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THE ENDANGERED CATALONIAN DONKEY BREED: THE MAIN ANCESTOR OF THE AMERICAN ASS OR MAMMOTH

J. Jordana and P. Folch

SUMMARY

The Catalonian donkey is an endangered local donkey breed located in several Pyrenean and pre-Pyrenean regions of the Catalonian area (Northeast Spain). Following the rules of action marked by the FAO Expert Consultation for the identification and study of possible stocks of conservation, this work undertakes the initial action points, giving a generic description of the population as to their origin and phylogenetic relationships, existent relationships with other worldwide breeds, censused sizes, and future perspectives of the same. A morphological description is carried out with the objective of seating bases for breed characterization and carrying out a proposal of racial standard in order to create and manage the future Stud Book of the Catalonian donkey breed.

Keywords: Donkeys / endangered breed / morphological characters

INTRODUCTION

Racial regression is a phenomenon that obviously does not affect just the asinus species. The decline worldwide in a number of breeds affects in a dramatic way all or almost all the species,[1] raising the controversy of whether they should or should not be conserved.[2,3,4] Upon losing the breeds, the genes that they are carrying are lost. The gravest problem is the great ignorance concerning the danger of extinction that exists in populations. This ignorance persists even though there are important questions regarding genetic improvement, productivity, whether or not these animals are carriers of any major interesting or valuable genes(s), currently or in the future (which might not be found in other breeds), or their power of heterosis, etc., The assertion of Mason[5] that "any extinction or disappearance of a species or breed represents an irreplaceable element of the life diversity that is lost," would have to be enough reason in order to justify any program of conservation in the species and breeds in danger of extinction.

Nevertheless, it is necessary to give some points of view which are more objective than the programs of conservation could somehow justify. In a general and summarized way, and according to several authors,[3,6,7] the following could be enumerated as possible valid reasons for the conservation of breeds:

Economic-biological reasons: It is necessary to maintain the genetic variability so that adaptations to possible new future requirements could be made, as well as also to production under unfavorable conditions.

Scientific reasons: Study of each breed in particular for the search of unique and valuable genes, through the identification of QTL (Quantitative Trait Loci) by means of molecular genetic analysis. The conservation of populations also provides material for research that could contribute to the better knowledge and understanding of some aspects of the evolution, such as domestication, behavior, and effects of natural and/or artificial selection.

Cultural-historical reasons: Conserved breeds can be considered valuable as genetic patrimony of the country, and as a living parallel history of the human populations.

Ecologic-environmental reasons: Some breeds or

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Figure **1.** Jennie with foal of the Catalonian donkey breed.

populations only meet in some determinate geographical zones. Their loss could possibly deteriorate the milieu and the ecological symbiosis of the zone.

The Catalonian donkey (Figure 1) is a local donkey breed located in several Pyrenean and pre-Pyrenean regions of the Catalonian area (Northeast Spain); the current geographical location of this breed is shown in Figure 2. The current census is very reduced, and the total number of animals of the Catalonian donkey breed slightly surpasses one hundred individuals, approximately a third of which are males. These figures fit into the category of Critical Breed (< 100 females) or into the category of Endangered Breed (100–1,000 females) proposed by the FAO Expert Consultation,[8] which implies that the breed is in danger of extinction.[9] Without action, its effective population size is inadequate for preventing continuing genetic loss in future generations.

Although the decline in census of the Catalonian donkey has been vertiginous and uninterrupted during this century, it is noteworthy to comment that from the year 1880 a Registration Book of the Catalonian donkey[10] exists, and that in the year 1978, due to the severe situation that this breed experienced, the "Association of Fomentation of the Catalonian Donkey Breed" (AFRAC) was created, in order to protect, foment and improve this population.

