



Morphometric separation of pig (*Sus scrofa domesticus*) and wild boar (*Sus scrofa ferus*) remains identified in sites of the second millennia AD from Dobrudja (Romania)

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Introduction

The study represents a comparative morphometric analysis of pig (*Sus scrofa domesticus*) and wild boar (*Sus scrofa ferus*) remains discovered in archaeological sites from Dobrudja (Oltina, Piatra Frecatei, Dumbraveni, Harsova, Isaccea and Capidava), dating from the second millennia AD (Figure 1). The purpose of this study is to reveal differences between wild boar and pig, in terms of metric variation patterns.



Figure 1. Map of Romania showing the geographical zones.

Table 1. Quantification of mammal remains from archaeological sites of the second millennia AD from Dobrudja.

Assemblages	References	Historical period	Total mammals	Wild boar	Pig
Dumbraveni	Haimovici, 1999(2000)	IX th -X th centuries	199	3	16
Oltina	Stanc&Bejenaru, 2005	X th century	940	17	268
Capidava	Haimovic&Ureche, 1979	X th -XI th centuries	1028	28	172
Piatra Frecatei	Stanc, 2009	XI th -XII th centuries	1947	331	214
Harsova	Bejenaru, 2003	XI th -XIII th centuries	698	26	192
	Bejenaru, 2003, 2007;				
Isaccea	Bosniceanu, 2008; Cot, 2008	XI th -XIII th centuries	6890	216	634

Material and Methods

The linear measurements were taken with a calliper rule (in millimeters) for following anatomical elements: humerus, radius, tibia, scapula, pelvis and the lower third molar. Measurements were defined according to von Driesch (1976). The bones with non fused epiphysis and porous surface were excluded from the study. Samples sizes were too small to test males and females separately. High degree of fragmentation of the bones and high proportion of the young individuals in the samples are reasons why the number of measurements is relatively low.

The descriptive analysis were carried out separately for each analyzed variables. The measurements of variables are compared using t test. The bivariate analysis (Pearson Index, r) was applied for some variables of the lower third molar, scapula and humerus.

The statistical analysis was performed by the software PAST, version 2.08b and Excel (Haber *et al.* 2002; Hammer *et al.*, 2001).

Results and Discussion

The archaeozoological samples include a total of 11702 mammal remains and less of 20% of them belong to swine (Figure 2). High frequencies of pig remains are found in the sites of Harsova (27.51%) and Oltina (28.51%), while the high frequencies of wild boar remains are identified from sites from Piatra Frecatei (17%) and Harsova (3.72%) (Figure 3).

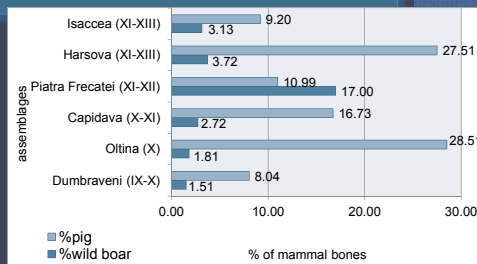


Figure 3. Swine proportions (%NISP calculated from the mammals) in studied samples.

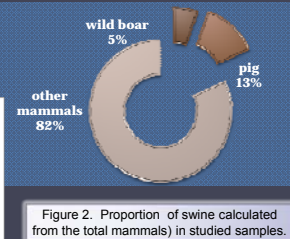


Figure 2. Proportion of swine calculated from the total mammals in studied samples.

Table 1: Descriptive analysis in suine measurements. Abbreviations: n - number of bones examined; Min - minimum value; Max - maximum value; Mean - mean value; SE - Standard; CL (95%) - Confidence Level(95.0%)GL / GB - greatest length / breadth; Bp / Bd - breadth of the proximal / distal part; BFD - breadth of the Facies articularis is distalis LG - Length of the glenoid cavity (scapula) BG - Breadth of the glenoid cavity; SLC - Smallest length of the Collum scapulae; GLP - Greatest length of the Processus articularis (glenoid process) p - pig; wb - wild boar.

Anatomical element	Variable	Suine form	Statistic Indices						
			n	M	EM	Min	Max	CL (95%)	
M3	GLM3	p	10	31.15	0.62	28	34	1.41	
	GBM3		9	14.56	2.18	13	16	1.04	
	GLM3		9	45.53	1.00	41	51	2.30	
	Humerus	Bd	p	9	19.67	0.29	19	21	0.67
		Bd		20	36.06	0.60	30	40.5	1.25
		SD		3	15.33	-	23	17	-
Tibia		BFD	p	17	28.56	0.78	23	33	1.64
		Bd		15	54.17	3.50	50	63	1.94
		SD		3	24.17	-	20	26.5	-
	Astragalus	BFD	wb	13	41.77	2.13	39	46	1.29
		Bd		1	30.00	-	-	-	-
		Bd		14	38.56	0.67	35	42.00	1.44
Scapula		BFD	p	7	23.79	0.45	22	25.60	1.10
		SD		7	28.29	0.68	26	31.00	1.66
		GL		5	41.50	2.89	35	49	8.02
	Radius	Bp	p	1	28.00	-	-	-	-
		Bd		4	23.25	1.65	20	27	5.26
		BFD		2	-	-	24	25	-
Pelvis		GL	p	9	53.44	1.01	50	59	2.33
		Bd		6	31.83	0.79	30	35	2.04
		BFD		2	-	-	31	31.5	-
	Lumbar vertebrae	GLP	p	5	33.60	2.44	29	43	6.76
		LG		5	28.90	1.81	24	35	5.01
		BG		3	20.73	-	18.5	22.7	-
Ilium		SLC	p	5	22.34	1.23	20	27	3.42
		GLP		8	49.69	0.82	45	52	1.93
		LG		9	40.69	0.73	37	43	1.68
	Femur	BG	p	9	35.00	0.72	31.5	37	1.70
		SLC		9	36.54	2.05	31.3	50	4.84
		GL		1	141	-	-	-	-
Humerus		Bp	p	2	-	-	26.2	32.3	-
		SD		2	-	-	34	35	-
		Bd		2	-	-	20	31	-
	Tibia	Bp	p	5	38.2	0.99	36.5	41.5	2.76
		SD		1	-	-	22	-	-
		LA		1	-	-	25	-	-
Femur		LA	p	10	43.75	0.83	40	49	1.87
		BG		10	40.25	0.70	37.5	45	1.59
		LAR		10	40.25	0.70	37.5	45	1.59

In the samples without whole bones, the withers height was not estimated. The higher withers height was obtained from pigs from Piatra Frecatei (80 cm) and Oltina (73.25 cm). t test indicated that there were no significant differences between the mean of variables from different sites ($p > 0.05$) and this made possible to pool of data from the sites. An overview of the size in populations investigated are presented in Table 1.

Molar measurements, particularly, are less affected by sex, age and intra-population variation than other bones, therefore are probably more suitable for comparing the size of the two forms (domestic and wild). The lower third molar width has proven useful in this purpose (Davis, 2008).

Conclusions

Our results reveal that the lower third molar (M_3), humerus and scapula are the best anatomical elements for discrimination between pig and wild boar. The length of the M_3 ranges as followed: 28 - 32.2 mm (pig) and 41 - 51 mm (wild boar). The width of M_3 : 13 - 16 mm (pig) and 19 - 21 mm (wild boar).

For the scapula a great discrimination between the domestic and wild forms is GLP: 29 - 43 mm (pig) and 45 - 52 mm (wild boar) and in humerus Bd: 30 - 40.5 mm (pig) and 50 - 63 mm (wild boar).

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