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Changes in cattle body size in Slovenia from the Iron Age to the Early Middle Age

Variazioni di taglia del bue domestico in Slovenia dall'Età del Ferro all'Alto Medioevo

Summary - This paper presents the first results revealed by a research project focused on getting a deeper insight into alternations in domesticated animal populations in the area of contemporary Slovenia from Prehistoric times onwards. The results will be compared with the data from neighbouring regions (Northeastern Italy and Austria). In order to achieve our goal we have created an ACCESS database containing morphometric data originating from the area. We have managed to document a significant increase in average cattle body size through bi- and multidimensional testing (i.e. Principal Component Analysis). This increase has been dated to the transitional period between the Iron Age and the Roman Period. The observed increase can be attributed to the import of improved Roman breed(s). The large cattle progressively gained importance to the detriment of the small local forms. However, these never completely disappeared from the area. The inverse process took place during the period of (the) Late Antiquity. This has also been documented in some of neighboring regions.

Riassunto - In questo lavoro si presentano i primi risultati emersi nel corso di un progetto che mira a studiare l'avvicinarsi delle popolazioni domestiche nell'area slovena dalla preistoria in poi, per confrontare infine i dati ottenuti con quelli già disponibili in alcune aree vicine, come per esempio l'Italia nord-orientale e l'Austria. A tale scopo è stato creato un database ACCESS per la raccolta di dati morfometrici da siti sloveni o situati in aree confinanti con il paese. Utilizzando sia analisi statistiche di tipo bidimensionale, sia multivariate (analisi delle componenti principali), si registra, al passaggio tra l'Età del Ferro e il periodo romano, un aumento delle dimensioni delle popolazioni bovine. Tale variazione è legata all'importazione di nuovo bestiame, sebbene in alcune zone sembrano sopravvivere razze di tipo locale, caratterizzate da una taglia ridotta. In Età Tardo Antica si assiste ad una riduzione delle dimensioni dei bovini, come già osservato da altri autori in alcune delle aree vicine.

Key words: Slovenia, morphometric database, cattle, Iron Age – Roman Age transition.

Parole chiave: Slovenia, database morfometrico, bue domestico, transizione Età del Ferro – Età Romana.

INTRODUCTION

At the Institute of Archaeology ZRC SAZU in Ljubljana (Slovenia), we began a research project titled "Alternations in Domesticated Animal Populations in Slovenia" in 2007. It focuses on creating a reference collection of morphometric data of domestic mammal and bird bones collected at Slovenian archaeological sites from prehistoric times onwards. Today, thanks to the financial support of CMEPIUS our database contains over 5000 remains from more than 20 locations. Starting from scratch we began to fill the knowledge gap concerning the situation in neighboring countries (see e.g. Riedel 1979, 1986, 1993, 2002; Pucher, Schmitzberger 2003; Pucher 2006a). This paper presents the preliminary results of an analysis of alternations of cattle populations within the examined area between the Iron Age and the Early Medieval Period.

MATERIALS AND METHODS

The study is based on published and our own data that refers to the material from Slovenia and neighboring areas. In certain skeletal elements (e.g. horn cores, skulls, mandibles), the data is enriched with morphological observations to achieve a better morphometric characterization of the individual skeletal elements. Most measurements were taken following the method of von den Driesch (1976); a few additional were added by ourselves. We retook some of the measurements that had been published by other authors in order to improve the homogeneity of the dataset.

RESULTS AND DISCUSSION

Cattle, by far the best represented species in our database (N = 2464), demonstrate a significant change in size during the transition from the Iron Age to the Roman Imperial Period (Fig. 1). The Iron Age

populations were characteristically small in body size, similar to what has been observed in individuals from the Italian and Austrian Alpine region (e.g. Pucher 1999; Riedel 2002). They are thus significantly different from the larger animals found in the contemporary archaeological contexts in the eastern Po plain (e.g. Riedel 1986). These observations are fully confirmed by the results of the Principal Components Analysis (PCA), performed on astragali. The difference in principal component 1 (= size vector) scores between specimens of the Iron Age and those of the Roman Imperial Period is highly statistically significant (F test: $p < 0.001$; Fig. 2). The obtained results are both informative and relevant in view of the fact that the dimensions of both the astragali and the metapodials (Fig. 1) are useful for body size reconstructions (e.g. Bartosiewicz 1984; Bartosiewicz *et al.* 1997, 14).

Furthermore, the metric and fusion data of the studied metapodials indicates a notable resemblance between the age and sex structures of the various samples. The observed differences are thus not to be seen as a reflection of possible gender and age discrepancies. In this respect, the inclusion of the astragali in the analysis was based on the consideration that they originate from the same set of populations. The strong increase in average cattle size observed in Slovenia during the Roman Imperial Period can be attributed to the import of the improved Roman breed(s). A similar process took place in Austria (Pucher, Schmitzberger 2003; Riedel 2004; Pucher 2006b). It is not surprising that skeletal remains of cattle measuring over 120 cm at the withers appear already at the earliest Roman commercial posts in the southeastern Alps – dated to the 1st century BC or initial decades of the 1st century AD

