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Livestock management in Spain from Roman to post-medieval times: a biometrical analysis of cattle, sheep/goat and pig

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ABSTRACT

The aim of this paper is to present the results of the biometrical analysis carried out on cattle, sheep/goat and pig measurements from a number of Spanish archaeological sites, dated between Roman and post-medieval times. The results show that important transformations occurred in livestock management, as it is visible through various changes in the body size of the main domesticates. The Romans had a great interest in improving[1] cattle breeds,[2] while during the Middle Ages most effort was put in improving sheep breeds. The size of the three taxa decreased after Roman times, reaching their minimum size between the 8th and 9th centuries, probably in association with changes in livestock management, including free-range keeping and non-selective breeding.

1. Introduction

Biometrical analysis constitutes one of the most important aspects of zooarchaeological research, and can be used to address a huge diversity of archaeological questions. Relevant to this paper are changes in animal husbandry practices, such as the appearance of different breeds, the introduction of improved animals, or the way animals were fed (e.g. Albarella, 1997a; 2002; Boessneck and Driesch, 1978; Davis, 1981, 1996; 2000; Driesch, 1976; Meadow, 1999; Payne and Bull, 1988; Rowley-Conwy, 1999; Albarella et al., 2007; Thomas, 2005; Thomas et al., 2013; Holmes, 2014).

Despite being such an important tool for zooarchaeological research, the analysis of biometrical data has been used by Spanish zooarchaeologists sparingly. Raw data are rarely published, making the comparison of different datasets difficult, particularly if they have not been recorded by the same author. Moreover, many authors merely calculate withers heights of domestic animals, ignoring other types of measurements in their publications (such as individual measurements of postcranial bones and teeth/mandibles). Other analytical approaches, such as size and shape variation in time and space are often neglected and some of the less basic methods, but still widespread, such as size index scaling techniques, have been rarely employed in Spanish zooarchaeology.

There are a number of exceptions to this trend, but they rarely deal with historical periods, which have been, more in general, zooarchaeologically neglected (Morales, 2002: 108–9). Biometrical analyses in Iberia have dealt with the process of domestication (e.g. Altuna, 1980; Hadjikoumis, 2010), but more rarely with changes in animal husbandry practices that occurred after Roman times. The few biometric studies from historical periods mainly consist of mere lists of the measured bones and teeth from particular sites, but regional or diachronic analyses are rare (but see Mariezkurrena, 2004 and Colominas and Saña, 2010). A few studies have dealt with the problem of identifying different breeds (Castaños, 2007–2008;

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[1] It is assumed throughout the text that an increase in size generally results in an overall improvement, in economic terms: a larger animal will generally produce more and more rapidly. Of course, this is a modern interpretation of this phenomenon, but it is likely to have been perceived in a similar way by past societies, and it is mentioned in late-medieval and post-medieval documentary sources (Davis, 2002).

[2] The term *breed(s)* is used throughout the text as a synonym of *landrace(s)* or *morphotype(s)*; it is not being used in the modern sense of the word, because it is not until the 18th century when the first documented bloodlines exist.

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Table 1
Sites located in the Iberian Peninsula that have been consulted to obtain biometrical data for the analysis. ✓: data used. (–): no data.

