MORPHOMETRIC DATA CONCERNING AN ASSAMBLAGE OF CATTLE (*BOS TAURUS*) REMAINS DISCOVERED IN THE MEDIEVAL SITE OF BAIA (SUCEAVA)

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Abstract. The archaeological site of Baia is situated in the Suceava County, on the right side of Moldova River. The archaeozoological material discovered in 1977-1978 comes from a complex of houses and it is represented by a large amount of remains. The cattle (*Bos taurus*) remains dominate the archaeozoological assemblage and the present paper studies certain morphometrical characteristics of the cattle found in medieval settlement of Baia.

Keywords: Middle Ages, Baia (Suceava), *Bos taurus*, Morphometry.

Rezumat. Date morfometrice privind un eşantion de resturi de bovine domestice (*Bos taurus*) descoperite în situl medieval de la Baia (Suceava). Aşezarea medievală de la Baia este situată în judeţul Suceava pe malul drept al râului Moldova. Materialul arheozoologic descoperit cu ocazia săpăturilor din anii 1977-1978 provine dintr-un complex de locuinţe şi este reprezentat de numeroase resturi osoase. In cadrul eşantionului arheozoologic, resturile de bovine domestice sunt cele mai numeroase. Prezenta lucrare analizează unele caractere morfometrice ale bovinelor domestice medievale din aşezarea menţionată.

Cuvinte cheie: Evul Mediu, Baia (Suceava), *Bos taurus*, morfometrie.

Introduction

Special studies concerning the economical development of the medieval town of Baia started with the archaeological exploitation of this town. Baia is one of those Moldavian towns that existed before the foundation of the medieval state. Archaeological excavations certify the existence of an urban life in Baia since the second half of the XIII century. The appearance and the development of this early town were stimulated by the richness of the soil and by the position of the place on an ancient but very important commercial route. The establishment in these places of some groups of Hungarian and Saxons, artisans and workers, probably contributed to this development. They got here from Transylvania in the second half of the XIII century and after that the first capital of the incipient Medieval State was settled here in Baia (Neamtu *et al*., 1980).

Archaeological excavations in this area were made by the team of Eugenia Neamţu, Vasile Neamţu and Stela Cheptea starting from 1958 until 1978. A great part of the animal remains has been studied by Haimovici (1980) and Bejenaru (2003), and another part represents the object of the present study. Due to the great amount of cattle remains we were able to do a statistical analysis and describe some morphometrical characteristics of cattle in those times.

Material and Methods

The material studied in the present paper represents a faunal assemblage recovered from the archaeological excavations made in 1977-1978 in the medieval site of Baia (Suceava County, Romania). According to the archaeologists, the archaeozoological sample belongs to XIV-XVII centuries (Neamţu *et al*., 1980).

The archaeozoological analysis was achieved in the Laboratory of Animal Morphology, Faculty of Biology. Study methodology was specific to archaeozoology, mainly consisting of anatomical and taxonomical identifications, encoding and

quantification of data (Udrescu *et al*., 1999). In this approach we used the standard measures provided by A. Van den Driesch's (1976) osteometrical guide. As measuring tools we used the vernier calipers and metrical band (for circumferences). The metrical values allowed us to study the intraspecific variability, which contributes to the description of the cattle population and estimates the dynamics of the species' morphometric characteristics in relation to its geographic or ecological changes. The metrical data were stocked in a database and then processed in Excel program depending on the target objectives. For each sample we used parameters as: minimum, maximum, average, standard deviation and confidence.

Results and Discussion

The structure of the archaeozoological sample from Baia is characterized by a large amount of the cattle remains, representing about 75% from the total number of the identified remains. These high values certify that the cattle represented for the medieval settlement of Baia the main source of food and were also used for milk, skin or dragging.