Within this context, it became necessary in 1994 to carry out a "Program of Conservation and Maintenance of Animal Genetic Resources" in this breed, which was promoted and financed by the D.A.R.P. (Department of Agriculture, Livestock and Fishing) of the autonomous Government of Catalonia (Generalitat de Catalunya), in collaboration with FRAC, and the Animal Genetics unit of the Veterinary School of Barcelona. The generated information will be integrated in the "FAO Global Data Bank on Domestic Animal Diversity," located in Hannover, Germany.[11,12]

ORIGIN AND PHYLOGENETIC RELATIONSHIPS

Discussion of the evolution of the Equines is still continuing. However, the *Pliohippus* or *Plesihippus* is considered as the ancestor of the genus *Equus* in all its forms. The *Equus* was probably developed in North America, from where it passed to Europe, Asia and Africa. Nevertheless, at the end of the Pleistocene or the beginning of the Holocene (9,000 to 10,000 years ago), *Equus* disappeared completely from the American continent, developing in the Old World.[13]

The genus *Equus* contains six subgenres: *Asinus, Hemionus, Equus, Dolichohippus, Hippotigris* and *Quagga*. Nevertheless, both Corbet[14] and Bennet,[15] based on studies carried out from archaeological findings, only recognize two, the *Equus asinus*, descendant of the *Astrohippus*, with three species: *E.a.asinus, E.a.hemionus* and *E.a.kiang*, and the subgenre *Equus equus*, direct descendant of the *Dinohippus*, with five species: *E.e.caballus, E.e.quagga, E.e.burchelli, E.e.zebra*, and *E.e.grevyi*.

The domestication process of asses began during the Holocene (8,000 to 10,000 years ago) in the Northeast Africa zone, subsequently disseminating toward the Southwest of Asia and the South of Europe.[16] The oldest findings of domestic asses date back to the fourth millennium BC, found in Egypt and associated with other skeletons of domestic animals. Around the third millennium BC, murals were beginning to be seen where the ass was frequently represented and utilized as a beast of burden.

Domestic asses did not appear in the southwest of Asia until the beginning of the third millennium BC. In India and Pakistan, bones of domestic asses were not found until 2,000– 800 BC. In Europe, the domestication of the ass began later than in Africa and Asia. As their ability to adapt to humid and cold climates was poor, they never became very numerous in the northern lands. Asia Minor seems to have been the starting point from where the asses were introduced into Europe, through the Ukraine, Russia and the Balkan Peninsula. There is evidence of the presence of these animals from 800–900 BC in the Ukraine. From the Balkans, the ass reached Italy, producing its expansion to the remainder of Europe in a parallel way to

