

ANIMAL BREEDING IN LATE ROMAN SETTLEMENTS FROM DOBRUDJA, IN THE LIGHT OF RESEARCH AT MURIGHIOL (HALMYRIS, TULCEA COUNTY)

Abstract: În privința cercetării arheologice, perioada romană târzie este bine documentată în Dobrogea (provincia Scythia Minor), în privința analizelor faunistice, până în prezent s-au publicat materiale din șapte situri (tabel 2, fig. 1), însumând 3942 oase. În acest context, cele aproximativ 3553 oase de la Murighiol aduc un plus de informație, oferind date inedite asupra acestui subiect. Prima parte a lucrării prezintă pe scurt datele faunistice de la Murighiol (anticul Halmyris), insistându-se pe profilele de abataj (fig. 6-8) și frecvența speciilor în diverse contexte (fig. 5). În partea a doua a lucrării se discută frecvențele speciilor, cât și „schemele ipotetice de sacrificare” ale principalelor mamifere domestice în siturile romane-târzii în Dobrogea. Conform acestora (fig. 4, 9) oasele de vită prevalează în aproape toate eșantioanele, valorile taxonului, oscilând în jur de 40-55 %. La extreme se plasează Jurilovca cu un procent foarte mare, de 71,04 % și Murighiol cu numai 24 %. În materie de exploatare a speciilor de talie mică se înregistrează două categorii de situri: a – cu predominanță a suinelor domestice, e cazul lotului de la Murighiol (24,85 %) și Dinogetia cu 22,65 %. O explicație ar reprezenta-o localizarea așezărilor în vecinătatea Dunării, creșterea speciei fiind relativ facilă și la îndemână. Capidava ce ar intra în aceeași categorie de situri cu condiții ambientale similare, evidențiază un procent de numai 9,94 %. Celelalte eșantioane oferă valori cuprinse între 11-17 %. Diferențele procentuale apar și în cazul aceleiași așezări, dar pe loturi diferite, e cazul celor două eșantioane de la Adamclisi. Unul oferă o valoare de 11,04, celălalt 17,78 %. Este un exemplu elocvent de fluctuații procentuale rezultante al unor loturi nesemnificative sub raport cantitativ; b – situri cu predominanță a ovicaprinelor: Slava Rusă, Capidava, Histria, Adamclisi 1, Jurilovca, Ovidiu. Se pare că și în epoca romană târzie, clima și mediul dobrogean au favorizat creșterea ovinelor și caprinelor, punându-și amprenta puternic asupra caracterului economiilor animaliere. Astfel că și în situri cu valori sporite ale porcinelor (cele legate de Dunăre), ovicaprinele înregistrează peste 15 %. Calul este documentat prin resturi faunistice în toate eșantioanele, indiferent de mărimea lor, comportând procentaje variabile, oscilând între valoarea maximă de 43,46 % la Ovidiu și 2,83 % la Dinogetia. Element oarecum comun acelor vremi, asinul are puține oase în eșantioanele în discuție, sub 2 %, lipsind de la Jurilovca și Ovidiu.

Keywords: Halmyris, Scythia Minor, Dobroudja, late roman sites, age profiles.

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The Roman late period is well-known in Dobrudja (province Scythia Minor) in terms of archaeological excavation, but in relation to fauna only 3,942 bones from seven sites (table 2, fig. 1) have been published by now. Except for the assemblage from Slava Rusă totalling over 2,600 pieces, the other ones contain no more than 1,310 remains. In this context, the approximately 3,553 bones from Murighiol¹ partially complete the shortage of information, providing original data on this subject. Unfortunately, in most cases there are few detailed published data on slaughter profiles, probably because of small samples. At the very beginning we give some information on sample from domestic taxa at Murighiol (fort Halmyris in antiquity), collected during 2003-2007 campaigns, noting that professor Sergiu Haimovici have previously published another sample in the same site². Data about hunting and characteristics of wild taxa from Murighiol were presented in a recent paper³. To remember that the settlement is located at the eastern end of the Dunavăț Peninsula (the ancient *Extrema Scythiae Minoris*), within the Murighiol commune, at about 3 km east of the village, on a rocky promontory, slightly higher than surroundings. In ancient times the site was placed on the bank of the southern arm of the Danube. Over centuries, the river moved to the northern and the terrain around the settlement silted gradually. The course of the Danube runs now 1 km north of the site nowadays. The close location of Halmyris to the mouth of the Danube and the Black Sea suggests that it must have played an important role as a naval base also in the 2nd century AD. The environment offered relatively comfortable conditions for living and exploitation of the natural resources. Located in an area rich in lakes, Murighiol village is surrounded by them, in almost all parts: Lake Murighiol I - in the north-east, Murighiol II - to the east, both with fresh water supplied by the arm of St. George, "Beibugeac" and "Sărat" Lakes in the south and southwest, forming together "Sărăturile Murighiol". They are surrounded by a tough marsh vegetation (reeds, rushes), providing good conditions for many species of birds nesting. The climate is influenced by the vicinity of the Danube area, so winters are mild and summers are quite warm. The site produced evidence of continued habitation of more than 11 centuries (4th century BC - 7th century AD) containing no less than 13 identified archaeological levels. Three main periods of occupation have been established: a- the native Getae settlement: Two phases of occupation were uncovered. The first encompasses the 4th - 3rd and the second the 2nd - 1st century BC, It is difficult to determine whether the Getae settlement was an open or a fortified place, specifically called "dava", which seems more likely; b- the Early Roman Fort: 1st - 3rd century AD. This fort seems to have had the typical card-like plan following the 1st - 2nd century Roman grid (castrametatio). A large civil settlement stretched out to the west; c- the Late Roman Fort: 4th - 5th century AD. It shows a triangular shape. The new fortification abandoned the rectangular plan of the early one and Roman civil

¹ In addition, fish bones seem to be around 1,000-1,500 at least according to our observations.

² S. Haimovici 2009, p. 189-199.

³ El Susi 2008, p. 201-221.

engineers adapted their design for the fort to the terrain and tactical requirements. Starting with the end of the 4th century, the fort gradually turned into a fortified town. The later phase of the site encompasses the period between the last quarters of the 3rd until the second decade of the 7th century AD⁴.