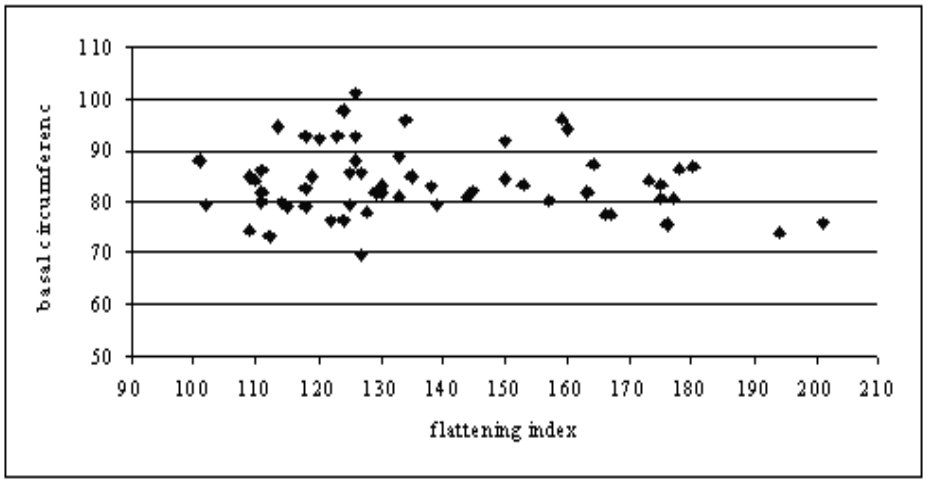

Figure 1. Diagram of horn core dispersion.

In the case of the horn cores we have considered the flattening index and the basal circumference (Table 1). These parameters helped us to determine the sex of the animal to which the horn cores belonged. The horn cores with a small circumference and a lower flattening index are estimated from females, while the horn cores with a big circumference and a greater flattening index are probably from males and castrated males. As we see in the dispersion diagram (Fig. 1), the percentage of females is greater than that of males.

In the morphometrical description of the skull we also used the lower and the upper jaws. Some of these had all the teeth and others only the molars. We measured especially the length of the series of cheektooth row and of molar row but also the length of the third molar. In the case of lower jaws as well as in the case of upper jaws the large number of the remains allowed a complete statistical approach. For the lower jaws we measured the length of the cheektooth row on 77 jaws, the length of the series of molars on 108 fragments and in the case of the lower third molar we measured 156 lengths and widths. As we see in the Table 1, the limits of variability for these lengths are relatively large, but the confidence interval is very tight. Comparing these parameters with those

obtained from other samples from Baia or from samples belonging to other towns in that period of time (Bejenaru, 2003), we see a great resemblance between the values of the averages from these towns. For the upper jaws we measured the length of the cheektooth row on 21 jaws, the length of the series of molars on 40 fragments, and in the case of the third molar we measured 76 lengths and widths. The variability of the population in Baia is quite large but comparing these parameters with those from other towns we don't see a large variability between them (Bejenaru, 2003).

The greatest part of cattle remains consists in postcranial bones. These parts of the body are parts covered in flesh, and for this reason they are more strongly carved and it's difficult to obtain their lengths. An exception is represented by the distal part of the limbs, such as metacarpi and metatarsi.

Regarding the elements that attach the limbs to the body, we measured 32 scapula fragments (Table 1) and we found the values a little bit lower than the values corresponding to the samples from other towns. The average length of the glenoid cavity is 51.53 mm lower than the values from other samples (Bejenaru, 2003).

The best-preserved bone remains are the metapodium elements due to its lower amount of flesh. These bones offer a large variety of information regarding the sex and size of the animals but also the age when they were sacrificed.

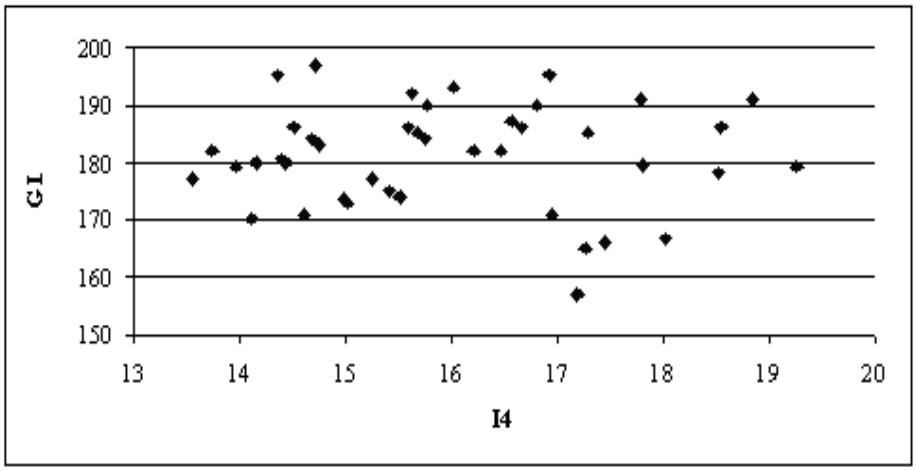

Figure 2. Diagram of the metacarpus dispersion.

