or edges, usually at head level (Fig. 15). Scapula head cuts aimed at detaching the scapular-humeral joint, occasionally the supraglenoid tubercle being removed. Other times carvings emerge on the edge of glenoid cavity, larger or smaller portions being removed as a result of disarticulation (Fig. 14/a, b; Fig. 15/a). The longitudinal sectioning of the spine facilitated the removal of subspinal and supraspinal muscles, the acromion being usually cut off (Fig. 14/e; Fig. 15/a). In most cases, the glenoid cavity was longitudinally split once with the removal of the spine (Fig. 14/f). The six distal humeri were extracted from the scapula-humeral joint at a third of their distal part; only one, almost complete, shows filleting traces above the trochlea (Fig. 18/a). In the five radius bones we could not identify cutting traces, as they were clipped in the proximal third. The metacarpals, except for one (Fig. 18/b) are not complete. Only fragments of epiphyses with diaphysis portions survived, some with visible severing traces (Fig. 11/b, c).

In posterior limbs were noted many disarticulation and filleting traces. Coxal bones are fragmented, parts usually containing the acetabulam. On the 68 pelvis bone pieces were identified a series of disarticulation and filleting variations: ilium cut at body level, ischium removed by a cut that also included part of the acetabulam; sometimes, oblique successive cuts on its dorsal edge may be noticed, the cavity being also carved longitudinally (Fig. 16/a-c); ilium cut at body level and vertical successive cuts on ischium, under the acetabulam lip; ilium cut precisely at acetabulum level, ischium and pubis cut lower; there are cases when the two bones partially survive, with oblique cutting traces as a result of filleting (Fig. 16/b); in other cases, the two bones were severed at acetabulum level, thus the hip joint being clipped. On the six femurs and four tibias we identified few cutting traces. Epiphyses were cut below the joint, the femoral head appears alone, cut at head level (one case); the trochlea has fine traces on the condyle likely by sectioning the ligaments (for disarticulation) (Fig. 16/f). The tibia is usually fragmented above the distal or proximal epiphysis, the diaphysis being broken in many pieces (Fig. 16/d). It seems that we cannot define a clear, systematic pattern of butchering cattle, so it possible that animal stunning and carcass butchering were done by different persons, depending on necessities. Only two pig bones have visible cuts, namely a left mandible with strong cuts on the internal side (Fig. 16/e), for portioning and a humerus, with incisions on the medial side, for disarticulation (ligament cutting). It is likely that maxillaries were cut at molar level, with occasional survival of the anterior part of the mandibles (Fig. 17/a). On ovicaprid material we identified only one scapula with incisions on scapular plate and head.

Paleopathology

Only three cases of bone pathology were identified, which suggests a well maintained local genofund. Thus, in terms of dental abnormalities we mention a mature sheep mandible with inflammation of the mandible wall at the level of molars M2, M3. It is an infection that would have ultimately led to paradontosis[24]. In cattle we mention a metacarpal with developed bone tissue as a result of a hitting (Fig. 11/b). On an anterior proximal cow phalanx a few exostoses are visible, due to overloading (Fig. 10/c). Likely, the young age of the animals prevented the development of advanced pathological processes. A complete right metatarsal has an asymmetry of the two components (metatarsals 3, 4), meaning that the lateral condyle is longer than the medial one (Fig. 18/b). Therefore, phalanges have different lengths, especially phalanx III being more affected (hoof). This would explain why lateral III phalanges of posterior limbs are predisposed to sole ulcers on hard surfaces[25]. It does not exhibit a pathological aspect, we only mentioned the piece because it is the single that presents a visible asymmetry, not found in the remaining metapodials. Fig. 10/a shows a horn of immature cow with a "strangulation" at a certain distance from the base. It was obviously more marked on the corneous layer of the piece. These circumferential constrictions were interpreted as *secondary response to ambient stress factors, such as malnutrition, repeated pregnancies and suckling, extensive milking or ... a combination of these factors*[26]. Another hypothesis would be that these deformations called "chord imprints" would be the result of yoking cattle for traction[27].

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[24] Coroliuc, Haimovici 2006, 263.

[25] Nacambo *et al.* 2007, 408.

[26] Thomas *et al.* 2018, 140-142.

[27] De Cupere *et al.* 2000, 255.

Fig. 16. Cattle bones with cut-marks (a-d, f); pig mandible (e).

Fig. 17. Pig mandibles (a); small ruminant's bones (b, c); donkey tooth (d).

Fig. 18. Cattle bones.

Age profiles

Cattle. In order to appreciate dental ages we used the dental schemes of eruption[28] and wear[29]. Obtained data were correlated with data about long bone sutures[30]. Based on the 64 fragmented cattle scapulae, 58 individuals were identified. Based on teeth remains, slaughtering ages were established only for 22 specimens. According to dental statistics, only one animal was culled under one year

[28] Schmid 1972, 75.
[29] Grant 1982.
[30] *Apud* Udrescu *et al.* 1999, tab. 5, 60.