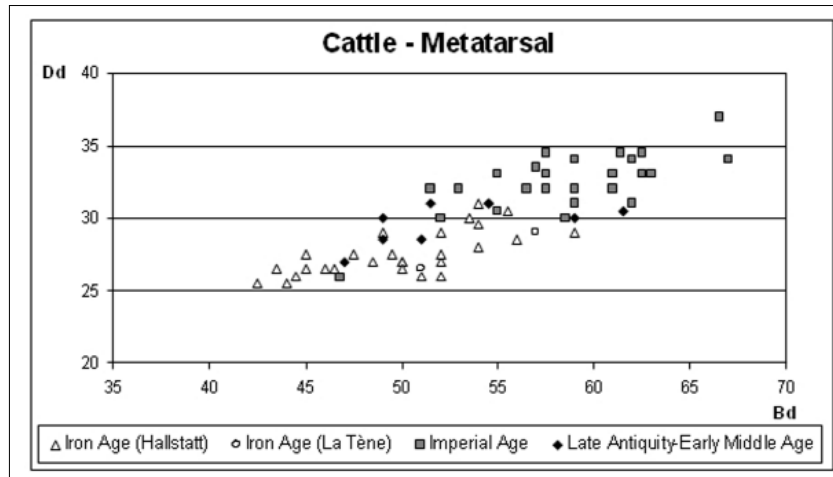


Fig. 1. Size of the cattle metatarsal bones from slovenian sites (in mm).

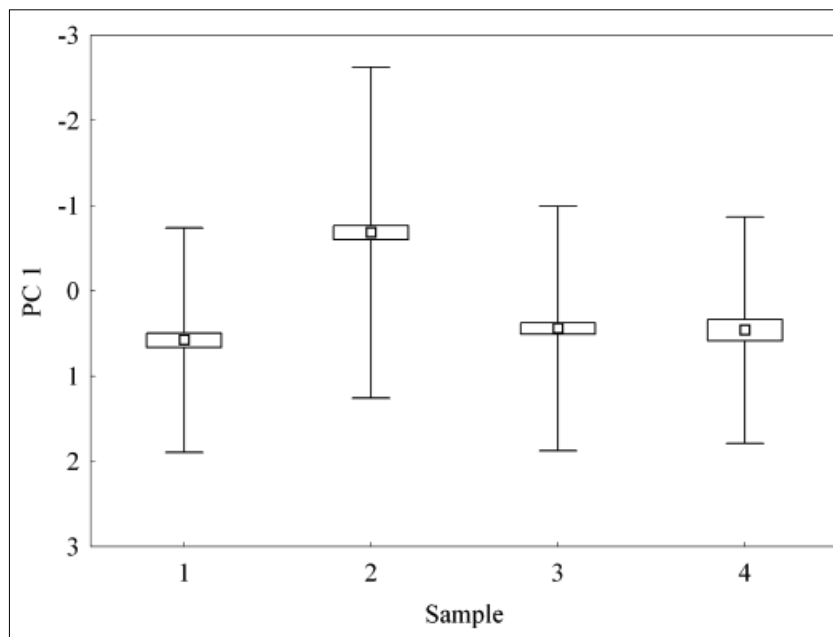


Fig. 2. Differences in the size of the astragalus in cattle of different periods, as expressed by scores on the 1st principal component (PC1). The variables used are GLL, DI and Bd (sensu von den Driesch, 1976). PC1 accounts for 93.25% of the total variance; the factor loadings are all high (i.e. > 0.95) and negative. The smallest box in the plot (= middle point) represents the mean of the variable, while the dispersion is represented by ± 1 times the standard error (large box) and ± 2 times the standard deviation of the mean (“whiskers”). Samples: 1 – prehistory (Riedel 1998 and Slovenian data; N = 61); 2 – Imperial age, Roman Empire (Riedel 2004 and Slovenian data; N = 144); 3 – Imperial age, Germanic settlements (Riedel 1996, 2001; N = 114); 4 - Late Antiquity (Riedel 2007 and Slovenian data; N = 30).

(e.g. *Ocra*/Preval near Postojna, *Nauportus*/Vrhnika near Ljubljana, *Emona*/Ljubljana; cf. Horvat, Bavdek 2009, 133-147). However, the presence of individual outliers (e.g. Humerus: BT = 64.3 mm; Metatarsus: Bd = 46.8 mm) strongly indicates that small local forms – probably directly derived from the Late Iron Age populations – never completely disappeared from the area. The presence of two cattle “breeds” in the Roman Imperial Period has also been observed in neighboring regions. Horn cores resembling Iron Age specimens from the Po Plain were found in the Roman city of Aquileia in Northeastern Italy (Riedel 1979). Remains of both large and small cattle were found also in the Tyrolean Alps (Pucher 2006a; Boschin, Weissteiner 2008) and the area correlative to the Roman imperial *limes* on the Danube in present-day Austria (Riedel 1993; Pucher, Schmitzberger 2003). A renewed decrease in average body size happened during the Late Antiquity (Figs. 1–2). It was most probably related to politically and economically unstable circumstances of the time, which constrained the local communities towards a more localized self-sufficient (food) economy (Ciglencečki 1999). The rapid disappearance of improved Roman breed(s) and agricultural knowledge that had accumulated over the centuries made way for small local forms once again. However, even cattle of these primitive forms progressively decreased in their number to make way for the much less demanding ovicaprids and/or pigs (Bartosiewicz 1999, 315; Turk 2000; Toškan, Dirjec 2012). The process of diminishing cattle body size continued well into the (Early) Medieval period (Bartosiewicz 2006; Toškan, Dirjec 2008).

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