The sample in question was brought to light in the following sectors: the barracks - no. 2, 3, 4 occupied by soldiers of the garrison, a Domus (supposed Episcopal palace), a Domus (building) no. 2, a block/building (related to the use of two other important monuments, Basilica and Thermae), the Thermae sector and the Towers no. 12 (defensive role) and 2 (role of food storage). Traces of a pool of water, used to preserve fresh fish or other meat products have been identified at its base⁵. Of the 3,553 wastes (excluding fish remains, still unidentified), 3,457 bones (97.3%) derive from mammals, 87 fragments from birds/fowls (2.44%) and only nine shells of molluscs. Fish debris, extremely high, reflecting a very rich fish fauna have not been determined and included in any statistics text, they are to be studied further. According to preliminary published data⁶, sample of hunted mammals includes artiodactyls, carnivores and rodents (table 1). Preliminary data confirm eight domestic species (cow, pig, sheep, goat, horse, donkey, dog and cat) and nine hunted (wild boar, deer, hare, fox, otter, marten, badger, beaver and aurochs), the ratio of domestic/ wild taxa being 78.76/ 21.24%. Referring to livestock, percentages of domestic species are very similar, i.e. the pig totals 24.85%, cattle and small ruminants 24.04% and 22.53%. The differences are too small to speak of a preference for particular exploitation of some taxon. Rather, their exploitation was differentiated according to community needs for a certain period of time, throughout the year. If cattle slaughter profiles (fig. 6) suggests a reduced culling of calves under six months (3.33%), the largest share (58.3%) of specimens cut up to four years, obviously for meat (Type A- exploitation⁷). The use of milk products is suggested by a 28.3% proportion of animals 4-9 years old. A 10% animals kept over nine years, could suggest the use for traction, labours, burdens. In this regard, to mention some phalanges of bovine, strongly flattened and deformed (fig. 2). On castration, there are some metapodials from such specimens. Therefore the beef is very used at Halmyris, mostly in feeding of the soldiers, as is suggested by the increased share of cattle bones in the barracks area, over 40% (fig. 5).

The pig age profile is as follows: a percentage of 28.73% culled up to a year, a maximum value registered between 1-1.5 years (27.58%), with progressively decreasing in the following age classes: 16.09% between 2-3 years and 13% above this limit (fig. 7). The maximum rate of killing is reached between 12-18 months, probably coinciding with achieving optimum weight; about 7% of specimens are females for breeding. In terms of sheep exploitation, the sample from Murighiol shows few culling between 0-6 months (categories A, B, 9%), 13% slaughtering in

⁴ Zahariade 1991, p. 311-317.

⁵ Zahariade, Topoleanu, Ene 2004; Zahariade et al 2006, *Ibidem*, 2007.

⁶ El Susi 2008, p. 201-221.

⁷ Blaise 2009, p. 133.

post lactation period (6-12 months category C), suggesting an exploitation on a small scale of the mutton from sub-adults. The slaughter of animals between 1-2 years (category D) and 2-4 years (categories E, F) reaches its maximum of 37%; the statistics put forward the mutton use from mostly adults. Categories G, H refer to animals over four years, summing up to 16.66%; therefore wool and dairy products were exploited to a lesser extent. If goats, the culling of mature specimens suggest as main purpose the meat obtaining (10.25%) and secondary the dairy products (Class G, 7.69%). Slaughter profile is for the most part similar to sheep, accepting that the use of juveniles is reduced (fig. 8). About a quarter of the small ruminants' bones are assigned to goats, their growth is relatively easy when the environmental conditions. As regards the relations between the sexes in sheep material, of 59

Table 1- Taxa frequencies at Murighiol

	Tower 12	Tower 2	Domus 1	Domus 2	Therme	Barracks	NISP	%
Bos taurus	316	99	114	99	17	40	685	24.04
Sus domesticus	433	132	104	24	8	7	708	24.85
Ovicaprine	352	132	95	49	5	9	642	22.53
Equus caballus	60	16	19	25	5	2	127	4.46
Equus asinus	6	1	2	4	3		16	0.56
Canis familiaris	34	2	5	15	1	1	58	2.04
Felis domestica	2	3	1	1		1	8	0.28
Total domestics	1,203	385	340	217	39	60	2,244	78.76
Sus scrofa	183	48	64	12	18	5	330	11.58
Cervus elaphus	108	29	44	24	2	2	209	7.33
Capreolus c.	6	9			1		16	0.56
Vulpes vulpes.	4	2	5				11	0.39
Lepus europaeus	10						10	0.35
Lutra lutra	9			1			10	0.35
Martes martes	5			3			8	0.28
Meles meles	4			1			5	0.18
Castor fiber	4					1	5	0.18
Bos primigenius			1				1	0.04
Total wilds	333	88	114	41	21	8	605	21.24
Total identified	1,536	473	454	258	60	68	2,849	100
Sus sp.	9	3	2				14	
Unidentified	228	114	200	36	13	3	594	
Mammals	1,773	590	656	294	73	71	3,457	

	Tower 12	Tower 2	Domus 1	Domus 2	Therme	Barracks	NISP	%
Gallus domesticus	39	3	7	1			50	
Anser domestica	4			1			5	
Anas platyrinchos	4						4	
Aves sp.	20	4	2	2			28	
Molluscs	9						9	
Total sample	1,849	597	665	298	73	71	3,553	

*NISP- fragments

individuals, at least 19 are rams. The percentage should not surprise, the slaughtering of males for meat is normal in order to preserve the females for dairy products. Another group of mammals, with importance rather utilitarian than food, refers to horse (4.46%) and donkey (0.56%). We do not exclude the use of horse in diet, about 52% of the identified bones are from specimens killed between 2-4 years, and 21% from matures; among them two animals are 18-23 years old. The 16 bones of donkey (0.56%) originate from adult specimens. Although fragmented, the skeletal remains do not suggest consumption. Introduced in Dobrudja by the Greeks with the establishment of their colonies, its share is always reduced in faunal samples. So far, there is no evidence of its use, although many of its bones come from body parts with food importance. For example, its sample from Murighiol included such elements, from the fleshy parts (tibia, shoulder blades). Cat and dog complete the list of domestic taxa; their frequency is reduced, 2.04% and 0.28%.