Table 3: Pig and cattle age profiles

Cattle/ age	MNI	%	Stage	Pig/ age	MNI	%	Stage
0-1 year	1	4.55	infans, juvenile	<12 months	1	4.76	juvenile
1-1.5 y	2	9.09	juvenile	16-18 m	1	4.76	subadult
1.5 y	1	4.55	juvenile	18-20 m	4	19.05	subadult
1.5-2 y	2	9.09	juvenile	20-22 m	2	9.53	subadult
2-2.5 y	1	4.55	subadult	22-24 m	5	23.81	subadult
2.5-3.5 y	2	9.09	subadult	24-36 m	6	28.57	subadult
3.5-4 y	2	9.09	adult	36-48 m	1	4.76	adult
4-6.5 y	3	13.63	adult	>48 m	1	4.76	adult
6.5-9 y	4	18.18	adult	Total	21	100	
9-11 y	2	9.09	mature				
>11 y	2	9.09	mature, old				
Total	22	100					

(4.55%), five being slaughtered between 1-2 years (22.73%), three between 2-3.5 years (13.64%), nine between 3.5-9 years (40.9%) and four over 9 years (18.18%). The ratio between infants+juveniles/ subadults/adults/matures+senile is 27.28/ 13.64/ 40.9/ 18.18% (Table 3, Fig. 19). Because maxillary remains are few, we used data offered by long bones and vertebrae fusions[31] for a general view on when individuals were slaughtered. According to estimates, 6.74% is the weight of elements in specimens that do not survive one year of age (infants and part of juveniles). Up to two years of age, the same low number of unfused elements maintains (2.33%). Practically, between 0-2 years, non-fused bones in juvenile specimens do not exceed 10%. Between 2-3 years the weight of unfused bones (subadults) is approximately 17.5%. Between 3-4 years, the weight of bones from subadults or young adults is about 45.76. 54.24% represents animals that reached and exceeded 3-5 years of age. Generally, dental and bone fusion statistics partially correlate (Table 5). According to dentition, the weight of animals exceeding the age of 3-5 years is 58% and somehat smaller according to bone epiphyseal suturing (54%). Nevertheless, the weight of young animals and subadults is 41% on dentition and lower on bones, below 15%. It is likely that the fragmentation of material from young specimens prohibited the highlight of suture phases. Thus, cattle slaughtering in order to supply the legionary fortress concerned 50% of bodily immature specimens (below 3.5-4 years), with a small number of animals below one year. Remaining cattle were culled at various stages, about 32% adults and 18% mature/senile. Practically, it was mixed husbandry that focused on both meat and dairy given the rather low percentage of specimens slaughtered during the period of maximum economic efficiency (about one third of the stock).

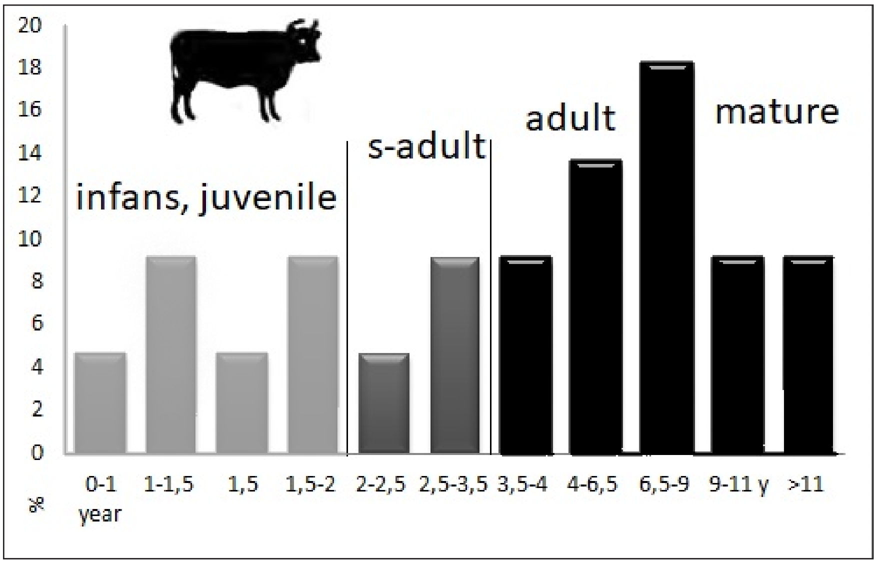

Fig. 19. Age groups of cattle.