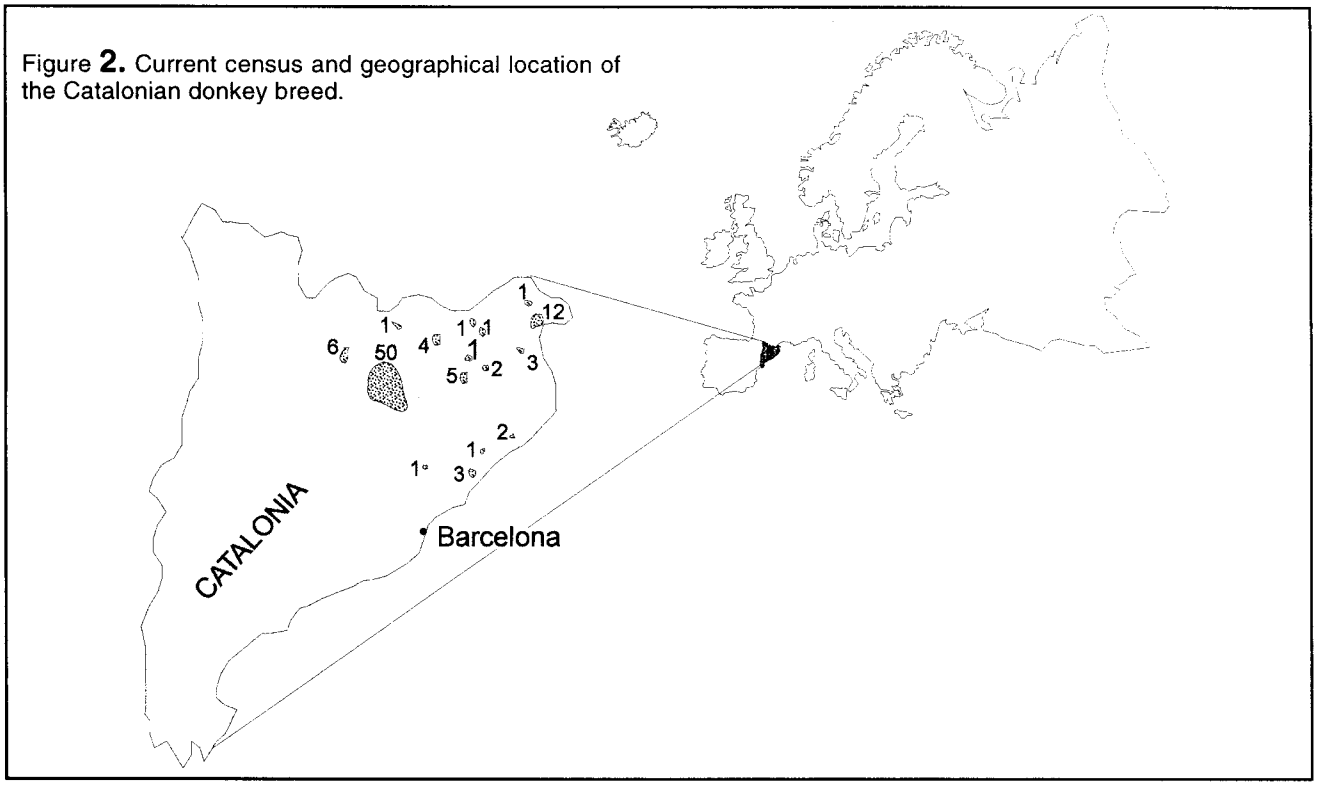

Figure **2.** Current census and geographical location of the Catalonian donkey breed.

the Roman conquests. Nevertheless, some Iberian peninsula ass populations came directly from animals that passed from Africa through the Straits of Gibraltar.[17]

According to several authors,[17,18,19] the current breeds of asses seem to come from two ancestral trunks: the *Equus asinus africanus,* or Ass of Nubia, native to the Nile Basin, and the *Equus asinus somaliensis,* or Ass of Somalia, which subsequently gave rise to the asses from the Southwest of Asia and probably also to the majority of the European breeds, among them the Catalonian donkey breed. Notwithstanding, other authors such as Dechambre and Sanson[10,20,21] also maintain the theory of two ancestral lines, one of them originating from the Northeast of Africa which would correspond to the *Equus asinus africanus,* and the other one the *Equus asinus europeus,* whose area of origin is the Mediterranean Basin, concretely the Balearic Isles, which would have given rise to the majority of European donkey breeds, among them the breed which concerns us here.

INFLUENCE OF THE CATALONIAN DONKEY BREED IN OTHER WORLDWIDE BREEDS

The Spanish donkey breeds have had much importance in the formation and improvement of other populations, mainly European. The Catalonian donkey has contributed to the improvement of the French "Baudet of Poitou" breed, preferably in order to increase the size and improve the sexual prowess of their animals,[20,22,23] although the Spanish breed that has most contributed to the formation of the Poitou has been the Zamorano-Leonesa breed, specimens of which were exported to France during the reign of Felipe V.[21,22] The Andulusian donkey breed would be, according to Sotillo and Serrano,[21] the ancestor of the Brazilian Ass, or Lagoa Dorada, breed.

The influence that the Catalonian donkey has had in several Italian breeds is more importan, contributing in a decisive way to their formation and improvement. Among them could be mentioned the Pantellaria, Martina-Franca and Siciliana or Ragusana breeds.[10,17,20–23] Sotillo and Serrano[21] also assign a certain influence of the Catalonian donkey in the Mediterranean Maltese and Cypriot breeds, originally from African and Asian asses.