Table 2 – Taxa frequencies in late-Roman settlements in Dobrudja

	1	2	3	4	5	6	7	8	9	10
Dating	IV-VII	IV-VII	VI	IV-VI	IV-VI	V-VII	VI	VI	IV-VI	VI
Cattle	24.04	26.1	44.5	51.55	41.51	53.89	46.67	54	41.02	71
Pig	24.85	20	14.5	9.94	22.65	11.04	17.78	11.8		7.89
Ovic.	22.53	8.8	28.7	21.74	18.87	18.18	15.56	16.5	15.38	21.1
Horse	4.46	1.6	5.94	3.1	2.83	8.44	11.11	13.3	43.6	
Donkey	0.56	3.46	0.5	0.62	0.94	2.6	2.22	0.75		
Dog	2.04		1.76	1.24	3.77	0.65	2.22	0.56		
Cat	0.28					0.65		0.18		
Dom.	78.76	60	95.9	88.21	90.57	95.45	95.56	97.2	94	100
Wild	21.24	40	4.1	11.79	9.43	4.55	4.44	2.81	6	
Total	3,553	495	2,632	180	180	185	56	570	90	49

1- Murighiol; 2- Murighiol (Haimovici, 2009); 3- Slava Rusă ("Baza 3" sample); 4- Capidava; 5- Dinogetia; 6- Adamclisi (Stanc, 2005); 7- Adamclisi (Haimovici, 1991); 8- Histria; 9- Ovidiu; 10- Jurilovca)

To outline an overview on what it means animal exploitation in Dobrudja and to detect the peculiarities specific to each site were considered two issues: inter-specific relationships, taxa frequencies and their slaughter profiles. In our approach, we believe that clarification on bio-geographical position of the mentioned settlements is necessary. From this point of view, some sites are located west, north and north-west of Dobrudja in a biotope something more varied, with more wooded areas (especially in the past), whether it's about the Murighiol hills or Măcin, the Babadag plateau, or the Danube Plain. Current appearance of Dobrudja as a steppe with few water courses, which dries up during the warm season, with patches of planted forests, mainly consisting of acacia, alien species, distributed mainly in Northern Province is the result of anthropogenic factor. Woods still well represented, given the altitude (300 m maximum) belong to the sub-floor below (part of the nemoral floor), various species of oak, silver linden, elm, and maple being characteristic to them⁸. According to archaeozoological studies, the fauna is various, with a prevalence of forest taxa (deer, wild boar) and waterfowl (in sites located near the Danube). We include in this group settlements in Capidava, Dinoeția and Murighiol. The well-known city of Capidava, is located in western Dobrudja on a limestone spur, at S-SE of the village on the right bank of the river, halfway between Hârșova and Cernavoda, even crossing the road linking the villages near the city walls. It has been working for more than a millennium⁹. Roman and Byzantine forts of Dinoeția were identified at 4 km north of Garvăn village on a small island (Popina) called by locals "Bisericuța" with a natural strategic positioning and visibility on the left bank of the Danube¹⁰, being surrounded by water (streams and ponds that make up the Danube to the right side of the great city of Galați). The second group includes the settlements of Jurilovca, Histria, Ovidiu and even Adamclisi¹¹ located in the lowlands, south-eastern Dobrudja, in a biotope somewhat poor in "forest" taxa, but better represented in aquatic species (less Adamclisi). Fort Argamum (Orgame) is located on Lake Razim, about 7 km east of the village Jurilovca and 40 km north of Histria¹². Currently, Histria is at some distance from the sea, which is separated by a wide coastal belt. The fortress was situated on a bay of the Black Sea, isolated by a coastal belt which separated from it, making Sinoe lagoon with brackish water, to the north. The area is part of Histria Plateau, which are the most eastern portion and the lowest in Central Dobrudja. In terms of geography, the Histrian Plateau presents heights below 100 m. Current vegetation is a typical steppe, including secondary meadows and agricultural crops that have replaced the forest steppe

⁸ Haimovici 2001, p. 153, 174.

⁹ Haimovici, Cărpuș, Cărpuș 2006, p. 355.

¹⁰ Stanc 2005, p. 77.

¹¹ We made this division based on percentages of wild species, which reflects some features of the environment. Although the percentages of species are insignificant, they attest, simply the presence of mammals in that area at that time.

¹² Stanc 2005, p. 64.

cover. A halophyte azonal and/ or psammophyte vegetation, mostly in the seaside belt exists. "Vegetation however was not the same as the current one. The forest was composed of *Quercetum mixtum*, yet xerophile type, with species of thermophile oak and other deciduous woods¹³. Ancient settlement from Ovidiu is located on Lake Shore Siutghiol, in the east of Casimcea Plateau. Adamclisi site is located about 20 km from the Danube in the middle of the south Dobroudja plateau, near the river Urluia. The current vegetation is strongly anthropogenic, consisting of crops and xero-mesophilic pastures; remnants of oaks are also found just to the west. And finally the site of Slava Rusă is located in the centre of one of the most picturesque areas of Dobrudja, on both sides of River Slava. Our days, over the ancient city Ibida lays the village Slava Rusă, located at an altitude of 55 m¹⁴. From our list, we excluded the sample from the villa rustica from Telița-Amza¹⁵, since it is dated earlier, (in II-III centuries AD) and it was unearthed in a single rural farm and not a large settlement.

In terms of the report hunted/ domestic mammals (fig. 4), the following data were recorded in the settlements of the first group. A large percentage of the game, of 21.24% is found in Murighiol, even 40% (the second sample), in other cases it is estimated below 15% as follows: 14.25% - Slava Rusă¹⁶, 11.79% - Capidava¹⁷ and 9.43% at Dinogetia¹⁸. Wildlife is diversified, obviously it does not exhaust the full list of taxa in those times, and however a majority of species typical to forested biotope (red deer, wild boar) was found. Sites with a small percentage of the game, less than 6% are: Ovidiu – 6%¹⁹, Adamclisi – 4.5%²⁰, Histria – 2.8%²¹, Slava Rusă – 4.1%. Red deer and wild boar consistently appear in all the samples, but with small percentages. Perhaps they had low densities in antiquity in the lower regions of the Dobrudja Plain compared to some higher areas, or the banks of the Danube (Murighiol Capidava). As regards the faunal composition, interspecific relationships, wild boar and red deer (forested area species) also occur in all cases, regardless of sample size. Boar rate is variable, with a peak in Murighiol -11.5%; that is not surprisingly given the proximity of the Danube Delta. Lower values are found in Dinogetia (6%), Capidava, and Slava Rusă (3%). Red deer has a rate of 6-8% in Capidava, Murighiol, and Slava Rusă and below 3% in other sites. The bear (another typical element of the forest) is revealed only in Slava Rusă (0.08%). Perhaps somewhat higher wooded areas or those in the vicinity of the Danube were suitable for it. The mammals adapted to an open area as roe deer, hare, aurochs are present in almost all samples, especially in the central Dobrudja, in a drier

¹³ Haimovici 2007a, p. 541, 550.