31 Determining fusion times cf. Udrescu *et al*. 1999, tab. 3.7, 60.

Table 5: Estimated fusion date from cattle sample

Cattle	Age *	Unfused	Fusing	Fused	Total
Early fused	*0-1 year*	*6-6.74*	*1-1.13*	*82-92.13*	*89*
Scapula, distal	7-10 months			48	48
Acetabulum	7-10 m	6	1	34	41
Early fused	*1-2 y*	*1-2.33*	*2-4.65*	*40-93.02*	*43*
Radius proximal	12-15 m			4	4
Ph. I, II	20-24 m		2	32	34
Humerus distal	15-20 m	1		4	5
Middle fused	*2-3 y*	*10-17.54*		*47-82.46*	*57*
Tibia distal	2-2.5 y	2		3	5
Calcaneum	3 y	3		1	4
Metapodial distal	2-2.5 y	5		43	48
Late fused	*3-5 y*	*27-45.76*	*10-16.95*	*22-37.29*	*59*
Humerus prox.	3.5-4 y	1			
Radius distal	40-48 m	3			
Ulna, prox., dist.	3-3.5 y	1	1		
Femur proximal	3 y		2		
Femur distal	3.5 y	1		2	
Tibia proximal	4 y				
Vertebrae	4.5-5 y	21	7	20	

*Udrescu *et al*. 1999

In order to appreciate pig slaughtering ages, we used the dental eruption schemes of Schmid[32] and the dental wear schemes of Horard-Herbin[33]. Out of the 21 domestic pig, only one specimen was below 12 months (4.76%), most pigs being slaughtered between 16-24 months (57.15%); six between 2-3 years (28.57%) and two over three years (9.52%). Thus, slaughtering begins after 16 months, with a peak between 18-20, 22-24 and 24-36 months (Table 3, Fig. 20). The male/female ratio is 13/5. Likely certain rules were in place, they followed a slaughtering pattern of pig stocks. Thus, piglets were not much on the menu of the soldiers in the legionary fortress, or if they existed, numbers were low. Animals that reached an optimal weight prevailed (between 1.5-2 years). Instead, the weight of adult individuals (reproducers) in meat supply is insignificant, given its diminished quality.

In order to establish slaughter ages and interpret culling profiles in small ruminants we took into account the works of Payne[34] and Helmer[35]. Based on material we identified seven sheep, seven goats and two individuals unspecifically

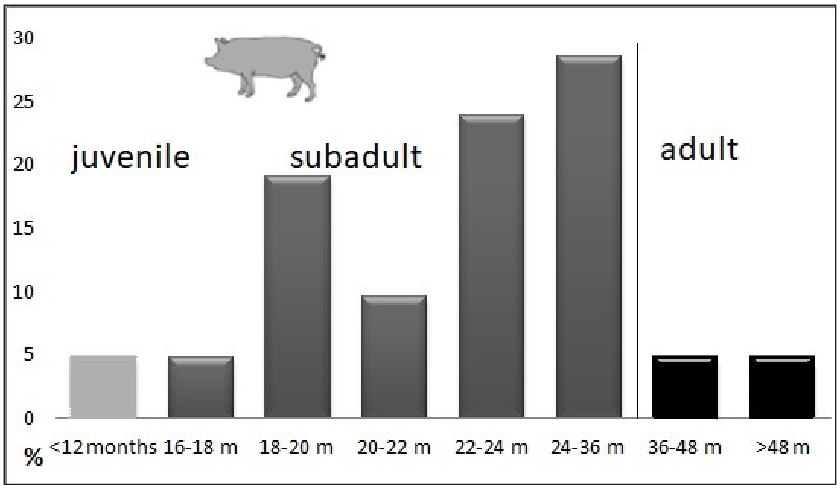

Fig. 20. Age groups of pig.

32 Schmid 1972, 77.
33 Horard-Herbin 1997, tab. 26, 252.
34 Payne 1973, 281-303; Payne 1987, 609-614.
35 Helmer 2000, 29-38.