But where all the authors agreed was with the direct and decisive influence of the Catalonian donkeys in the formation of the American Ass,[10,17,20–24] also named Ass of Kentucky or Mammoth in honor of that which is considered to be the best founding sire of this particular breed, named Imported Mammoth, which arrived in Charleston (South Carolina) in 1819, coming from Catalonia, being extensively utilized in the States of Kentucky, Tennessee and Missouri.[24]

Lastly, just one comment that several authors make in reference to the diverse exports carried out of Catalonian donkeys; at the end of last century and also during the current one, this donkey reached to such far away and dispersed places as: Algeria, Argentina, Australia, Brazil, Canada, Congo, Cuba, Central American Republics, Ger-

Table 1. Census equine evolution in Spain and Catalonia during the 20th Century.

YEAR	ASSES		HORSES		MULES	
	SPAIN	CATALONIA	SPAIN	CATALONIA	SPAIN	CATALONIA
1929	1,006,000		598,000		1,154,000	
1935	1,176,000		808,000		1,475,000	
1940	851,000		592,000		1,139,000	
1950	732,000		642,000		1,089,000	
1960	686,000		506,000		1,158,000	
1970	368,000		282,000		533,000	
1976	253,000	3,702	262,000	13,301	281,000	15,452
1978	232,000	5,411	257,000	19,016	253,000	17,861
1980	188,000	3,252	242,000	9,233	199.000	6,264
1984	160,000	1,550	254,000	11,349	145,000	4,069
1986	140,000	928	248,000	9,256	117,000	2,603
1988	131,000	---	250,000	---	110,000	---
1990	130,000	415	241,000	22,027	100,000	543
1992	130,000	---	240,000	---	100,000	---

many, Great Britain, India, Madagascar, Mexico, South Africa, Tunisia and Zaire.[23]

THE EQUINE CENSUS EVOLUTION IN SPAIN

The Spanish asinus population, as well as the horse and mule, has been diminishing uninterruptedly during the last decades (Table 1). The Statistic Agrarian Yearbook[25] gives us some official ass figures of 1,100,000 individuals, approximately, during the 20's and the beginning of the 30's, already being of some 800,000 animals at the end of the 30's and during the decade of the 40's.

But the period where the great descent in the equine census is produced are the decades of the 60's and 70's, probably due to the intense mechanization of the countryside that began in Spain during those years. In 1980 the ass census decreased 73% compared to the census of 1960. During the same period, the horse census was reduced by 52%, and the number of mules dramatically diminished by 83%. From the analysis of Table 1, it could be observed that in the last decades (80's and 90's) there has been a decline in the number of mules and asses, with the horse population staying more or less uniform in number.

FUTURE PERSPECTIVES

As for the future perspectives of this breed, the first fundamental objective is that it should not disappear, since it is a unique and valuable genetic patrimony, and as Hall[26] says, "local breeds of livestock are genetic resources which should be protected as part of the world heritage of biodiversity."

Moreover, in the current times, this breed could still have a certain economic importance for pure-breeding as well as for mule production, above all, and according to the FAO Expert Consultation,[27] in the tropics and for some developing countries since this species is more important than the horse. Export of stallions and/or frozen semen could be very important for the genetic improvement of other worldwide asinus populations. Forest exploitation, in zones of difficult access, could require the continuation of the services of these animals. Cleaning the forest is an important effect linked to these herds, which collaborate in the prevention of forest fires. Development of commercial products from the species such as the jennie's milk, could be an interesting, although restricted, market. Lastly, there is an important use of the ass as a companion animal and for recreational tourism activities (agro-tourism) in mountain zones.

MORPHOLOGICAL DESCRIPTION OF THE BREED

According to the FAO,[7] the morphological characterization of the breed is necessary to identify conservation stocks. Accordingly, we will use the descriptions from several authors,[10,20–22,28] and the information contributed by several breeders or owners of AFRAC, as well as our own observations.