¹⁴ Stanc 2005, p. 56.

¹⁵ Haimovici 2001, p. 153-174.

¹⁶ Stanc 2005, p. 59.

¹⁷ Haimovici, Cărpuş, Cărpuş 2006, p. 359.

¹⁸ Haimovici 1991, p. 356.

¹⁹ Haimovici 2007b, p. 561.

²⁰ Stanc 2005, p. 63.

²¹ Haimovici 2007a, p. 551.

environment. Except for roe deer and hare, common elements in Dobrudja, boar seems to have a low density in the mid-first millennium, in this province. Whether, aquatic carnivores (otters) or terrestrial (wolf, fox, marten and badger) appear in almost all cases, obviously in the richest samples (e.g. Murighiol). Their hunting was occasionally practiced. Beaver occupies a special place, being documented only in Murighiol and Dinogetia, certainly the species was relatively dense in the Northern Province, along the Danube branches. Ammianus Marcelline's notes on the presence of dolphins in the waters of Pontus Euxinus „for in the Pontus nothing of that kind has ever been seen, except small and harmless dolphins”²², species was documented in terms of osteological material at Histria²³ and Slava Rusă²⁴. In terms of domestic mammals (table 2, fig. 9), the following data were reported. Regardless of site location cattle bones prevail in almost all samples, their rate fluctuating around 40-55%. Jurilovca²⁵ with a very high percentage of 71.04% and Murighiol, with only 24-26% represent extremes. In terms of exploitation of small species, there are two groupings of sites: a – with prevalence of domestic pigs, as Murighiol (24.85%) and Dinogetia (22.65%). One explanation would be the location of them in the vicinity of the Danube; the pig growth will be relatively easy and convenient. Capidava, although falling into this category of sites with environmental conditions conducive to the development of pigs, shows a rate of only 9.94%. The other samples give values ranging between 11-17%. The differences occur even for the same settlement, as is the case of two samples from Adamclisi. The first gives a value of 11.04% and 17.78% the second. It is an example of percentage fluctuations as a result of scarce samples; b – with predominance of ovicaprids: as Slava Rusă, Capidava, Histria, Adamclisi 1, Jurilovca and Ovidiu. It seems that the climate and environment in Dobrudja have strongly influenced the character of animal husbandry, promoting sheep and goats during Late Roman epoch. So, in sites with increased values of the pigs (those of the Danube), ovicaprinele has over 15% as well. With an indisputable role in the life of communities the horse is documented with faunal remnants in all samples, regardless of their size. This involves percentages varying between a maximum of 43.46% at Ovidiu and a minimum of 2.83% at Dinogetia. The donkey, somewhat common element of those times has few wastes in Dobrudja sites, less than 2%, being absent from Jurilovca and Ovidiu.

In the slaughter of cattle, the mature and adult specimens prevail in almost all settlements: a share of 84.2% (on post Cephalic skeleton) and 57.15% (on teeth) is registered in Slava Rusă, and “at Adamclisi were estimated at least seven individuals, over 20 months ... but still two over the age of 36 months and three do not reached...”²⁶. A rate of 100% of specimens culled between 4-6 years, according

²² Ammianus, XXII, 8, 46, p. 241.

²³ Haimovici 2007a, p. 542.

²⁴ Stanc, Bejenaru 2008, 275.

²⁵ Limited number of bones- 49, certainly does not provide a basis for discussion.

²⁶ Stanc 2005, p. 187.

to dental remainders was also found in Adamclisi²⁷. An animal slaughtered under 2.5 years and about three, just over the limit were identified based on skeletal postcefalic, at Jurilovca. Perhaps they were concerned individuals with reduced economic performance (to reform stock)²⁸. On cattle in Capidava general assessments were made, killing between 6 months and 8-10 years, focusing on adults group are mentioned; thus, beef exploitation is secondary, only after reducing economic efficiency. Dairy and traction were especially targeted, according to the authors of the study²⁹. About a third of the specimens are immature, there are no specimens in one year according to material from Dinogetia³⁰. Specimens of 3-4 years were identified in material from Ovidiu, too³¹. Histria sample allowed estimating of 19 cattle, slaughtered "at very different ages, ranging from calves and finishing with very old individuals, but most are represented by adults and especially by matures, not very old"³². Specifically, the data in Table 11 indicates a 36.83% percentage of animals slaughtered up to two years, 21.05% between 2-3 years, 3-5 years 15.78%, 10.52% between 5-7 years 5.26% between 7-10 years and 10.52% over that limit. So, half of the animals were used to obtain meat (especially males) but there are cuts at very advanced ages. „It is obvious that the killing was done in a fairly balanced, aimed at young males and even as adults, females and gelds after they were no longer good for other types of exploitation. The small number of older animals indicates that the Histrian people culled the cattle at the ages when they were still in their full power; maybe this shows that their economy was booming somewhat, and could thus afford to sacrifice adult and mature individuals"³³. Overall, the mentioned data correlated with those from Murighiol confirm (if needed) their importance as beef and by-products. Depending on sample size, the kill-off patterns reported by authors, points out one or other of components. To establish a common scheme, generally valid for sites listed is a superfluous thing. Unfortunately the samples in question "surprised" only disparate sequences of these economic "schemes". Probably, the needs arising in a certain period of time will be adapted the economic strategies to immediate or long-run requirements of the communities.

About pig management the statistics little vary from site to site; most of the killings are performed up to two years. Something larger percentage of breeding specimens, cut in 3-4 years, even seven years there have been only in numerous samples. Specifically, the slaughter of pigs up to 2 years at the rate of 83.34% and 16.67% between 2-3 years are mentioned in Slava Rusă. A 54.54% share until only two years and 36.36% between 2-3 years is highlighted in Histria. Surprisingly, specimens over 7 years (9.09%) were also identified. About two thirds of the

²⁷ Stanc 2005, p. 188.

²⁸ Blaise 2009, p. 133.

²⁹ Haimovici, Cărpuş, Cărpuş 2006, p. 356.

³⁰ Haimovici 1991, p. 357.

³¹ Haimovici 2007b, p. 560.

³² Haimovici 2007a, p. 543.

