SHORT NOTE

Shorani sheep phenotype, husbandry and performance in Elabassia Tagali area in the Nuba Mountains, South Kordofan State, Sudan

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Sheep production is very important in the Sudan. Live sheep and meat exports increased greatly in the country due to prime quality and the animals depend mainly on natural pastures with no growth promoters or feed additives that endanger livestock and human health.

The wide range of environments increased the types of sheep in the Sudan and different methods are used for their classification. Mason and Maule (1960) classified sheep according to tail type and Devendra and Mc Leroy (1982) classified them according to tail length: height at withers and according to ecotypes. They used the term ecotype as sheep were not considered improved in the Sudan to be breeds according to western standards. They classified Sudan sheep into five main ecotypes and three fused ones. The ecotypes were associated with tribes and their boundaries. Desert sheep is the main ecotype, with many subtypes, and is preferred in local markets and for export. Consequently, Desert sheep blood is increasing in other ecotypes. According to Devendra and Mc Leroy (1982), the Nilotic ecotype is found mainly in the Republic of South Sudan, contact areas between north and south and in Nuba Mountains. Shorani sheep is found in the Nuba Mountains and is considered a cross between Desert (mainly Shanabla sheep) and Nilotic sheep. However, it is not mentioned by Devendra and Mc Leroy (1982) and there is no available information on its phenotypes, husbandry, performance and carcass characteristics. Consequently, this study was conducted to provide information about Shorani sheep in Elabassia Tagali area in the Nuba Mountains.

The study described below was launched in 10 villages in Elabassia Tagali (ET) area in the Nuba Mountains in Rashad Province, South Kordofan State, Sudan. It is located between latitudes 11°30́ N and 12° 45́ N and longitudes 30^0 30' E and 32^0 04'E and is about 2000-5000 feet above sea level (Survey Department, Elabassia Tagali, 2002). The soil is sandy in the west and clay in the east. Mean minimum and maximum temperatures are 17^0 C and 43^0 C, respectively with a peak in May. Annual rainfall is 500-700 mm and is from April to October. Relative humidity is 35-75%. Animal production is important in the area with about 0.5 million sheep reared in traditional systems based on natural pastures and crop residues. Vegetation in the area is affected by rainfall, soil and topography and feeds quantity and quality are affected by seasons with a peak in autumn and serious shortages in the dry season affecting animal's health and performance.

The villages in the study area are Elsanadra (about 8km west of ET), Toufain (about 10km north west of ET), Eldadouri (about 25km west of ET), Munduraba (about 13 km west of ET) and Elmouraib (about 35km west of ET). They also included Tabasa (about 30km north of ET), Karmogia (about 18km south ET), Toutah (about 42km north ET), Kalenda (about11km west of ET) and Barid (about 27km south east of ET).

A survey was conducted to determine Shorani sheep phenotype at different ages in the 10 villages. Four flocks were selected at random from each village. The lower jaw incisors were used to estimate the animals age as described by Devendra and Mc Leroy (1982). A spring balance (50 kg capacity) was

used to measure the body weight (BW) and body measurements were determined with a measuring tape as described by Khalifa (2002). The hair length and hair texture, coat colours and horns were observed.

Fifty questionnaires were distributed to sheep owners in the 10 villages in ET area to obtain information on Shorani sheep husbandry and performance.

The means and standard errors were calculated for different parameters in males and females in each age group. The correlations between BW and measurements were calculated. Linear regression equations were used to predict BW from heart girth (HG), height at withers (HW) and back length (BL) at different ages as described by Khalifa (2002). Age was predicted from regression equations in 6 animals selected at random in each age group. Mean predicted and measured BW were compared in each age group.

Table 1 shows Shorani sheep BW and measurements at different ages. Males and females BW generally increased with age up to 4 years old in males and 2 years in females. The increased Shorani BW and measurements with age were similar to those in Garag sheep in Kenana Sugar Company (Khalifa, 2002) and Um Hani area in the White Nile State (Bashir, 2007) and Shugor sheep in Rahad Scheme (Elimam and Babikir, 2011). This was mainly because animals growth and development are proportional.