General characteristics

Appearance and format

According to Baron systematics, the individuals of

this breed are of longilinear appearance, hypermetric format and concaviline profile, this concavity being slightly more apparent in jennies and foals than in stallions.

They are animals of large size, 140 cm at the withers, on average, with a weight ranging between 350 to 450 Kg. They have robust extremities with long, thick bones, acquiring large proportions within a harmonic group. They are slender, with a straight neck and rounded thorax. Not a running animal, this breed is very effective at hard work where great strength and vigor are needed.

Coat color and pigmentation

The black coat color is considered characteristic, although this could be influenced by several environmental factors, as well as nutritional state, season of the year, sun incidence and hair length.

The belly and internal face of the extremities show whitish fadings. The muzzle and orbital zone of the eyes also show these silver fadings. A very characteristic reddish fringe, between silver and blackish colors, can be seen above all in the zones of the head.

Skin and hair

The skin of these animals could be classified as hypermetabolic type, relatively fine but profuse in growth. It possesses scanty subcutaneous conjunctive tissue in relation with the horse. The foals have fine, long and slightly ruffled hair. As the animals grow, they lose this fluff, changing to straight, fine and short hair. The mane in both sexes is dark, short and not very thick.

Characteristics of behavior

They are animals of sanguine temperament although they are accustomed to being quite peaceful. In general they are very noble and of rapid reactions. The expression of the eyes is lively, always carrying the ears and the head very upright. The sexual instinct of the males is very developed. Therefore, according to their biotypology these animals could be grouped within the so-called hypermetabolic or oxidative type.

Regional characteristics

Head

The head is wide and weighty. The front bone shows a straight profile in both sexes, although in females and foals it could be manifested as a little subconvex. This slight subconvexity starts disappearing in the stallions as they begin to manifest the secondary sexual characteristics. Females as well as males are of dolicocefal type.

The eyes are large, lively, and very expressive. The orbital arcade is very thick, with a strongly pronounced apophysis and guided in direction to fronto-parietal crests.

The muzzle is wide and pronounced with a tendency to acromegaly and with bounded fading. The nasal bones expand at their base, but halfway down the nose they narrow in order to enlarge again at the end, where they contact with the muzzle, giving a very pronounced configuration of the supranasals. A very pronounced excavation in a longitudinal way is formed at the union of the frontals and nasals.

The jawbones are strong, wide and very resistant. The inferior jawbone shows some voluminous and convex branches. The dental arcade is rounded and of a short dimension. Ears are long, straight and narrow. Due to their potent muscular insertions, they stay erect and are very mobile and expressive.

Neck

The neck is long, wide, straight, flexible, very muscular, and not given to accumulating adipose tissue, thus giving a very slender image to the animal.

Trunk

The chest is wide and elevated, with long, well-arched ribs.. The belly is contracted in males and more pronounced in females. This makes the relationship between the thoracic perimeter and length diameter have a longilinear body index, characteristic of the breed. The withers are elevated, although not very apparent. The back is straight and long, with a marked waist in its union with the rump. This is of a convex type, mostly more lengthened than wide in males, with great harmony; females show forms much more softened and slightly angular. Kidneys are wide and well united to the rump. The body gives the sensation of being almost cylindrical. The tail is long and of low insertion, normally reaching the level of the hocks and having an abundant mane.

Extremities

The extemities are well conformed and robust. Shoulders are vertical or slightly oblique, and they seem short when they are compared with withers height. The width of knees and hocks especially stands out, with well conformed cannons. The muscular system is very apparent, with tendons separated from the cannon. The leg-line is very regular. Hoofs are slightly narrow in both sexes but well proportioned.

Morphological descriptions, as well as the study and analysis of several biometric variables of the breed, have allowed us to make a proposal of racial standard in order to create and manage the future Stud Book of the Catalonian donkey breed.

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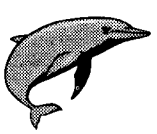

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