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Morphological characteristics of "Monterufoli horse"

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ABSTRACT - Monterufoli horse is a local endangered breed of the Tuscany and derives from the omonym area in province of Pisa. This horse derives from local wild and extinct equines and has Maremmano, Tolfetano and Oriental ancestors. The mean and the standard deviation of biometric characters, and the absolute and percentage frequency of morphological characteristics were calculated. The measures of the adult females were estimated by ANOVA considering three different classes of age. The average sizes were: height at withers of 135.4 ± 6.3 and 129.2 ± 5.9 , thorax circumference of 166.4 ± 8.3 and 163.4 ± 8.9 , frontshank circumference of 17.7 ± 1.5 and 17.5 ± 0.9 , for males and females, respectively. All the observed horses presented dark coat. Monterufoli horses showed the physical characteristics of local extinct ancestors (Selvena pony), but also the characteristics of other breeds that contributed to improve the local population. This horse, which was once used in agriculture and for light draught, is now involved for saddle use.

Key words: Monterufoli horse, Morphological characteristics, Body index.

INTRODUCTION - The conservation of the biodiversity is an important aim that concerns many plants and animals species in the world. The aim of this paper is the morphological characterization of an important equine breed of the Tuscany. The Monterufoli horse, like many other Italian breeds, is endangered (Arzilli, 2006; Tocci, 2006). This condition is due to technological development in agriculture field and to rural depopulations. Various local and state organizations are working on this field in this last twenty years. This breed derives from local wild and extinct equines. In early 1900 began the selection and the improvement of Monterufoli horses, supported by the introduction of oriental, Maremman and Tolfetan horses (Arzilli, 2006, Gennero and Calcagni, 1985).

MATERIAL AND METHODS - Material for the studies of biometric characteristics was provided by 27 animals in different horse-breedings: "Corpo Forestale dello Stato of Cornocchia (Si)", "Comunità Montana dell'Alta Val di Cecina" of Pomarance (Pi) and a private breeding of Suvereto (Li). For the visual evaluation (Table 2) 97 Monterufoli horses were examined. Hooves of horses were also estimated by visual evaluation (Table 2), considering compactness and not splinter and not enlarged structure (Bossi, 1926). Each horse was measured, considering 26 different body measures, whereof 7 are related in this paper (Table 1). The height at withers and the height at back were measured using "measurer bat" or "Lydtin's bat", the widths of body were measured by "caliper", and the length and the girth of body were measured by a ruler. Nine "body index" (BI) (Table 1), including the "Relative Trunk Length" (RTL) and the "thoracic index" (TI) (Catalano, 1985; Meregalli, 1980) were calculated. For each measure and each different classes (foals, females and males) the mean and the standard deviation were estimated. The variation of the morphological characteristics was estimated submitting data of adult females to analysis of variance (SAS, 2002) following a linear model with the fixed effects of the age of horses (3 classes: 3-4 years, 5-6 years, over 6 years old). Percentage, frequency of different body physical characteristics, including coat color, physical conformation, legs characters, were also calculated.

RESULTS AND CONCLUSIONS - Height at withers, thorax circumference, and frontshank circumference (Table 1) met the requirement of the specific literature (Arzilli, 2006; Gennero e Calcagni, 1985) and of the "standard breed" of AIA (<http://www.aia.it/>, 2006). The zoometric measurements, the relation with trans-

versal and longitudinal measures, the length of the legs and the width of chest (BI), indicated a mesomorphic type (Catalano, 1984) with distinctive features of riding-horse and light draught-horse (Meregalli, 1980): relatively short body and developed thorax, legs with short shank.

Table 1. Measures and Body Index (BI) of adult females and males (Average \pm sd).