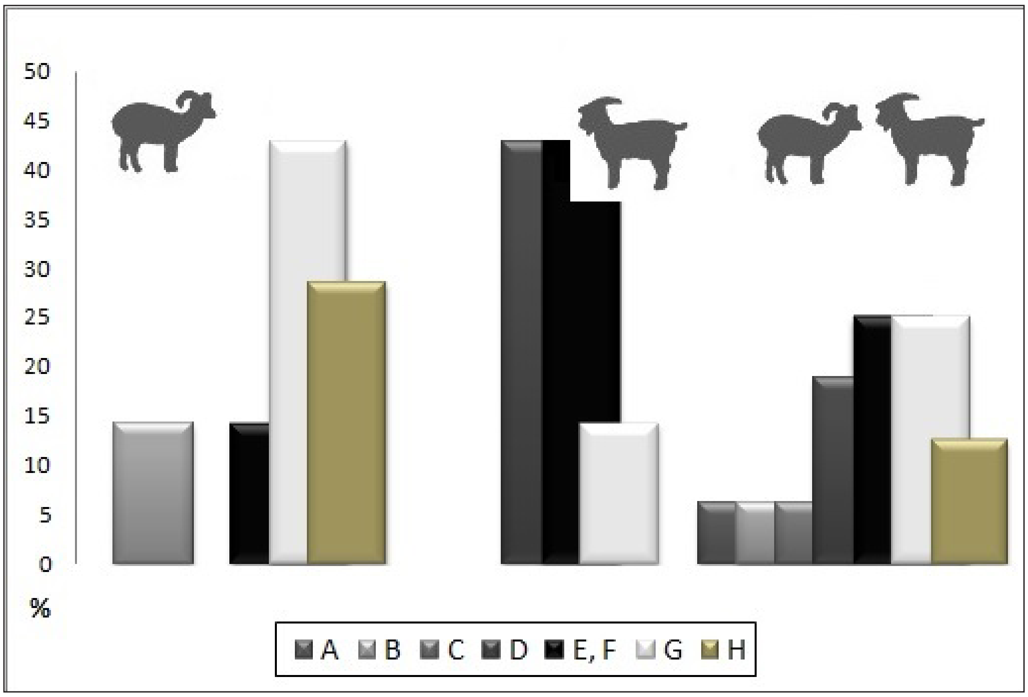

Fig. 21. Age groups of ovicaprids.

ascribed. Sheep were slaughtered between 2-6 months (14.29%), 2-3 years (14.29%), 4-6 years (42.86%) and over 6 years (28.57%). It seems that one third of sheep were slaughtered in young and subadult stages (for meat), the majority being represented by specimens kept for milk and wool (Fig. 21). The slaughter scheme would correspond to type "E" of Payne (dominance of classes G, H), meaning mixed husbandry (wool and meat) with emphasis on wool obtaining[36]. Goats were slaughtered between 1-2 years (42.86%), the same percentage between 2-4 years and 14.29% between 4-5 years. Practically, the weight of individuals slaughtered between 1-3 years (for meat) is 57%, those exploited for more years were fewer. As a whole, cumulating data for the two species we estimated a proportion of 18.75% of animals slaughtered below one year, the same percentage up to two years, 25% between 2-4 years and 37.5% over this limit. (Table 4). Absence of lamb and kid bones would suggest that whole animals were provided to the legionary fortress. Or, their absence would be due simply to the investigation of a small part of the civil area. Wool harnessing was also very important in the civil area, as they likely supplied it to the fortress as well. Given the different depths, the five bones of horse come from three adult exemplars. The four hen bones belong to three specimens of which two subadult. The hare ulna and rib come from an adult specimen.

Table 4: Age profiles of Ovicaprids

Age	Stage*	Stage**	Sheep		Goat		S/G	Total	
			MNI	%	MNI	%	MNI	MNI	%
0-2 m	A	infans					1	1	6.25
2-6 m	B	infans	1	14.29				1	6.25
6-12 m	C	juvenile					1	1	6.25
12-16	D	juvenile			1	14.29		1	6.25
18-24	D	subadult			2	28.57		2	12.5
2-3 years	E	subadult	1	14.29	1	14.29		2	12.5
3-4 y	F	adult			2	28.57		2	12.5
4-5 y	G	adult	1	14.29	1	14.29		2	12.5
5-6 y	G	adult	2	28.57				2	12.5
>6 y	H	mature	2	28.57				2	12.5
Total			7		7	100	2	16	100

* Age groups were established using Payne's distribution; ** cf. Forest 1997

[36] Payne 1973, fig. 3, 284.

Biometry

From cattle we determined horn walls, frontals splinters and only seven measurable pieces. Three horn cores come from subadult males. The first piece (Table 7) is of *primigenius* type, oriented sideways, twisting upwards from midway. The second piece, 220 mm long is oval on section, thick at the base and upward twisted from midway (Fig. 12/d). It exhibits cutting traces above the base. The third piece seems shorter, thinning abruptly (Fig. 12/c). Their sizes are small considering they belong to subadult exemplars. From females there are four short-horned *brachyceros* type horns. Piece no. 6 is short, curved anteriorly with a cut above the base for sheet removal. Piece no. 4 also exhibits cut traces above the base. Metrical data processing of some of the bones in the appendicular skeleton highlighted the following aspects: in scapula, the variation coefficient (CV) is very high (14-19.6) given the weight of specimens from various age groups. From the four distal humeri, one belongs to a cow (BT=64 mm)[37], the others to bulls (BT=76-86 mm). The last value indicates a robust specimen. In distal metacarpals, there is a high CV (10.6-11), although values characterize animals exceeding 2-2.5 years old, they are unlikely to reach full body maturity. At least one specimen is castrated. Only three male bones have Bd/Dd values greater than 63.5/ 32.5 mm, the other low values are associated with females (which is economically illogical) or castrated specimens. Distal metatarsal values are also low, however they seem more unitary, thus CV is a little lower (5.8-8.5). Among acetabulum sizes one is very large, with LA=78 mm, which is high even for a male. Possibly an improved specimen? The measurements of the proximal phalanx present wide variations of size, especially on the proximal width. CV is also high, 9.3 for GL and 14.8 for Bp. Generally, small values dominate, few length sizes exceeding 63 mm, correlated with Bp>34 mm. Only one piece is of a somewhat more robust male (GL/Bp= 69/37 mm). It seems that metric data of cattle characterize rather the local type, except for the size of 3-4 bones, with high values. This may suggest that some improved individuals were imported.

