

## Phenotypic Characterization of Crossed Goats F<sub>1</sub>- (Desert Goat and Damascus)

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### Abstract:

This study was conducted in North Kordofan state, Western Sudan, during the period Feb 2016- March 2020 to study the Phenotypic Characterization of crossed goats (F<sub>1</sub>-Desert goat and Damascus). 44 female Desert goats of average age of 3-4 years and average body weights  $33.18 \pm 0.84$  kg, were purchased from the local markets. Two mature sexual Damascus bucks were used in the experiment in addition to two castrated local young ones (teasers) all animals were identified using ear tags, tested for brucellosis and treated against external and internal parasites. During gestation period goats were

closely observed up to the time of kidding. Data concerning with crossed kids (phenotypic characters, body measurements, performance up to maturity) were recorded. Data were analyzed using Statistical Package for Social Sciences, software package (SPSS, V23, 2017). The results indicated that Male kids were significantly ( $P < 0.01$ ) heavier than females ( $2.74 \pm 0.48$  visas  $2.04 \pm 0.14$ kg). 27% mortality rate was recorded in kids. 71% of crossed goats (first generation) had light blue eye color. The flock had different coat colors (light brown, reddish brown and dark brown). The udder was somewhat small and attached to the abdomen the average body weight at kidding was  $26.28 \pm 1.56$  and  $22.03 \pm 1.27$  kg for single and twins, respectively.

**Keywords:** Crossed goats F<sub>1</sub>, Desert goat  $\times$  Damascus, Phenotypic Characterization.

### Introduction

The main types of goats in Sudan are Desert, Nubian and Tagger (Ageeb, 1992; El-Hag et al., 2012). In North Kordofan State, the small ruminants play important economic and social roles in the life of rural communities. In addition, goats are considered as great valued

animals in arid zones where they provide inhibitors of these areas with valuable products. In these marginal areas, stricken by recurrent droughts goats and camels are usually the sole survivor when all other types of livestock excluded. According to climatic and environmental changes, which follow the drought waves and probable effects, the goats

are important for small farmers who depend on it as a source of food security in the future, so it needs more attention from the decision makers and researchers. Western Sudan Resource Management Program (WSRMP) of the International Fund for Agricultural Development (IFAD) attempted to improve goat productivity for traditional smallholder farming communities in West Kordofan by introducing Damascus goats bucks to cross with local goats (Desert). This study aim to assess the impact of the foreign bloods on F<sub>1</sub> generation Phenotypic Characterization and body measurement.

## Materials and Methods

North Kordofan state, Western Sudan (latitudes 12:15-16:32 N and longitudes 27-32 E). The average daily temperature ranges between 10-35 C° with annual variation of 15 C°. April, May and June are the hottest months of the year while December, January and February are the coldest ones. 44 female Desert goats of average age 3-4 years and average weights of 33.18±0.84 kg were purchased from the local markets. Two mature Damascus bucks were used in the experiment and two local castrated young males were used as teasers. Blood samples were taken to make sure the Flock was free of Brucella. All animals were identified using ear tags and treated against external and internal parasites. A spring scale with capacity of 50 kg was used to weighted animal live weight, ALW, while a tailor measurement tape was used to obtain the needed body measurement. Weighing scale was checked and calibrated before each procedure was done. The animal was made to stand upright on a flat ground area to take the body measurements which include:

- Rump high (RH) as the distance from spinal illiac to the ground.
- Body length (BL) as the distance between the occipital protuberance and tail drop.
- Heart girth (HG) as circumference of the chest just caudal to the forelimbs.

- Weightier high (WH) as the distance between the most dorsal point of the withers and the ground.
- Head length (HL) The length of the head was taken from the horn to the beginning of the nasal hatch.
- Ear length: The length of the ear from the area of adhesion of the ear with the head to the end of the ear.

In addition, the eye color of each goat, the shape and orientation of horns, presence of toggles, and beard were observed and recorded.

## Results and Discussion

### Phenotypic Characterization of F<sub>1</sub> Crossed Desert × Damascus

61.3% of crossed goats have toggles (Table 1), while 13.9% of the original Flock had toggles. This shows the influence of foreign blood in the status of the presence of toggles. The presence of toggles in the Desert goats does not exceed 15% according to Bushara et al. (2010). The study observed that the crossed have no beard in both sexes and this is probably due to genetic changes.

In the current study colors of eyes observed are light blue and Brown (Table 1) while the mothers had only brown eyes and this may reflects the effect of foreign blood. It was also observed that the coats of crossed Flock have different colors including light brown or reddish brown followed by dark brown then beige and finally full black (Table 1). The domination of the brown color in different grades is clear and this may reflects the influence of the Damascus blood, while in the Desert goats the colors were multiple and overlapping so the continued cross can unite color in brown.

The study found that 54% of the crossed goats have flat profile nose while 46% of them have convex face, and this may shows the rule of the foreign blood. Also the results showed that most of crossed animals (74.2%) have horns, and 58.2% of Flock had straight horns while 41.8% of them showed curved horns. The horns have

different orientation including upright, backwards and lateral (Table 1).