Measures (cm)	Females		Males	
		n.		n
Height at withers	129.2 \pm 5.9	20	135.4 \pm 6.3	5
Height at croup	129.6 \pm 5.5	19	138 \pm 6.8	5
Trunk length	141.8 \pm 8.2	15	145 \pm 7.8	5
Frontshank circumference	17.5 \pm 0.9	12	17.7 \pm 1.5	5
Thorax circ.	163.4 \pm 8.9	20	166.4 \pm 8.3	5
Chest width	34.6 \pm 3.3	13	39.4 \pm 3.9	5
Frontshank length	21.7 \pm 2.4	12	26.0 \pm 2.8	5
Index	Females		Males	
		n.		n
RTL	110.8 \pm 6.4	14	107.4 \pm 9.7	5
HTI	45.3 \pm 3.4	18	44.6 \pm 1.7	5
TDEP/TCIR	126.5 \pm 6.2	19	123.1 \pm 8.1	5
LBC	90.5 \pm 5.3	14	93.7 \pm 7.8	5
TBC	64.6 \pm 7.0	18	65.1 \pm 3.7	5
LTC	40.8 \pm 4.9	12	41.9 \pm 4.6	5
TI	143.9 \pm 19.2	16	146.1 \pm 11.8	5
CI	87.9 \pm 6.4	14	87.2 \pm 3.1	5
DTI	10.8 \pm 0.6	12	10.6 \pm 0.2	5

RTL (Relative Trunk Length) = Trunk oblique length / height at withers x 100
 HTI (Height Thorax Index) = Thorax depth / height at withers x 100
 TDEP/TCIR (Relation-ship between thorax depth and thorax circumference)= Thorax circumference / height at withers x 100
 LBC (Lateral Body Conformation) = Thorax oblique length / height at withers x 100
 TBC (Transversal Body Conformation) = Thorax oblique length / height at withers x 100
 LTC (Lateral Trunk Conformation) = Thorax depth / trunk oblique length x 100
 TI (Thoracic index) = Thorax oblique length / thorax depth x 100
 CI (Corporal Index) = Trunk oblique length / thorax circumference x 100
 DTI (Dactyl Thoracic Index) = shank circumference / Thorax circumference x 100.

Through visual evaluation (Table 2) of different horses in 3 horse-breedings, some body characteristics typical of the breed were shown: dark and thick coat, dark and hard wearing hooves, simple head of hair, fetlock. Many horses were serviceably sound: knock-knees in front legs and cow-hocked in hind limbs. These imperfections, that can be treated by selection and improvement, portrayed a feature of the traditional Monterufoli horse, that lived and evolved in a rugged mountainous territory (Tocci, 2006). The typical black and thick coat is evolved to help the “wild” Monterufoli horse to pass the hard winters that characterize the native environment of this animal. Up to about 3 years of age, foals presented red coat, than slowly developed in dark. Some horses presented pastern or coronet, while others presented stars or trace of stars. The very hard hoof was important in the past for hold up the typical rugged soil of Monterufoli. In this area are present characteristic ophiolitic outcrops, with stones containing poisonous minerals for plants and animals: Cadmium, Nickel, Chromium, Lead, Cobalt, Zinc. The hard hoof of Monterufoli horse permitted to resist the foot consumptions and infections. Moreover, this horse lived for several centuries in an impervious territory, with poor and not controlled feeding and without improvement and selection: for these reasons many equines were serviceably sound.

Table 2. Main features of adult females and males.

Main features	Females		Males	
	n	%	n	%
Simple, thick dark coat	21	100	6	100
Coronet or pastern	2	9.52		
Star or trace star	4	19	2	32
Dark and hard hooves	21	100	6	100
Simple head of hair	21	100	6	100
Knock-knees (front leg)	0	-	3	50
Cow-hocked (hind limb)	0	-	3	50
Fetlock	21	100	4	66.6

No statistical differences were found among the class of age for all the measures considered (Table 3). Monterufoli horse reaches a good body development in about 30 months ("standard breed", Aia, 2006). From 3 to 6 years old the growth of horses continues, but without significant development. This horse, which was once used like pack animal and for light draught, is now involved for saddle use, employable in children horse-riding activities and pet therapy.

Table 3. Measures of adult females.

Measure (cm)	n.	3-4 years	5-6 years	>6 years	DSR	Sign.	Degrees of freedom
Height at withers	20	126.0	129.2	131.2	5.8	ns	17
Height at croup	19	126.0	130.8	131.0	5.3	ns	16
Trunk length	15	140.2	138.3	145.1	8.3	ns	12
Frontshank circumference	12	16.5	17.7	17.6	0.8	ns	9
Thorax circ.	20	158.2	163.2	167.0	8.4	ns	17
Chest width	13	33.2	38.5	34.5	3.0	ns	10
Frontshank length	12	20.5	22.3	22.2	2.5	ns	9

ns = not significative.

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