Table 7: Horn measurements in ruminants*

Context	No.	GL	BA	BB	BC	Sex	Age	Taxon
SI/BC/10-12/1,4 m	1		65	54	185	M	Imature	Cattle
SI/1,3-1.4/B23	2	220	59	43	180	M	Imature	Cattle
SI/room 1/1.3-1.4	3		53.5	43	154.5	M	Imature	Cattle
SI/room 1/1.3-1.4	4		56	38	144	F	Imature	Cattle
SI/room 1/0.5-1 m	5		53	43	163	F	Adult	Cattle
SI/1.4/BC/8-12	6		47	43	148	F	Adult	Cattle
SI/room 1/0.5-1 m	7		36	36.5	110.5	F	?	Cattle
SV/0.7-1 m	8		40	27		M	Adult	Goat
SI/ABC/10	9		47	32	134	M	Adult	Sheep
SV/0.7-1 m	10		21	13		F	Adult	Sheep

* Measurements cf. A. von den Driesch, 1976

Withers heights of 114 and 125.6 cm (Matolcsi) were calculated using an 189 mm long metacarpal and a 219.5 mm long metatarsal. The first specimen is a female and the second a castrate. Such low values are ascribed to local, unimproved types, which we also identified in the *vicus* of Războieni (103.1 cm)[38]. The comparison with other Roman sites highlighted a wide range of sizes, consequence of sexual dimorphism and possible mixes with improved cattle. Small size of animals were identified approximately everywhere, as evidenced by the lower variation limits from exemplified Roman settlements (Fig. 22). In sites from Transylvania mainly small and medium sized cattle were found; in a few cases, there are also larger, improved specimens, with heights over 130 cm: 104-133 cm (M=125 cm) in the civil settlement of Apulum-*Stația de salvare*[39]; 123-135.6 cm (M=129.3 cm) at Apulum-*Liber*

[37] Measurements cf. Von den Driesch 1976.
[38] Personal data.
[39] Gudea 2012, 223.

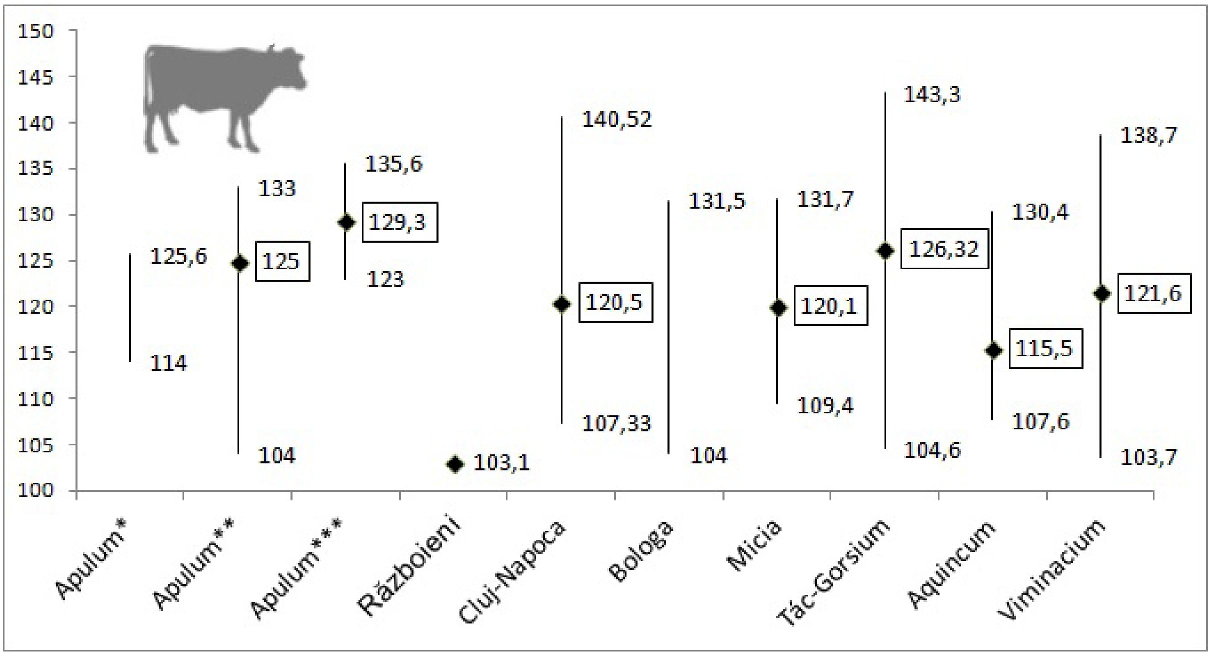

Fig. 22. Cattle' whiters heights in Roman sites.