Site	Province	Region	Postcranial bones			Teeth	Reference
			Bos	*Ovis Capra*	*Sus*	*Sus*	
Bilbilis	Zaragoza	Aragón	✓	(–)	(–)	(–)	Castaños et al. (2006)
Aistra	Álava	Basque Country	✓	✓	✓	✓	Grau-Sologestoa (unpubl. 2010b)
Aitzorrotz	Gipuzkoa		✓	✓	✓	(–)	Mariezkurrena and Altuna (1981)
Amalda	Gipuzkoa		✓	(–)	(–)	(–)	Mariezkurrena (2004)
Arcaya	Álava		✓	✓	(–)	(–)	Castaños (2007-8)
Arcayatermas	Álava		✓	(–)	(–)	(–)	Grau-Sologestoa (unpubl. 2008)
Atxa	Álava		✓	(–)	(–)	(–)	Mariezkurrena (2004)
Bilbao	Bizkaia		✓	✓	✓	(–)	Castaños (1998-9)
C/Cubo, Balmaseda	Bizkaia		✓	✓	✓	✓	Fernández et al. (2011)
Casa del Cordón, Vitoria-Gasteiz	Álava		✓	✓	✓	(–)	Castaños et al. (2011)
Clarisas, Salvatierra	Álava		✓	✓	✓	✓	Grau-Sologestoa (unpubl. 2011c)
Correría 131, Vitoria-Gasteiz	Álava		✓	✓	✓	✓	Grau-Sologestoa (unpubl. 2009d)
Laguardia	Álava		✓	✓	✓	✓	Grau-Sologestoa (unpubl. 2009c)
Mavilla	Álava		✓	✓	(–)	(–)	Escribano (unpubl. 2011)
Dulantzi	Álava		✓	✓	✓	✓	Grau-Sologestoa (unpubl. 2011b)
Santa Coloma	Álava		(–)	✓	(–)	(–)	Grau-Sologestoa (2011a)
Vitoria	Álava		✓	✓	✓	✓	Castaños et al. (2012)
Zaballa	Álava		✓	✓	✓	✓	Grau-Sologestoa (2012a)
Zapatari 33, Salvatierra	Álava		✓	✓	✓	✓	Grau-Sologestoa (2009a)
Zapatari 35, Salvatierra	Álava		✓	✓	(–)	✓	Grau-Sologestoa (unpubl. 2010a)
Zarautz	Gipuzkoa		✓	✓	✓	✓	Altuna and Mariezkurrena (2009)
Zornoztegi	Álava		✓	✓	✓	✓	Grau-Sologestoa (2009a)
Cárcava de la Peladera	Segovia	Castile and León	✓	✓	(–)	(–)	Bellver (unpubl. 1999)
Castillo de Treviño	Burgos		✓	✓	✓	✓	Grau-Sologestoa (unpubl. 2009b)
El Pelambre	León		✓	✓	(–)	(–)	Fernández (2009)
Ladera de los Prados	Valladolid		✓	✓	✓	(–)	Bellver (unpubl. 2001)
Mata del Palomar	Segovia		✓	✓	✓	(–)	Bellver (unpubl. 2002)
Castell de Mur	Lleida	Catalonia	✓	✓	✓	(–)	Valenzuela and Colominas (2009)
Els Antígons	Tarragona		✓	✓	✓	(–)	Valenzuela (2010)
Foro de Tarraco	Tarragona		✓	✓	✓	(–)	Miró (1989)
La Solana	Barcelona		✓	✓	(–)	(–)	Estrada and Nadal (2007)
El Pelícano (s. 9)	Madrid	Madrid	✓	✓	✓	✓	Grau-Sologestoa (unpubl. 2012b)
Gózquez	Madrid		✓	✓	(–)	(–)	Morales and Pino (unpubl. 2000)
La Huelga	Madrid		(–)	✓	(–)	(–)	Morales and Llorente (unpubl. 2003)
La Indiana	Madrid		✓	✓	✓	(–)	Morales and García (unpubl. 2002)
Manzanares el Real	Madrid		(–)	✓	(–)	(–)	Liesau and Daza (2012)
C/del Duque 33, Cartagena	Murcia	Murcia	✓	✓	✓	(–)	Portí (1991)
Arellano	Navarra	Navarra	✓	✓	(–)	✓	Mariezkurrena and Altuna (1994)
Desolado de Rada	Navarra		✓	✓	✓	✓	Castaños and Castaños (2003–7)
Silves	Algarve	Portugal	✓	✓	(not used)	(not used)	Davis et al. (2008)
Ambra	Alicante	Valencia	(–)	✓	(–)	(–)	Benito Iborra (2006)

López et al., 2012; Llorente et al., 2012). Available publications on medieval biometrical data from the Iberian Peninsula are extremely scarce, with remarkable exceptions dealing with Portuguese Islamic assemblages (Albarella et al., 2005; Davis, 2006, 2008; Davis and Moreno, 2007; Davis et al., 2008; Albarella et al., 2013).

In other geographic areas in Europe, biometrical analyses suggest that the size of the main domesticates decreased after Roman times, and only increased again during the late and post-medieval period (for example, Yvinec, 1991; Clavel et al., 1996; Davis, 2008; O'Connor, 2010; Salvadori, 2010; Hammon, 2011; Holmes, 2014), but different trends have also been observed (McCormick et al., 2011). This paper presents a review of the available biometrical data of historical periods (broadly from the 1st to the 21st centuries AD) in Spain. It constitutes the first regional synthesis that aims to understand changes in livestock management in Spain, from Roman times to the post-medieval period, through the analysis of measurements taken from archaeological faunal remains. The main research question in this paper is if there were any changes in the size of domesticates in Spain during this period, as has been suggested for other European areas. If so, when did these changes occur? Were these size changes related to transformations in agricultural systems (such as changes in foodstuff, genetic modifications or livestock management)? And, were these changes the result or the cause for the general economic improvement?

2. Materials and methods

This work will present a regional overview in order to identify general trends on size changes of the main domesticates. To do so, biometrical analysis of the three main domestic taxa is undertaken, using the log ratio technique (Simpson et al., 1960; Payne and Bull, 1988; Meadow, 1999). For this, I will present my own biometrical data combined with data that have been taken by other specialists, in order to provide a regional overview of the changes during a long time span. For this reason, I refer the readers to the specific publications (see references in Table 1) for clarification of the methods used by other authors; the methods explained below are those followed by the author of this paper. The list of the sites used for this review is provided in Table 1 (also see map in Fig. 1 for their location). Most sites are located in the Basque Country, Catalonia and the central Iberian Peninsula.

Measurements of postcranial fused bones of cattle, sheep/goat[3] and pig were collected. In the case of pig, which is not only

[3] Although it would have been better to consider separately those measurements attributed to sheep and goat with certainty, caprines have been amalgamated here due to the small number of available measurements. The proportion of identified goats is generally smaller than sheep.