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Morphological characterization of the local goat population "Beni Arrous"

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Abstract. A total of 106 goats (10 bucks and 96 does) in 21 farms chosen at random in two districts of Beni Arrous and Rommani were used for description and measurements. Goats studied had stains on their coat, red for two thirds and black for one third of them. The adult goat weighed in average 37.5 kg, the size (height at withers) averaged 63.6 cm and the total body length 64.4 cm. The buck weight averaged 41.8 kg, the height at withers 65.2 cm, and its total body length 60.8 cm. A proportion of 51.4% of goats had a dressed ears form, 76% had no tassels and 57.3% did not have a beard. The presence of horns is dominant in males and females. The chest is prominent; the heart girth is of 79.5 cm.

Keywords. Goats – Beni Arrous breed – Measurements – Height at withers – Tassels – Chest.

Caractérisation phénotypique de la population caprine locale «Beni Arrous»

Résumé. *La description et les mensurations ont porté sur un effectif de 106 caprins (10 boucs et 96 chèvres) chez 21 éleveurs choisis au hasard dans les communes rurales de Béni Arrous et Rommani. La coloration de la robe est rouge chez 2/3 et noire chez 1/3 des caprins. La chèvre adulte pèse en moyenne 37,5 kg avec une hauteur au garrot de 63,6 cm et une longueur du corps de 64,4 cm. Alors que le bouc pèse 41,8 kg avec une hauteur au garrot de 65,2 cm et une longueur du corps de 60,8 cm. Plus de 51,4% des chèvres ont des oreilles dressées, 76% n'ont pas de pampilles et 57,3% n'ont pas de barbiche. La présence des cornes est dominante chez les mâles et les femelles. La poitrine est saillante, son tour est de 79,5 cm.*

Mots-clés. *Caprins – Race Beni Arrous – Mensurations – Hauteur au garrot – Pampilles – Poitrine.*

I – Introduction

In Morocco, there are approximately 5.991 million goats (MAPM, 2011). The majority of Moroccan goats are indigenous and kept by traditional farmers. Indigenous breed goats are a valuable source of genetic material because of their adaptation to harsh climatic conditions and resistance or tolerance to diseases and parasites found in their habitats. Despite their multiple roles and economic importance, information collected by the Food and Agriculture Organization (FAO) of the United Nations indicated that approximately 30% of the word's farm animal breeds including goats are at risk of extinction (FAO, 1999). With the increasing of uncontrolled crossbreeding and the introduction of exotic breeds, there has been growing concern about the disappearance of indigenous breeds (Nsoso and Morake, 1999).

The physical or morphological characteristics can be particularly useful in the classification of populations, strains or breeds within a species (Winrock International, 1992). However, little information is available on genetic and phenotypic characteristics of Moroccan goats, which are essential for the development of appropriate breeding goals and programmes for each farm zone. The aims of this study were to identify the morphometric and physical characteristics of the "Beni Arrous" goat in two districts of Beni Arrous in Beni Arrous and Rommani regions, in order to facilitate their field identification and classification.

II – Materiel and methods

1. Study area

Recording of the different goat body characteristics was carried out in two different locations, Beni Arrous and Rommani (Fig. 1). The total number of goats recorded was 106 goats, where 76 from Beni Arrous and 30 from Rommani districts.

Fig. 1. Beni Arrous goat.

2. Data analysis

In each district a total of 20 goats' farmers were randomly selected and records were taken on a random sample of 4 to14 animals per farm, depending on the herd size average of the district.

The measurements included body weight (BW), height at wither (HW), measured vertically from the floor to the wither, body length (BL), as the distance between the scapula and the sacrococcygeal joint, rump length (RL), as the length of the hip bone and heart girth (HG), the circumference of the thoracic cavity taken just behind the forelimbs.

Records were also taken on the coat colour (brown, brown + white, red, black and white), presence of horns, wattles and beard, and ear types (dressed or drooping).

All quantitative data were analysed using the General Linear Models Procedure of the Package for the Social Sciences SPSS (2001). Herd, Location (district), and sex were used as fixed effects. The statistical model used for the body measurements took the following form:

$$Y_{ijk} = \mu + A_i + S_j + L_k + E_{ijk},$$

Where:

μ: Population mean; A_i: Effect of herd; (i = 1, …., 29); S_j: Effect of district; (j = 1, 2); L_k: Effect of sex; (k = 1 , 2); E_{ijk}: Random error peculiar to each animal.

III – Results

Table 1 shows the analysis of variance (ANOVA) summary for various body measurements of Beni Arouss goat. All traits are significantly affected by sex and herd ($p<0.05$). However, the location had no significant ($p>0.05$) influence on chest circumference.

