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A point scale in the study of excavated osseus remains of the domestic sheep (Ovis ammon f. aries)

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On the basis of the standard measurements of 1277 long appendicular bones of the domestic sheep, a universal point scale has been elaborated. The bones examined were obtained from European, Asian and African archaeological sites dating from 4500 BC to 1500 AD. A comparative analysis of the metapodial bones of the domestic sheep from Central Europe (Poland, Germany and Hungary) has been undertaken, using this scale.

key words: domestic sheep, excavated bone material, point scale

INTRODUCTION

One of the research methods applied in archaeozoology is the point scale, used for the first time with reference to cattle [2]. It enables measurements of different bones to be estimated simultaneously. In this way, bone measurements of excavatory and contemporary animals can be compared. Moreover, it is possible to asses the size of an animal without having to recalculate the lengths of appendicular bones into withers heights. The study was aimed at elaboration of a point scale and at its practical application in the examination of excavated osseus remains of the domestic sheep.

MATERIAL AND METHODS

The material examined consisted of standard measurements [4] of 1277 appendicular bones (humerus, radius, III and IV metacarpal bones, femur, tibia and III and IV metatarsal bones), which were obtained from 162 archaeological sites located in Europe, Asia and Africa and dating back to the period from around 4500 BC to 1500 AD. This material was divided into five approximate chronological periods: I — before 2000 BC, II — from around 2000 BC to around 500 BC, III — from aroud 500 BC to around 500 AD, IV — from around 500 AD to around 1250 AD, V — after 1250 AD [3].

Based on the Lasota-Moskalewska method [2] a universal point scale for the maximal lengths of the above-mentioned bones was worked out. The method consists in transferring variously denominated measurements of different size ranges onto a common abstract scale. The scale comprises 100 points. The least size of a given trait is assumed to be the zero point, while the maximal size of the trait is granted 100 points.

This is the first time that the point scale has been worked out in such a way for the domestic sheep. The material taken into consideration was obtained from archaeological sites varying in geographical as well as in chronological terms, making the established scale universal. It was used in order to compare the changes in the adequate metapodial parts in the thoracic and pelvic limbs of domestic sheep living in Central Europe (Poland, Germany and Hungary) over a period of 6000 years.

RESULTS

The measurements of maximal appendicular bone length and adequate scores are represented in Table 1.

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Table 1. Score and adequate maximal length of appendicular bones (mm) of the domestic sheep

Score	Humerus	Radius	III and IV metacarpal bone	Femur	Tibia	III and IV metatarsal bone
100	167	185	178	195	272	189
90	162	178	170	191	262	180
80	157	171	162	187	252	171
70	152	164	154	183	242	162
60	147	157	146	179	232	153
50	142	150	138	175	222	144
40	137	143	130	171	212	135
30	132	136	122	167	202	126
20	127	129	114	163	192	117
10	122	122	106	159	182	108
0	117	115	98	155	172	99

The general rhythm of changes in the metapodium of the thoracic and pelvic limb over time is identical (Table 2). Two major tendencies are to be observed. Firstly, the size of the domestic sheep gradually increases, beginning in the first of the periods distinguished and continuing over the second and third. This growth in size started in the later stage of the Stone Age (Neolithic Age), and continued over the Bronze Age, up to the period of Roman influence in the Iron Age. The second tendency is a period of change just opposite to the earlier ones. Beginning with the fourth and the fifth period (the Early and Late Middle Ages) the size of domestic sheep visibly decreased, returning to that of the Neolithic Age. Such a rhythm of morphological change must have been influenced by domestication and varying environmental factors [3].

A comparison between the changes in the metacarpal and metatarsal bones may also be interesting. In the first of the periods distinguished the III and IV metatarsal bone of domestic sheep living in Central Europe was 11 points longer than the III and IV metacarpal bone, making the greatest difference between those bones from all the periods investigated (Table 2). In the second period both metapodial bones lengthened, the III and IV metacarpal bone by 12 points, and the III and IV metatarsal bone by only 6 points. The difference between the bones fell to 5 points. In the third period the average length of III and IV metacarpal bone and III and IV metatarsal bone increased by 8 points, the difference between them remaining the same. However, in the fourth period, the difference between the metapodial bones amounted to 9 points. In the fifth period no changes were observed in the average length of either bone.

Table 2. Average maximal bone length of the metapodium of the domestic sheep (points)

Chronological period	III and IV metacarpal bone	III and IV metatarsal bone
I	25	36
II	37	42
III	45	50
IV	30	39
V	30	39

DISCUSSION

The changes in homological sections of the appendicular skeleton of the domestic sheep, both in terms of their character and the time of their manifestation, are similar, regardless of differences in their mechanisms. Slightly greater relative changes occurred in III and IV metacarpal bones, as compared with III and IV metatarsal bones. The pelvic limb, with its propulsive function, is subject to much faster phenotypical changes and more prone to the influence of various morphogenic factors than the supporting thoracic limb. According to Lasota [1], studies on cattle have proved that some factors, mostly locomotive, that are either strong and of short duration or weak and long-lasting, induce modifications in the size and proportions of the metatarsus without deforming the metacarpus. Modifications to the metacarpus can only be caused by strong and prolonged agents. Such changes are more permanent and scarcely reversible.

In conclusion then, modifications to the pelvic limb are probably mainly influenced by environmental conditions, whereas changes in the thoracic limb occur due to genotypical factors.

More considerable changes have been noticed in III and IV metacarpal bones of the domestic sheep than in III and IV metatarsal bones, which may point to a greater influence of genotypical factors over environmental agents in forming the morphotype of the animal under examination.

The above-mentioned changes apply to both sexes. Earlier studies have proved that dimorphism in the domestic sheep does not show in the osteometric features of examined osseus material [3].

REFERENCES

1. Lasota A (1973) Przydatność badań archeozoologicznych dla studiów nad rozwojem hodowli pierwotnej. Kwart Hist Kult Mater, 213: 449–454.
2. Lasota-Moskalewska A (1980) The skeleton of prehistoric cow with characteristic of both Primigenious and Brachycerous cattle. Ossa, 7: 173–178.
3. Przespolewska H (2000) Cechy morfologiczne owcy domowej (Ovis ammon f. aries) z Europy Środkowej w świetle badań kostnych materiałów wykopaliskowych. Fundacja „Rozwój SGGW", Warszawa 1–92.
4. Driesch A (1976) A quide to the measurement of animal bones from archaeological sites. Peabody Museum Bulletin. Peabody Museum Archeology and Ethnology, Harvard University, 1: 1–136.