The metacarpi as well as the metatarsi reveal the predominance of females, followed by males and castrated males. We have analyzed 45 whole metacarpi and 43 whole metatarsi (Table 2). In the diagrams of dispersion we represented the maximum length and the diaphysis index (I_4). The metacarpus diagram (Fig. 2) shows three groupings; in the case of females we observed two groups, one with a great length and a small diaphysis index and one with a small length and a medium diaphysis index. The third group belongs to males and is distinguishable through a greater diaphysis index.

In the metatarsus series the distribution is quite the same and has been illustrated in the figure 3. The values of castrates, with a greater length and a medium diaphysis index, are mixed with the group of values belonging to females. The group of values for males is clearly distinguished through a high diaphysis index.

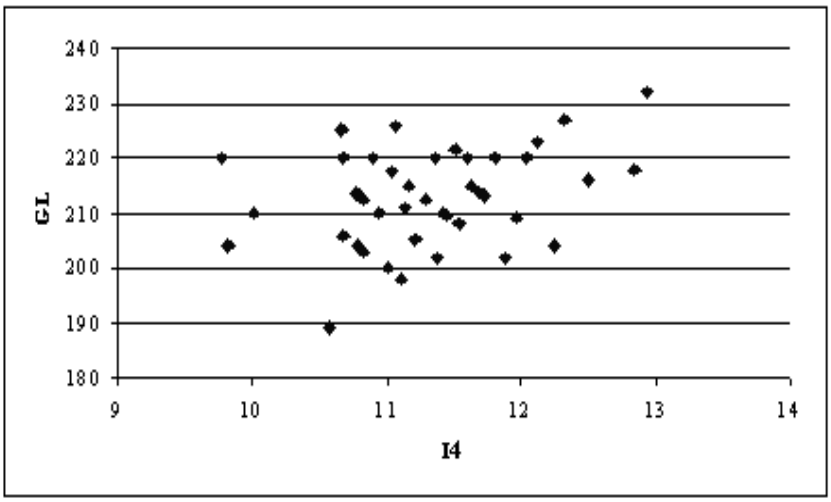

Figure 3. Diagram of the metatarsus dispersion.

We have calculated two series of sizes, the former series is obtained from metacarpus lengths and the latter series from metatarsus lengths. We can see in the Figure 4 a slight difference between these two series, the latter recording higher values. The variability interval for the sizes is quite large with a higher average than the other averages from other towns at the time (Table 2). Even if the range of sizes is wide, the most frequent values are those between 1101-1125 mm.

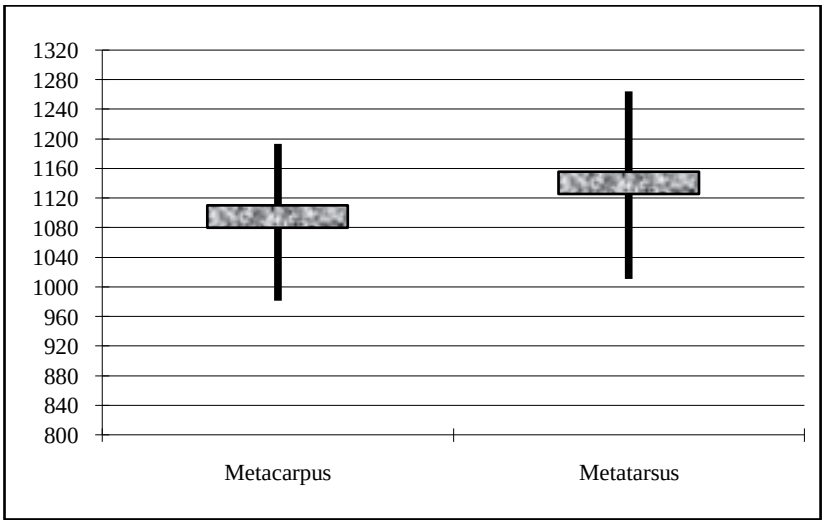

Figure 4. Variability of the withers heights.

Table 1. Statistical data concerning the osteometrical features (in mm).