Pater Temple [40]; 107.3-140.5 cm (M=120.4 cm) in the civil settlement from Cluj Napoca-*Str. Cotită*[41]; 104-131.5 cm in the fort at Bologa[42]; 109.4-131.7 cm (M=120.1 cm) in the fort at Micia[43]. In the fort of Brâncovenești we identified two individuals sized 103.7 and 116.7 cm[44].

At Tác-Gorsium, the waists widely vary between 104.6-143.3 cm (M=126.32 cm); 22% is the proportion of animals from local breeds and 62% that of improved animals. According to the author, individuals of 120 cm or below represented the local breed, while those over 125 cm the imports from Italy[45]. In the civil settlement of Aquincum, the height at withers of cattle is low, except for three specimens. It varies between 107-130 cm (M=115.5 cm), below the minimum value estimated for the breeds from Roman Pannonia (120-140 cm)[46]. On the other hand, in the hippodrome of Viminacium were identified large cattle sized between 103.7-138.7 cm (M=121.6 cm)[47]. In general, in Roman sites from Serbia it is assumed that larger types of cattle were present, with sizes varying between 120 and 140 cm[48]. In fact, it is unclear whether this large cattle breed was the result of improved zootechnical techniques and/or better feeding conditions. It seems that larger specimens were present especially on large estates (Roman villas), where their superior work power counted in the ploughing of extended areas and transport on larger distances[49].

Domestic pig is represented by very little measurable material, which suggests less robust specimens, with a gracile dentition. We mention the average values of M3 of 30.6 mm (maxilla) and 31.75 mm (mandible) (Table 8). The average height at withers is 71.74 cm (70.32-73.78 cm; N=4). These are values comprised within the large variation range of pig from certain Roman sites in Transylvania: 64-81 cm at Cluj Napoca-*Str. Cotită*[50], 68.66-72.55 cm (N=8; M=70.35 cm) in the fort of Micia, 70.3 cm in the *vicus* of Războieni, 60.7-73.4 cm (M=67.05 cm) at Apulum-*Stația de salvare*[51], 64-74 cm at

40 Gudea 2012, 223.
41 Matolcsi's coefficients were used to compute sizes, *apud* Gudea 2012, 182, 185.
42 Gudea 2012, 223.
43 Udrescu 1985, tab. 2, 67.
44 Kelemen 2015, 270.
45 Bökönyi 1984, 27-28.
46 Choyke 2003, tab. 1, 220-221.
47 Vuković 2015, 60.
48 *Apud* Vuković 2015, 61.
49 Choyke 2002, 213.
50 Gudea 2012, 219.
51 Gudea 2002, tab. 14, 91.

Porolissum-*Taverna*[52]. From two boars come a distal radius of Bd/Dd=51/35.5 mm, an upper canine and two fragments of a lower canine, with working traces, broken in ancient times (Fig. 13/g, h).

Few metric data were collected from the material of small ruminants as well. Among other, we mention a frontal of horned sheep and a ram skull, less robust (Tab. 7). A 26-32 mm variation, with an average of 29.07 mm (N=8) were estimated based on distal tibia. It is likely that values from the higher variation interval belong to caprines. There are no suitable pieces to estimate sizes. A distal tibia of a horse, sized Bd/Dd= 69/44 mm would correspond by correlation with data from Tác-Gorsium[53] to a small specimen, sized 133-135 cm. It is worth mentioning a proximal phalanx with maximum length of 87 mm and diaphysis width of 33 mm, suggesting a relatively gracile specimen, for riding, likely over 1.35 m in height. Out of the six bones of Equidae, a P_3 right (premolar) seems to belong to donkey. Its specific drawing and occlusal face measurements (length/ diameter=27/13.5 mm) confirm the assignment: metastylid, metaconid rounded, V-shaped lingual fold, no penetration of buccal fold[54] (Fig. 17/d).

Above the street running in front of the two houses, a dog skull was removed from 1.40 m deep (Fig. 23). The related mandible was found still in the road sector, but elsewhere. The skull is missing the zygomatic apophyses (recently broken) and teeth, except for a molar. The occipital condyles are slightly damaged. It exhibits a recent cut across the frontal-parietal area. The basi-occipital-sphenoid suture is closed, which suggests that the animal was more than one year old. The interparietal, frontal-temporal and nasal sutures are visible. Permanent teeth exist, but not worn. The first premolar is missing, not even the alveole is sketched. The interfrontal suture is visible, closing between 3-4 years and that interparietal between 2-3 years[55]; the animal was likely towards 2 years old. The sagittal crest is poorly developed and the globular neurocranium longer than the viscerocranium. The snout is short and narrow, narines are slightly bulging. Orbits are slightly distanced, auditory bullae are small, skull is not high. Dorsally (Fig. 23/a) is noticed the right temporal crest which is slightly asymmetrical from the left.