³³ *Ibidem*.

individuals below two years, exactly between 1-1.5 years were found in Murighiol. About 7% was killed over 4 years. Over half of the specimens were killed up to a year, just less than six months at Dinogetia. The samples from Jurilovca and Adamclisi did not provide reliable information on this subject. At Capidava the slaughter took place constantly under two years.

As for small ruminants³⁴, the data provided incomplete information, inconclusive as follows: a moderate proportion of animals to obtain meat at Slava Rusă: specifically 28.57% between 0-2 years, a maximum rate between 3-4 years (35.71%)³⁵, there are probably rams, barren females, or with low milk production; the slaughter percentage is 28.57% between 4-5 years, decreasing by 7.14% over 5 years. Wool and dairy production are important components in their management. According to materials from Jurilovca and Adamclisi, two individuals on each case culled over 18-24 months, and two below this limit are assessed³⁶. "There is a young specimen, several adults and mature and one senile exemplar, in Histria"³⁷. Interpretation of data in table 11³⁸ however, highlights a high percentage - 63.63% specimens culled up to three years, suggesting rather exploitation of meat, the milk and wool exploitation going in the background. It supposed a rate of 36.37 between 3-7 years. The same pattern applies at Capidava „were killed even young individuals but mostly adults and mature until five years. So ovicaprids were mainly kept for by-products (milk, wool) and then killed, the meat amount is still reduced compared to cattle”³⁹. The sheep sample comes from three specimens culled before 12-18 months and another about 4-5 years in the fortress at Ovidiu. In the goats, two females are mature, an individual is young and a fourth copy (unassigned sex) is sub-adult. Probably, the goats were supplying milk to a greater extent than sheep (mainly for mutton). There is no information about ovicaprids' age profiles in Dinogetia. As mentioned above a "scheme" focused on reduced wool and dairy product exploitation offered the Murighiol sample. Exploitation of this taxon was also focused on meat and milk production and lesser the wool. A special picture is offered by Slava Rusă sample. According to it are exploited, especially animals which exceeded two years (71%). For other sites, there are few data to enter into a graphic summary. But overall, it seems that the slaughter of a large proportion of small ruminants⁴⁰ for meat in most settlements in Dobroudja should not surprise. Environmental conditions will be favoured relatively numerous flocks, as evidenced by high percentages everywhere. In the sheep/ goats ratio there are insufficient data, for example there is a report of 3/ 1 (as NMI) in

³⁴ We took into account data from the study of teeth, in their absence I brought for discussion, data from postcefalic skeleton.

³⁵ Stanc 2005, p. 192.

³⁶ Stanc 2005, p. 62, 192.

³⁷ Haimovici 2007a, p. 543.

³⁸ *Ibidem*.

³⁹ Haimovici, Căruș, Căruș 2006, p. 357.

⁴⁰ The literature does not mention separate data for the two species.

Murighiol, 3/ 2 in Capidava, 4/ 3 in Ovidiu and “sheep are more numerous than goats” at Dinogetia.

Regarding horse, we mention the largest share of animals 2.5 - 5 years old in Murighiol, which would suggest the consumption of horse meat occasionally. There is evidence for the horse meat consumption as well in Slava Rusă. Also “the Histrian people current eating horse meat, probably the church not yet intervened, to consider an impure animal and anathematize its consumption. We found that the killing started from sexual maturity stage, but it is possible that individuals already very mature not to have been employed for meat⁴¹. Estimation of three sub-adult specimens in the lot from Ovidiu raises questions about its using in food. In contrast to Capidava is not certified, the consumption of horse meat⁴². Related to the consumption of horse meat, some authors suggest that traces of cutting or breaking of the bones could suggest, either the meat use for dog feeding, or for their easy storage in various places, or result of their processing. However, these interpretations do not explain the existence of sub-adult specimens, an increased proportion of 52% occurring in Murighiol. Using horses⁴³ in Dobrudja settlements is complex, aiming riding, transport burden, agricultural work; As for waist (fig. 10) there is a variety of horses in the late Roman settlements in Scythia Minor: small exemplars (around 130 cm tall) with thick legs and higher, of 143 cm at the withers⁴⁴, with semi-thin extremities, close to those of the Roman cavalry. It appears that most individuals belong to eastern group of horses in Europe⁴⁵. The ass was quite frequently used by the Roman-Byzantine armies in Dobroudja. Its remnants were identified in all sites mentioned in the text, except to Jurilovca and Ovidiu. Archaeozoological literature attests the use of donkey by Persians against the Scythians, about at the early first millennium BC, then adopted by the Greeks and widespread in the Black Sea colonies⁴⁶, so in cities on the shores of the Black Sea. Values of 104 cm (Russian Slava), 111.4 cm (Histria), 118 cm (Murighiol) seem to characterize the size of asses, and a value of 130 cm (Murighiol) associated with an shaft index of 11.24 could suggest either something higher donkey or a mule. As the mule, it is mentioned by Homer as increased by the Greeks, suggesting that the animal was present in SE Europe, the Greek colonies, from the seventh century BC. It was tall, with a waist like a horse⁴⁷.

Finally we mention data relating to other groups of animals, as birds/fowls, reptiles, fish and shellfish. In terms of poultry or birds exploitation, of course, they had much higher percentages in the diet, only illustrates the samples. The bone fragility, their small size (especially of juveniles) and their consumption by

⁴¹ Haimovici 2007a, p. 548.

⁴² Haimovici, Cârpuș, Cârpuș 2006, p. 357.

⁴³ On the characteristics of horses, from Halmyris, we return to a future work.

⁴⁴ Size estimate was performed with correlated factors, cf. May 1985, apud Johnstone, 2004, p. 156.

⁴⁵ Haimovici 2007a, p. 545.

⁴⁶ Bökönyi, apud Johnstone 2004, p. 72.