Anatomical element	Dimension*	NR	Minimum	Maximum	Average	Standard deviation	Confidence
Horn core	GL	28	91	204	135.42	27.79	125.13-145.71
	Basal Circumference	59	101	201	137.67	24.93	131.31-144.03
	Flattening Index	59	69.57	101.25	83.77	6.60	82.09-85.45
Upper jaw	Length P2-M3	21	108	128	119.57	5.59	117.18-121.96
	Length M1-M3	40	67	80	73.22	3.19	72.24-74.20
	Length M3	76	18	37	26.36	2.36	25.83-26.89
Lower jaw	Length P2-M3	77	110	148	127.64	7.01	126.08-129.2
	Length M1-M3	108	64	92	80.48	4.52	79.63-81.33
	Length M3	156	24	39	33.98	2.64	33.57-34.39
Scapula	GLP	37	35	84	60.56	11.8	56.76-64.36
	LG	38	27	61	48.58	9.22	45.65-51.51
	BG	37	24	54	41.24	7.52	38.82-43.66
	SLC	27	23	63.5	45.03	10.94	40.91-49.15
Humerus	Bd	8	65	79	71.28	4.75	67.99-74.57
	BFd	7	61	69	64.21	2.73	62.19-66.23
Radius	Bp	8	59	77.5	69.57	6.24	65.25-73.89
	Bd	3	56	64	-	-	-
	SD	6	51	68	61.83	5.77	57.22-66.44
Metacarpus	GL	45	157	197	181.03	8.83	178.45-183.61
	Bp	44	39	61.5	51.68	4.34	50.39-52.95
	Bd	44	47	66	53.62	4.62	52.25-54.99
	SD	43	24	36	28.84	3.08	27.92-29.77
	Withers height - females	31	996	1182	1090.54	46.46	1074.19-1106.90
	Withers height - males	4	981.25	1118.75	1063.28	-	-
	Withers height – castrated males	10	1009.8	1193.4	1120.87	56.79	1085.67-1156.07
Tibia	Bd	6	52	57	55.41	1.82	53.96-56.86
Astragalus	GL	7	59	70	63.71	3.98	60.77-66.65
	Bd	8	37	47	40.68	3.80	38.05-43.31
Calcaneus	GL	13	110	139	120.61	9.14	115.65-125.57
Metatarsus	GL	43	189	232	212.58	8.88	209.93-215.23
	Bp	44	37	48	42.19	2.54	41.44-42.94
	Bd	43	35	62.5	48.94	4.20	47.68-50.19
	SD	43	20	30	24.08	2.07	23.46-24.70
	Withers height - females	37	1011.1	1209.1	1132.32	44.82	1117.87-1146.76
	Withers height - males	-	-	-	-	-	-
	Withers height – castrated males	6	1111.8	1264.4	1189.91	-	-
Phalanx I	GL	90	35.5	68	55.73	5.13	54.68-56.78
	Bp	91	20	44	26.62	3.27	25.95-27.29
	Bd	87	19	55	25.35	3.85	24.55-26.15
	SD	60	19	27	22.8	2.14	22.26-23.34
Phalanx II	GL	41	33	67.5	39.73	7.41	37.47-41.99
	Bp	41	22	40	27.09	3.46	26.04-28.14
	Bd	39	19	30	22.76	2.63	21.94-23.58
Phalanx III	DLS	33	33.5	73	54.83	12.35	50.62-59.04
	MBS	15	20	27	23.56	2.06	22.52-24.60

* Angela von den Driesch, 1976

Table 2. Metrical data of metacarpi and metatarsi (in mm).