According to metric data and cranial indices[56], it is a small skull, of mesocephalic type. Some cranial indices[57] bring it to closer terrier group values[58], but not a typical

Table 8: Processing of cattle and pig measurements

Bones	**Scapula**			**Coxal**	**Metatarsus**		**Metacarpus**		**Ph. 1**		**Ph. 2**		**Humerus**	**Pig/ Maxilla**		
Measurements	SLC	GLP	LG	LA	Bd	Dd	Bd	Dd	GL	Bp	GL	Bp	BT	P2-M3	M1-M3	M3
N	41	17	30	10	23	23	11	12	24	23	10	10	6	1	6	10
Min	21	32	28	57	47	26.5	48.5	27	48	22	31,5	24	64	108	62	27
Max	64	79	67.5	78	61	32.5	65	35	69	37	47	34	86		70	34
Mean	48.8	62.3	55.6	64.6	53.6	29.5	55.4	30	57.1	29.2	38.8	29.8	72.4		65.2	30.6
Std. error	1.5	2.6	1.46	2.03	0.95	0.35	1.9	0.92	1.06	0.9	1.44	1.1	3.5		1.5	0.6
Variance	92	115	64	41.4	20.9	2.9	37.6	10	27.2	17.9	20.7	12.2	72.04		13.8	4.2
Stand. deviation	9.6	10.7	8	6.44	4.6	1.7	6.12	3.2	5.2	4.2	4.6	3.5	8.5		3.7	2.1
Coeff. variation	19.6	17.2	14.4	10	8.6	5.8	11.1	10.6	9.1	14.5	11.7	11.7	11.7		5,7	6.7

52 Gudea 2002, tab. 14, 91.
53 Bökönyi 1984, 197.
54 *Apud* Johnstone 2004, tab. 4.1, 165.
55 Lignereux *et al.* 1992, 147.
56 Alpak *et al.* 2004, 324-325.
57 Indicii cf. Alpak *et al.* 2004, excepting FI, I2 și LL1-2.
58 Alpak *et al.* 2004, tab. 2, 326.

Fig. 23. Dog' skull: a-dorsal view; b-lateral view.

specimen. Comparing our data with skulls from the modern period we noticed certain similarities with only skull no. 2 in respective collection[59]. But in terms of proportion and cephalic sizes, the skull no. 2 seems closer to cocker and less to teckel (dachshound)[60]. *Because dog morphotypology does not have the same basis as the assignment of breed identity, it is not appropriate on the basis of morphometric analysis to suggest that any ancient dog "belongs to" any modern breed*[61].

Although the material from Alba Iulia did not comprise long bones in order to estimate sizes, based on metric data we assume that the skull belong of a small dog. In the academic literature it is suggested that, to a skull basal length varying between 115-150 mm would correspond individuals sized 32-38 cm[62] in height. We believe that the dog from Apulum would frame these limits. The basal length Dahr (130) also confirms this fact. Likely, it was the pet of a wealthy family who lived in respective area. Small dogs emerge by late Iron Age and became common in Roman times[63]. Roman materials from Romania

59 Lignereux *et al.* 1992, tab. 2, 4, 144-146.
60 Lignereux *et al.* 1992, 147.
61 Bennett *et al.* 2016, 84.
62 Apud Lignereux *et al.* 1992, tab. 8, 148.
63 Bennett *et al.* 2016, 101.

Table 8: Dog skull measurements

Skull		**Mandibula**	
Total length: Ak-P	148	Total length	113
Cranial length: Ak-N	87	Lg. angular-Infradental	112
Basal length: B-P	133	P1-M3	60
Basicranial axis	36	H vertical ramus	44.5
Basifacial axis: S-P	97	Lg. Dahr	130
Upper neurocranium Gl: Ak-F	77	**Skull, continued**	
Viscerocranial length: N-P	61	Frontal breadth: Ect-Ect	47
Facial length: F-P	71	Entorbitale-Ent	37.5
Length of the nasals: N-Rh	52	Least palatal breadth	28
Snout length	47	Snout breath	31
Palatal length: St-P	76	Greatest height orbit	27
Staphylion-Palatine-oral	26	Skull height (+) sagittal crest	46
P1-M2	53.5	Skull height (-) sagittal crest	45
M1-M2	16	Height occip. triangle: B-Ak	37.5
P1-P4	37.5	Skull index (SI): Zy-Zy x100/Ak-P	56.08
LP4	15.5	Cranial index (CI): Eur-Eur x100/Ak-N	58.62
Lg. auditory bulla	17	Facial index (FI): Zy-Zy x 100/N-P	136.1
Otion-Otion	57	Index 1 (I1): Eu-Eu x 100/ Skull length	34.46
Breadth at occip. condyles	32.5	Cranial-viscerocr. lg. (LLI-2): Ak-N/ N-P	1.43
Breadth at paraocc. processes	44	Length width index (LWI-2): Ak-P/ Zy-Zy	1.78
GB foramen magnum	15.5	Length width index (LWI 4): Ak-N/ Eu-Eu	1.71
H foramen magnum	18	Cranio-facial ratio (CFO): (Ak-N)x100/N-P	142.6
Neurocranium breadth: Eu-Eu	51	Cranio-facial ratio (CFO1): (Ak-N) x 100/N-Rh	167.3
Zygomatic breadth: Zy-Zy	(83)	Basal index (BI): Eu-Eu x100/B-P	38.35
Least breadth of skull	34	Basal index (BI-1): Zy-zy x100/B-P	