⁴⁷ *Ibidem*.

humans, pig and dog impede their reaching the archaeological deposits, their preservation and collection. From this point of view, it is hard to establish their real weight in the current diet. Statistics show that poultry bones do not exceed 4%; they are missing in the samples from Histria, Ovidiu, Adamclisi and Jurilovca. In the exploitation of some species of waterfowl, it seems that such practices existed in the Danube settlements. There are a number of debris that would come from such taxa to Murighiol and Capidava. Although all settlements were located near water fish bones were absent in samples from Histria, Ovidiu and Jurilovca. In other cases the percentages vary, partly reflecting the share of fisheries in those communities. A significant percentage is registered to Capidava - 8% and 25% in Dinogetia. We could say that fish bones from Murighiol would be at least 25-30% of what was collected from archaeological deposits. The fish remains from the "Curtin G" sector represent 78.97% of Slava Rusă sample, those in the group "Baza 3" (the one used in our statistics) totalling 17%. "Thirteen species belonging to the families: Acipenseridae, Esocidae, Cyprinidae, Siluridae, Percidae were identified in the settlement of Slava Rusă. The best represented is the family Ciprinidae compared to other families"⁴⁸. These are freshwater species from the Danube or in rivers and lakes nearby. Remains of marine fish were not identified, even in Histria. Reduced sample is the explanation provided by the author⁴⁹. Since archaeological evidence support the idea of adoption of new procedures and techniques for land processing (crop rotation, natural fertilization, a new type of plug) in Dobroudja territory⁵⁰, in breeding, improved exemplars will be introduced, along with new methods of managing domestic stocks as well. Archaeozoological analysis largely reflects the "results" of these new techniques, mainly reflected by the increase of body parameters, especially for cattle and horses and a racial diversity in case of dog. There is no place for a breakdown of morphological types; it will be done in another context.

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⁴⁸ Stanc, Bejenaru 2008, p. 274-275.

⁴⁹ Haimovici 2007a, p. 542.

⁵⁰ Baumann 2001, p. 4-5.

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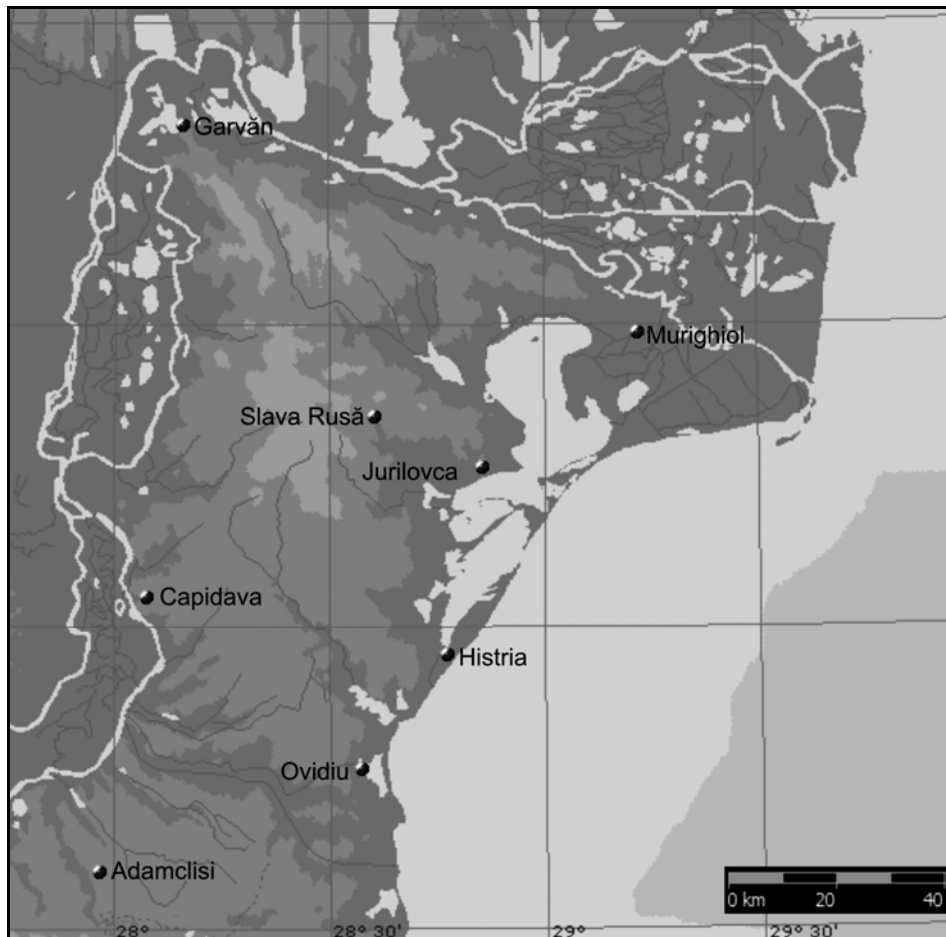


Fig. 1 Map of sites.