Table 1. Summary of ANOVAs for body measurements of Beni Arrous Goat

Sources	DF	BW (MS)	HW (MS)	HR(MS)	CC(MS)	CD(MS)	BD(MS)
Location (district)	28	***	***	**	ns	**	***
Sex	1	**	***	**	*	***	*
Herd	1	***	***	***	***	***	***
Residual	–	–	–	–	–	–	

DF: degrees of freedom; MS: mean squares; BW: live weight; BD: Body length; CD: Chest depth; HW: height at wither; HR: Height of rump, CC: Chest circumference.
*P < 0.05; **P < 0.01; ***P < 0.001; ns – non-significant.

The means of body measurement and body weight of Beni Arrous goats based for each sex are presented in Table 2. Values obtained from linear body measurements are higher for males than females, except body length, for which does were larger than bucks.

Table 2. Body measurements of Beni Arrous goats according to sex

Trait	Sex	Number	Mean	SD
BW	F	94	37.5	8.83
	M	10	41.8	13.57
	F&M	106	37.8	9.38
HW	F	94	63.6	6.95
	M	10	65.2	5.41
	F&M	106	63.8	6.75
RL	F	94	64.4	7.32
	M	10	66.7	4.71
	F&M	106	64.6	7.06
HG	F	94	79.0	6.39
	M	10	83.7	9.09
	F&M	106	79.5	6.73
BL	F	94	63.8	10.82
	M	10	60.8	12.53
	F&M	106	63.4	10.89

M: male; F: Female; SD: standard deviation.

The phenotypic frequencies of qualitative traits in the Beni Arrous goats according to sex are shown in Table 3. The most common coat colour of Beni Arrous goats is the red colour; its frequency is 70% and it is similar in males and females. All bucks of Beni Arrous goats are horned, while the proportion of horned females is 88.54%. This result is in agreement with the 75% proportion of horned animals in Twasna goats of Botswana (Katongole *et al.,* 1996). The dressed

ears form was the most in males (70.0%) and females (51.0%). The presence of beard was evident in both goat populations. However, there was sexual dimorphism in its distribution, since more males (90%) exhibited the trait than females (42.7%).

Wattles exist at a smaller proportion in male (10%) and in female goats (24.0%). The present result is in agreement with the findings of Yakubu *et al*. (2010) for WAD goats (31.6% in males and 5.78% in females) and for Red Sokoto goats (1.69% in males and 3.78% in females).

Table 3. Frequency (%) of qualitative traits of Beni Arrous goats according to sex

Traits	Number		Phenotypic frequency (%)	
	Males	Females	Males	Females
Coat Color				
Brown + White	0	3	0	3.13
Red	7	68	70	70.8
Black	3	22	30	22.9
White	0	3	0	3.13
Horn				
Absence	0	11	0	11.5
Presence	10	85	100	88.5
Ear form				
Dressed	7	49	70	51.0
Dropping	3	47	30	49.0
Beard				
Absence	1	55	10	57.3
Presence	9	41	90	42.7
Wattles				
Absence	9	73	90	76.04
Presence	1	23	10	23.96

IV – Discussion

Sex is an important source of variation for live body weight and linear body measurements. The body weight of adult females and males of Beni Arrous breed was found to be 37.5 kg and 41.8 kg, respectively.

Linear body measurements such as HW (63.6-65.2 cm) of Beni Arrous goat were slightly lower than those of Blanca de Celtibérica (69.07-72.89 cm) (Herrera *et al*., 2004[a]), Blanca de Rasquera 70.92 cm (Carné *et al.,* 2007), and Blanca Andaluza races 76.74 cm (Herrera *et al*., 2004[b]).

The BL (60.8-63.8 cm) and HG (79-83.7 cm) measures for obtained in this study compares well with that of Beetal goat (69.3-78.1cm) and (70.1-79.6 cm) (Hamayun *et al.,* 2006). The observed differences in body measurement might be due to genetic potential and environment.

The predominant coat color was the uniform red coat pattern for both males and females. However, males and females differed in the presence of beard. This present study showed that only 10% of males didn't have a beard compared with 57.3% of females. Adedeji *et al.* (2006) reported that wattles, beard and horns were predominant in both sexes, but more frequent in the males of West African dwarf goats. However, Odubote (1994) reported no sex difference in coat color, horns, beard, and wattles in Nigerian goats. The frequency of the presence of horns is in agreement with the 75% of horned animals in Twasna goats of Botswana (Katongole *et al.,* 1996).

The presence of wattles in 10% of males and 24.0% of females of the goats studied is in agreement with observations of Manzi *et al.* (2011) in Rwanda and in contrast with those of Rodero *et al.* (1996) who reported a presence of wattles in 68 to 98% of Spanish goats.

V – Conclusion

This study presented the beginning for the characterisation of Beni Arrous goats of north of Morocco. Thus development of conservation and improvement strategies for the breed must be done through mobilization of Beni Arrous and Rommani communities, non-governmental organizations, policy-makers and research institutions.

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