

## Heritability Estimates for some Biometric Traits in Martina Franca Donkey Breed

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In the past donkey breeding was an useful economical activity in Italy, in fact a census taken in 1918 counted 949162 head, with Italy at the second place in the Western Europe. The progressive reduction of demand for working donkeys, caused by the mechanization of the agricultural activities, determined the strong decreasing of ass population. The fifth Italian agricultural census (ISTAT, 2006) reports an ass population of 19325 heads in the year 2000. The FAO Institution (<http://dad.fao.org/en/Home.htm>) classifies the population with a strong risk of extinction, considering it in a critical situation. Originally, from the phylogenetic point of view, Italian donkeys were divided into four ancestral breeds: Pugliese, Siciliana, Pantelleria and Sarda (Marchi *et al.*, 1925). The Pugliese breed, the most diffused in Italy in the past, included the populations of Calabrese, Basilicata, Leccese, Martina Franca, Marchigiana and Romagnolo. Martina Franca donkey derives from Catalan donkey, brought to Puglia at the time of the Italian rule. This donkey is also called "morello", because it has a dark coat, while its mouth and inside the legs it is grey. Martina donkey is tall and well built and it has good temperament. This donkey was used to carry cargoes by alpine troops, because it adapted itself to the territory difficulties. This breed has been greatly appreciated in the past for its elevated stature (137–153 cm of height; Carnicella *et al.*, 2006) compared to other donkey breeds, and it is considered useful for the production of hybrids. The typical breeding area is on Mediterranean woody scrubland at altitudes of more than 400 m s.l., with cold and rainy weather during winter and humid conditions in summer (Pagano *et al.*, 1999). At present, asses are bred for amateur interest using a system of extensive or semi-extensive breeding (D'Alessandro *et al.*, 2007).

We analyzed the mean for the three basic body measurements (height at withers, chest girth and cannon bone circumference) in 314 males born between 1966 and 2002. We estimated the heritabilities for the biometric traits measured at registration in order to assess the morphological and genetic characteristics of this breed. In order to estimate heritabilities for each biometric trait, animals generated by 52 stallions were considered. The model included the fixed effect of year and the random effect of stallions, using REML from the Mixed Procedure of the SAS software (SAS, 1998). Error was assumed to be randomly and independently distributed, with a mean of zero and a variance of  $\sigma_e^2$ . Heritability estimates were based on the sire component of variance ( $\sigma_s^2$ ), utilizing the following expression:  $h^2 = 4 \sigma_s^2 / (\sigma_s^2 + \sigma_e^2)$ .

**Table 1. Estimates of sire's ( $\sigma_s^2$ ) and environmental ( $\sigma_e^2$ ) variance components, heritabilities ( $h^2$ ) for Martina Franca conformation traits.**

Trait	$\sigma_s^2$	$\sigma_e^2$	$h^2$
Height at withers	0.98	14.10	0.26
Chest girth	4.92	44.28	0.40
Cannon bone circumference	1.18	1.49	0.43

Heritability estimates ranged between 0.26 (height at withers) and 0.43 (cannon circumference) as shown in Table 1. Nowadays for donkey populations there's a lack of information in the scientific literature supporting our results. For a better evaluation and looking for an explanation, we compared our results with those reported by Dario *et al.* (2006) in Murgese horse breed; therefore the present values seem to be quite moderate. Rationale for comparing Murgese horse and Martina Franca donkey is in the sharing of the same environmental and breeding conditions in spite of they belong to different species and from our point of view they could be therefore overlapping.

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