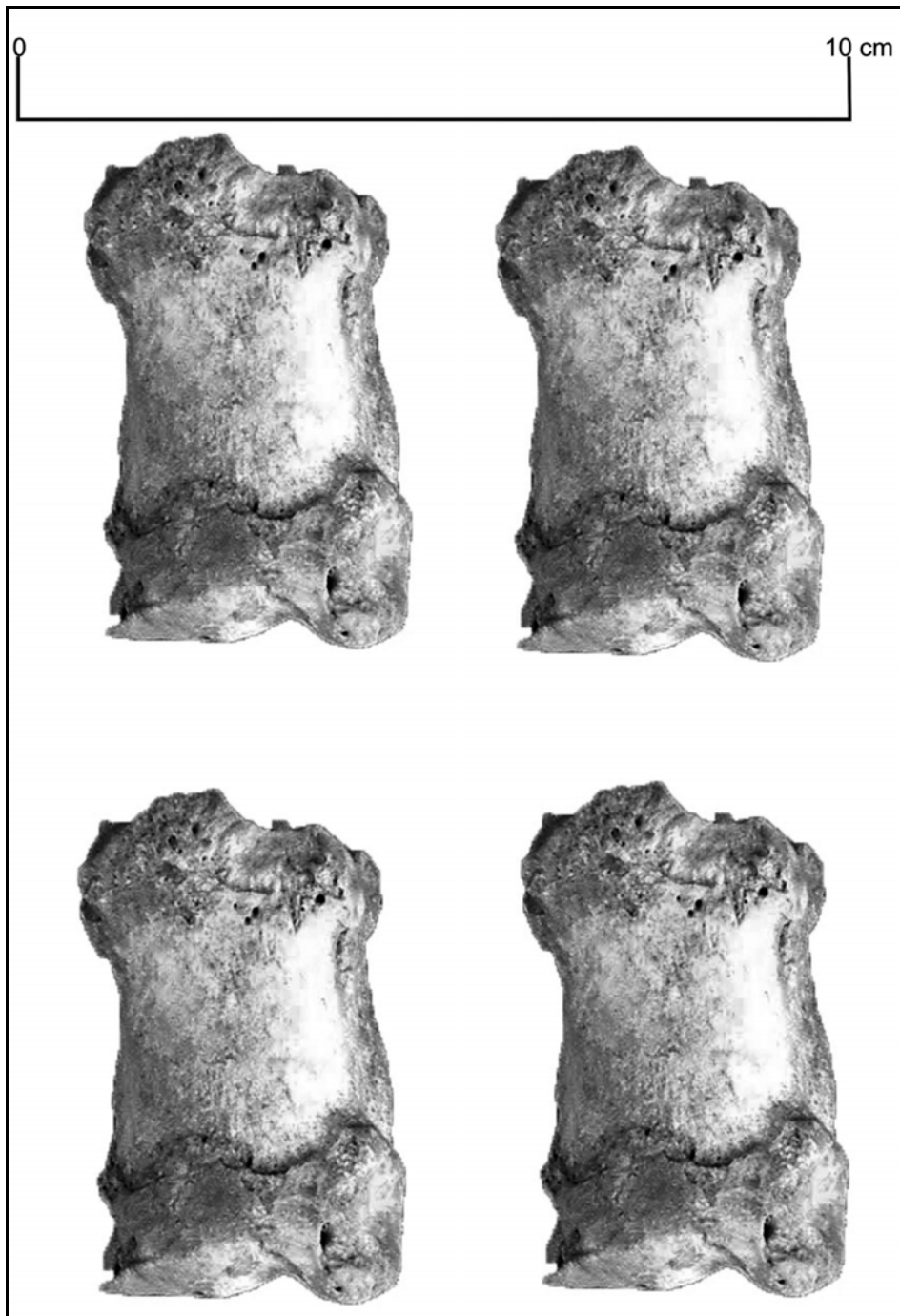


Fig. 2. Cattle phalanges.



Fig. 3. Horse metapodii.

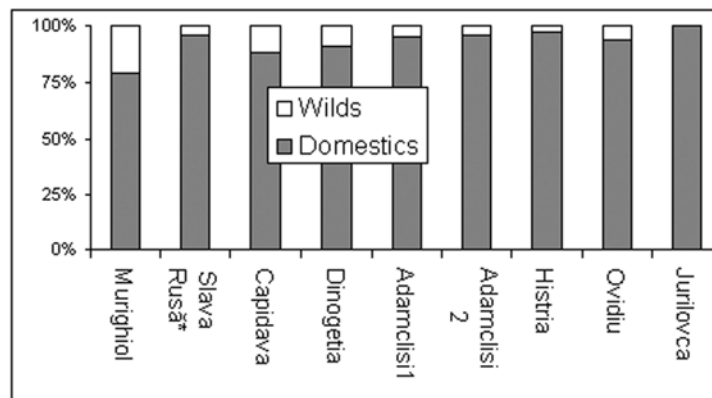


Fig. 4. Domestic/ wild ratio.

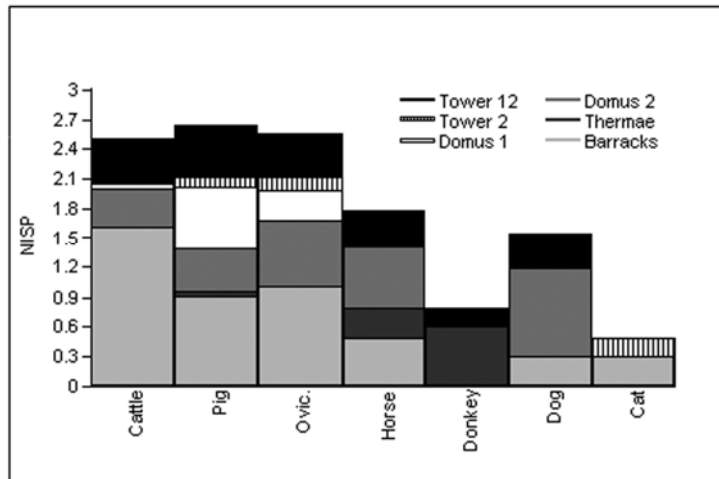


Fig. 5. Species distribution according contexts.

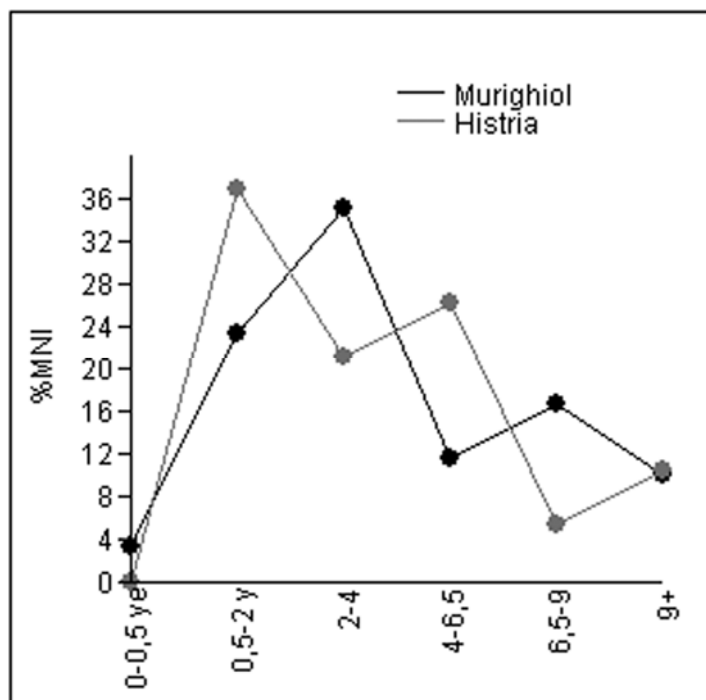


Fig. 6. Kill-off patterns in cattle at Murighiol and Histria.

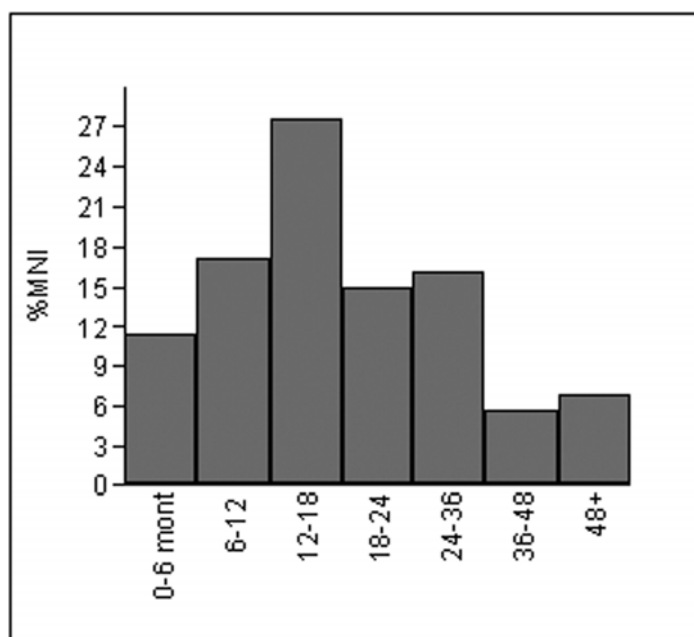


Fig. 7. Pig kill-off patterns at Murighiol and Slava Rusă.