Anatomical element	GL (1)	Bp (2)	Bd (3)	SD (4)	I_2 (2x100)/1	I_3 (3x100)/1	I_4 (4x100)/1	Sex	Withers height
Metacarpus	187	51	54.5	31	27.27	29.14	16.57	F	1122
Metacarpus	180	47	50	26	26.11	27.77	14.44	F	1080
Metacarpus	186	60	62	34.5	32.25	33.33	18.54	C	1138.32
Metacarpus	180	50	50	25.5	27.77	27.77	14.16	F	1080
Metacarpus	185	57	58	32	30.81	31.35	17.29	C	1132.2
Metacarpus	186	51	53	31	27.41	28.49	16.66	C	1138.32
Metacarpus	193	56	55	31	29.01	28.49	16.06	F	1158
Metacarpus	191	57	60	36	29.84	31.41	18.84	C	1168.92
Metacarpus	173.5	49	48	26	28.24	27.66	14.98	F	1041
Metacarpus	166.5	55	56	30	33.03	33.63	18.01	M	1040.62
Metacarpus	170	46	48	24	27.05	28.23	14.11	F	1020
Metacarpus	186	51.5	51	27	27.68	27.41	14.51	F	1116
Metacarpus	183	48	49	27	26.22	26.77	14.75	F	1098
Metacarpus	184	50.5	52.5	29	27.44	28.53	15.76	F	1104
Metacarpus	157	55	55.5	27	35.03	35.35	17.19	M	981.25
Metacarpus	190	53	55	32	27.89	28.94	16.84	F	1140
Metacarpus	179	-	51	25	-	28.49	13.96	F	1074
Metacarpus	182	49	50	25	26.92	27.47	13.73	F	1092
Metacarpus	166	48	49	29	28.91	29.51	17.46	F	996
Metacarpus	182	54	58.5	30	29.67	32.14	16.48	C	1113.84
Metacarpus	180.5	49	52	26	27.14	28.80	14.40	F	1083
Metacarpus	186	51	52	29	27.41	27.95	15.59	F	1116
Metacarpus	179.5	57	60	32	31.75	33.42	17.82	C	1098.54
Metacarpus	191	39	63	34	20.41	32.98	17.80	C	1168.92
Metacarpus	175	45	-	27	25.71	-	15.42	F	1050
Metacarpus	182	49	49	25	26.92	26.92	13.73	F	1092
Metacarpus	172.5	48	47	-	27.82	27.24	-	F	1035
Metacarpus	177	47	50	27	26.55	28.24	15.25	F	1062
Metacarpus	177	48	48.5	24	27.11	27.40	13.55	F	1062
Metacarpus	171	50	50	25	29.23	29.23	14.61	F	1026
Metacarpus	195	61.5	61.5	33	31.53	31.53	16.92	C	1193.4
Metacarpus	192	55	58	30	28.64	30.20	15.62	F	1152
Metacarpus	179	58	66	34.5	32.40	36.87	19.27	M	1118.75
Metacarpus	188	53	54	-	28.19	28.72	-	F	1128
Metacarpus	178	58	60	33	32.58	33.70	18.53	M	1112.5
Metacarpus	185	54.5	53.5	29	29.45	28.91	15.67	F	1110
Metacarpus	184	50	53	27	27.17	28.80	14.67	F	1104

Anatomical element	GL (1)	Bp (2)	Bd (3)	SD (4)	I_2 (2x100)/1	I_3 (3x100)/1	I_4 (4x100)/1	Sex	Withers height
Metacarpus	190	55.5	55.5	30	29.21	29.21	15.78	F	1140
Metacarpus	197	53	53	29	26.90	26.90	14.72	F	1182
Metacarpus	173	50	49	26	28.90	28.32	15.02	F	1038
Metacarpus	182	50.5	52.5	29.5	27.74	28.84	16.20	F	1010.1
Metacarpus	174	48	48	27	27.58	27.58	15.51	F	965.7
Metacarpus	195	53	52	28	27.17	26.66	14.35	F	1082.25
Metacarpus	165	52	54	28.5	31.51	32.72	17.27	C	915.75
Metacarpus	171	51	52	29	29.82	30.40	16.95	C	949.05
Metatarsus	202	38	46	24	18.81	22.77	11.88	F	1080.7
Metatarsus	203	40.5	46	22	19.95	22.66	15.83	F	1086.5
Metatarsus	220	41	48	25	18.63	21.81	11.36	F	1177
Metatarsus	218	48	62.5	28	22.01	28.66	12.84	C	1188.1
Metatarsus	202	39	-	-	19.30	-	-	F	1080.7
Metatarsus	212.5	40.5	50.5	24	19.05	23.76	11.29	F	1136.87
Metatarsus	202	41	48	23	20.29	23.76	11.38	F	1080.7
Metatarsus	205	40	46	23	19.51	22.43	11.21	F	1096.75
Metatarsus	206	40	48	22	19.41	23.30	10.67	F	1102.1
Metatarsus	204	41.5	35	20	20.343	17.15	9.80	F	1091.4
Metatarsus	223	47	51	27	21.07	22.86	12.10	F	1193.05
Metatarsus	198	40	46	22	20.20	23.23	11.11	F	1059.3
Metatarsus	226	43	50	25	19.02	22.12	11.06	F	1209.1
Metatarsus	220	46	51	23.5	20.90	23.18	10.68	F	1177
Metatarsus	209	44	51.5	25	21.05	24.64	11.96	C	1139.05
Metatarsus	210	41	46	21	19.52	21.90	10	F	1123.5
Metatarsus	208	41	49	24	19.71	23.55	11.53	F	1112.8
Metatarsus	232	47	59	30	20.25	25.43	12.93	C	1264.4
Metatarsus	217.5	42	49	24	19.31	22.52	11.03	F	1163.62
Metatarsus	220	47	55	26.5	21.36	25	12.04	C	1199
Metatarsus	204	42	51	25	20.58	25	12.25	C	1111.8
Metatarsus	200	40	45	22	20	22.5	11	F	1070
Metatarsus	225	43	50.5	24	19.11	22.44	10.66	F	1203.75
Metatarsus	213	41	50	25	19.24	23.47	11.73	F	1139.55
Metatarsus	220	42	49	26	19.09	22.27	11.81	F	1177
Metatarsus	215	42	47	24	19.53	21.86	11.16	F	1150.25
Metatarsus	220	40	47	21.5	18.18	21.36	9.77	F	1177
Metatarsus	209.5	42	48	24	20.04	22.91	11.45	F	1120.82
Metatarsus	215	40	47	25	18.60	21.86	11.62	F	1150.25
Metatarsus	210	40	48	23	19.04	22.85	10.95	F	1123.5