**Table 1. Phenotypic Characterization of crossed goats (F<sub>1</sub>-Desert goat and Damascus)**

Variable	Number	Description	%
<b>Toggles</b>	19	Present	61.3
	12	Absent	38.7
<b>Beard</b>	0	Present	0
	31	Absent	100
<b>Eyes color</b>	22	Light blue	71
	9	Brown	29
<b>Coat color</b>	3	Black	9.7
	6	Dark brown	19.4
	14	Light brown	45.2
	8	Beige	25.7
<b>Nose profile</b>	18	Flat	58.1
	13	Convex	41.9
<b>Horn</b>	23	Present	74.2
	8	Absent	25.8
<b>Horn shape</b>	14	Straight	54.8
	9	Curved	45.2
<b>Horn orientation</b>	13	Upright	41.9
	9	Backward	45.2
	1	Lateral	12.9

### Body measurements of crossed goats

The length of heads ranges between 10.3 and 14.3cm without significant differences between males, females, singles and twins. The average body length of males (60.1±4.63cm) was significantly ( $p < 0.05$ ) higher than that of females (55.76±2.83 cm). Single animals recorded higher values than twins (Table 2). Devendra and Mcleroy (1982) reported that the body length of Desert goats range between 65-85 cm. Also Wilson and Clarke (1975) stated that Desert goats are of large size (65-85 cm). On the other hand EL-Naiem (1979) described the Nubian goats as of large size (70-75 cm). However, the results of current study agree with El.Tahir (2010) who reported that the body length of Desert goats ranged between 57.04 - 59.22 cm. Ageeb (1992) stated that the body length of Baggara goats of South kordofan ranges between 58.9- 61.5 cm. The study found that the average of withers height of crossed goats was 67.7±2.84cm but there were some differences between males, females, singles and twins (Table 2). These results are in line with Wilson and Clarke (1975) who described Desert goats as of

medium to large size breed. Mousa (2015) reported that the height at withers of Damascus in Kassala state was 77.44±3.1 and 75.53±4.16 cm for males and females, respectively. Comparing the latter results with the current study may show the influence of Damascus on this trait. The study found that the average heart girth of crossed males was significantly higher ( $p < 0.05$ ) than female animals (Table 2). However, the values of heart girth in crossed animals were less than that of the foundation stock of Desert goats (67-83cm). That may be due to genetic effect or probably because the original stock was older (3-4years). Also Adam (1994) reported that the heart girth of Desert goats at the age of one year was 70.64 ± 6.13. According to Omar (2015), the heart girth of Damascus goats in Kassala state at the age of one year was 88.40 ± 2.901 and 76.80 ± 6.24 for males, female, respectively. It is expected that if additional feeding is added to the pre-and post-weaning crossed goat, it may reach a level close to the indigenous Damascus especially in the heart girth, which is a good indicator for body weight.

## Conclusions

This study found that the average length of ear in crossed goats was  $30 \pm 0.34$  and  $27 \pm 0.22$  for males and females, respectively (Table 10). This result was quite different from the values of the traits of the original Flock (mothers) and this may reflect the effect of crossing. The presence of foreign blood (Damascus) is observed in the ear length, where the length of the ear in the crossed is, to some extent, equal to the indigenous Damascus ( $29.09 \pm 1.81$  cm) according to the results reported by Omar (2015) in Kassala state. The study found that the average length of teats was  $2.46 \pm 0.23$  cm without significant differences between the single and the twins. The udder is small and attached to the abdomen. The effect of Damascus blood is very clear in the phenotypic form of the crossed especially in the coat color, length of the ear, color of the eyes and nose profile.

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## Appendix

**Table 2. Body Measurements of crossed goats (F<sub>1</sub>-Desert goat × Damascus) at the Age of one Year, In North Kordofan**

Traits	Mean	Mini.	Max.	Male	Female	Single	Twine
BW/kg	23.04±3.09	17.23	28.04	24.25±4.58*	20.86±3.48	23.95±4.67*	20.97±3.40
HL/cm	11.1±0.96	10.3	14.3	13.1±1.9 <sup>sn</sup>	11.2±0.91	13.4±1.6	10.33±0.92
BL	58.6±3.83	51.26	62.04	60.1±4.63*	55.76±2.83	58.65±4.83	54.01±2.71
WH	67.7±2.84	61.4	74.2	70±3.84 <sup>sn</sup>	66.3±2.01	69.41±3.46	66.1±1.94
CC	10.33±0.11	9.2	12.5	12.1±0.14	11.32±0.9	12.4±0.14	11±0.10
HG	67.18 ±1.62	63.44	73.07	69.45±2.21**	65.06±1.02	68.25±2.34	65.77±0.92
EL	29 ± 0.28	26	33	30± 0.34 <sup>sn</sup>	27± 0.22	29± 0.31	29± 0.21
TL	2.46±.23	2.2	3.6	#	2.46±.23	2.46±.23	2.46±.23

**Note:** BW= Body Weight, HL= Head Length, BL = Body length, WH=Withers height, CC= Cannon circumference, HG= Heart girth, EL = Ear length, TL = Teat Length

\* = (p <0.05), \*\* = (p <0.01) ns= not significant