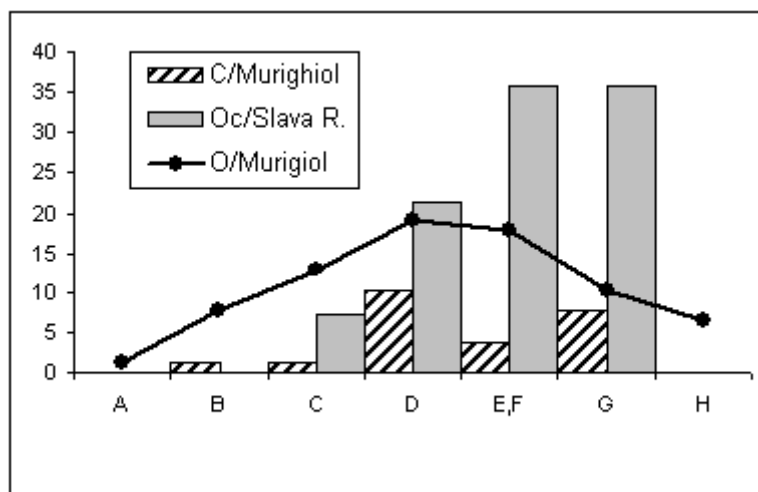


Fig. 8. Small ruminants kill-off patterns.

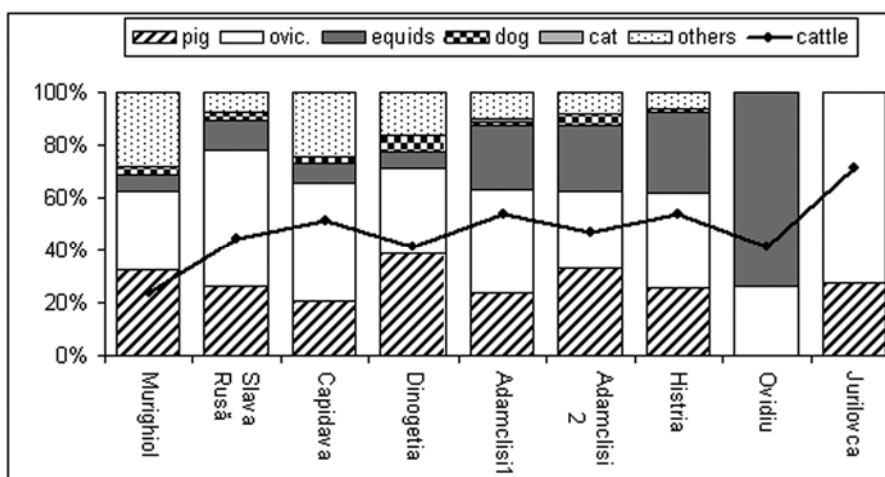


Fig. 9. Taxa frequencies in Dobroudja.

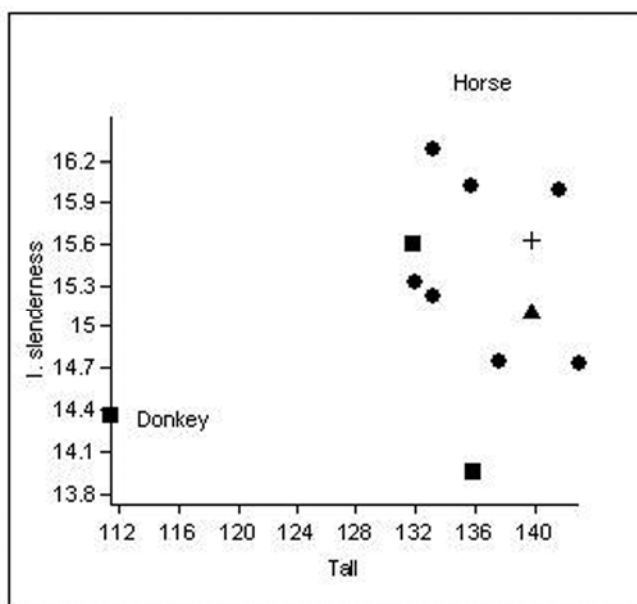


Fig.10. Scatter plot of withers heights vs. shaft index according metacarpal in equids: • -Murighiol; ■ - Histria; ▲ - Telița Amza; + - Capidava.

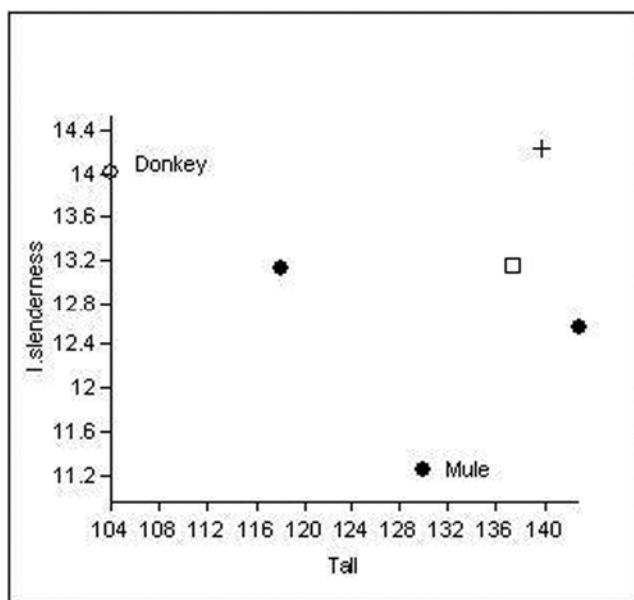


Fig.11. Scatter plot of withers heights vs. shaft index according metatarsal in equids: • -Murighiol; □ - Capidava; + - Dinogeția; o - Slava Rusă.