are deficient in terms of craniometric data, size estimates being based on long bones. The presence of small sized animals is mentioned in a few Roman sites. At Porolissum-*Taverna* dogs sized over 23 cm[64] are mentioned; in building LM3 from Porolissum and at Apulum-*Jupiter Dolichenus Temple* dogs over 35 cm[65] in size were identified. In the civil settlement from Stolniceni, canids' size varies within much larger limits: 28.2-67.5 cm. Obviously, the inhabitants of the Roman settlement of Stolniceni also had small dogs, whose utility was aesthetic and perhaps, sentimental. Undoubtedly, the small sized animal group included many dog "breeds": with fine or robust extremities. For instance, at Stolniceni are mentioned robust individuals, with shaft index of 11.8 but with sizes of 33 cm and 40.7 cm[66].

At Tác-Gorsium five-six dog breeds were highlighted, among which also those of small sizes, with different shaft indices. Most canids from Tác-Gorsium were animals of small to average height, varying from the size of a Fox terrier to an Airdale terrier (45-60 cm in size). We mention though a group of dogs with heights around 30 cm and straight and fine legs, similar to the modern Teckel (dachshund). There are also smaller specimens (dwarf dogs), with slightly twisted extremities and heights of 23-25 cm[67]. From the Roman civil settlement of Aquincum come a few dog bones, of the size of an Airdale terrier, used as watchdogs. In general, their bones were identified in the civil area of the forts, most being of small-average size with thin legs[68]. As for small sized dogs, they are quite difficult to frame in

64 Gudea *et al.* 2008, 45.
65 Gudea *et al*. 2008, 45.
66 Udrescu 1991, 265.
67 Bökönyi 1984, 323-326.
68 Choyke 2003, 222.

the classes proposed by *Columella* in *De re Rustica*. Indeed, this dog type cannot be classified either as a watchdog or a shepherd dog, because they are too small. They could be *Canes Venatici*, which means sports dogs, even though Columella never mentioned small dogs among these. They were likely pets part of the day-to-day life of humans[69].

Conclusions

Although the civil settlement of Legion XIII Gemina (*canabae*), respectively the Severan town, *Municipium Septimium Apulense*, benefited from extended archaeological excavations, archaeozoological data are insufficient. In this context, the presented faunal sample, although small is important because it provides new information on the animals that composed the diet of the civil settlement and indirectly the diet of legionary fortress, butchering and carcass processing techniques and harnessed morphotypes. The archaeological inventory from the perimeter of the houses discovered during the systematic excavations conducted in the St. Francisc de Paola Ravelin confirms their role in the household activities carried out in the area from the vicinity of legionary fortress. These are related to plant processing, production and storage of food resources and supply of the nearby legionary fortress. The interpreting of the faunal data confirms that the space annex between the two buildings was also used for the processing of animal resources meant for the civilian and military areas.

On the other hand, the high weight of cattle (78%), the low percentage of bones from parts with nutritional value implies that most slaughtered animals, butchered within the perimeter of the civil settlement were supplied to the legionary fortress. In addition, they were used for transport and dairy products. The cattle culled for the supply of the legionary fortress were in 50% proportion immature exemplars, with a few animals below one year of age. Only 32% of the slaughtered animals were adult and 18% were mature. A series of specialists in the archaezoology of the Roman period reached the conclusion that, cattle were used especially for the meat supply of the legionaries/auxiliaries.

Pig weights do not exceed 13% as NISP, important parts (hams) being supplied to the legionary fortress. Few sheep and goats were used as meat source, their weight not exceeding 7% as NISP. A part of sheep stock was bred for milk or wool, goats being slaughtered mainly for meat. Bones of horse are few and do not come from animals culled for meat. Hen represented an important nutrition component, especially of those who inhabited the first building. Their weight does not exceed 0.5%. The sampling of a dog skull from the road area allowed a detailed morpho-dimensional analysis. Accordingly, it was a small-sized specimen, likely a pet. Hunting represented an insignificant component of the current activities, with a 0.61% weight. Bone sizes evidenced small, gracile specimens, which belonged to local, unimproved types.

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[69] Zedda *et al*. 2005, 323.

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