Anatomical element	GL (1)	Bp (2)	Bd (3)	SD (4)	I_2 (2x100)/1	I_3 (3x100)/1	I_4 (4x100)/1	Sex	Withers height
Metatarsus	211	40	46	23.5	18.95	21.80	11.13	F	1128.85
Metatarsus	213.5	41	47	23	19.20	22.01	10.77	F	1142.22
Metatarsus	221.5	42.5	48.5	25.5	19.18	21.89	11.51	F	1185.02
Metatarsus	204	40	47	22	19.60	23.03	10.78	F	1091.4
Metatarsus	220	42	49	24	19.09	22.27	10.90	F	1177
Metatarsus	210	43	47	24	20.47	22.38	11.42	F	1123.5
Metatarsus	227	46	56	28	20.26	24.66	12.33	C	1237.15
Metatarsus	214	44	48	25	20.56	22.42	11.68	F	1144.9
Metatarsus	212.5	43	49	23	20.23	23.05	10.82	F	1136.87
Metatarsus	216	45	52	27	20.83	24.07	12.5	F	1155.6
Metatarsus	220	44	50	25.5	20	22.72	11.59	F	1177
Metatarsus	189	37	43	20	19.57	22.75	10.58	F	1011.15
Metatarsus	213	45	50	23	21.12	23.47	10.79	F	1139.55

Conclusions

The statistical analysis that we have made shows a great variability of the domestic cattle at the medieval times. If we consider all the parameters analysed, we can state that the domestic cattle from medieval Baia presented a certain degree of variability that certifies the concern of peoples in selecting the best specimens. The average values of corporal dimensions are quite reduced, indicating in general primitive, indigenous type of cattle, with relative short and thin horn cores.

References

Bejenaru, L., 2003. *Arheozoologia spațiului românesc medieval*. Editura Universității "Al. I. Cuza" Iași.

Driesch, A. Von Den, 1976. *A guide to the measurement of animal bones from archaeozoological sites*. Peabody Museum, Bulletin I, Peabody museum of Archaeozoology and Ethnology, Harvard University.

Haimovici, S., 1980. Studiul materialului faunistic din asezarea oraseneasca de la Baia. *In* Neamțu, E., Neamțu, V., Cheptea, S., *Oraşul medieval Baia în secolele XIV-XVII*, Editura Junimea, Iaşi, 270-273.

Neamțu, E., Neamțu, V., Cheptea, S., 1980. *Oraşul medieval Baia în secolele XIV-XVII*, Editura Junimea, Iași.

Udrescu, M., Bejenaru, L., Hrişcu, C., 1999. *Introducere în arheozoologie*, Editura Corson, Iaşi.