Shorani males were heavier than females at all ages. Height at withers increased with age up to 3 years old in males and females. Height at withers was generally higher in males than females. Heart girth generally increased with age in males and females. Abdominal girth increased with age in males and females. There were differences between males and females in abdominal girth. Body length generally increased with age and was higher in males than females. Back length generally increased with age and was longer in males. Tail length increased up to 2 years old in both sexes and was generally longer in males. Ear length increased with age in males and females and males had longer ears than females. Males had higher BW and measurements than females. This was also reported in Shugor (Elimam and Babikir, 2011) and Garag sheep in Um Hani area (Bashir, 2007). Shorani was heavier than Garag in Um Hani area (Bashir, 2007). Shorani BW, HW and HG were lower than Desert sheep and higher than Nilotic sheep (Devendra and Mc Leroy, 1982) suggesting that it may be a cross between them with higher percentages of Desert sheep blood. In addition, Shorani variable colours confirmed that it was a cross. Shorani males and females were polled. Colours varied greatly and were mainly white, brown and white and brown.

Table 1. Shorani sheep body weight (kg) and measurements (cm) at different ages (years) in Elabassia Tagali area in the Nuba Mountains, South Kordofan State, Sudan.

Para.	Age	Males	Females	Mean	Para.	Age	Males	Females	Mean
BW:	<1	24.90	24.40	24.65	HW:	<1	51.60	52.70	52.15
	1	35.30	32.80	34.05		1	60.01	57.20	58.60
	2	40.10	37.70	38.90		2	64.20	62.10	63.15
	3	42.50	38.30	40.40		3	64.20	62.60	63.40
	4	44.20	38.30	41.55		4	63.80	62.70	63.10
	>4	43.70	30.60	41.15		>4	63.80	63.00	63.40
HG:	<1	25.90	26.00	25.90	AG:	<1	40.90	43.20	42.05
	1	64.00	68.20	66.10		1	87.00	83.40	85.20
	2	77.50	78.10	77.80		2	102.30	105.40	103.85
	3	82.10	78.40	80.25		3	106.80	107.50	107.15
	4	85.30	77.70	81.50		4	107.90	106.70	107.30
	>4	84.00	79.30	81.55		>4	107.00	108.50	107.75
B0L:	<1	52.10	51.90	52.00	BL:	<1	39.10	38.70	38.90
	1	56.90	55.40	56.15		1	42.80	41.70	42.25
	2	60.60	59.70	60.15		2	46.60	45.80	46.20
	3	62.70	60.40	61.55		3	47.40	47.30	47.25
	4	63.80	61.20	62.50		4	48.30	47.20	47.75
	>4	63.10	61.20	62.15		>4	48.80	47.47	48.10
TL:	<1	31.60	32.70	32.15	EL:	<1	07.10	06.90	07.00
	1	40.00	37.20	38.60		1	11.90	10.40	11.15
	2	44.20	42.10	43.15		2	15.60	14.70	15.15
	3	44.20	42.60	43.40		3	17.70	15.40	16.55
	4	43.80	42.70	43.10		4	18.80	16.20	17.50
	>4	43.80	43.00	43.40		>4	18.10	16.20	17.15

BW=Body weight; HW= Height at withers; HG= Heart girth; AG= Abdominal girth; BoL= Body length; BL= Back length, TL= Tail length and EL= Ear length.

Table 2 shows that different linear regression equations were used to predict BW in Shorani sheep males and females at different ages. Similar different linear regression equations to predict BW were reported in sheep (Khalifa, 2002; Bashir, 2007; Elimam and Babikir, 2011).

Table 2. Linear regression equations predicting body weight in Shorani sheep in Elabassia Tagali area in the Nuba Mountains, South Kordofan State, Sudan.

Age (yrs)	Males	Females
<1	$Y= 0.31x_1+0.55x_2+0.30x_3-22.15$	$Y= 0.16x_1+0.54x_2+0.52x_3-16.90$
1	$Y= 0.39x_1+0.19x_2+0.14x_3-9.61$	$Y= 0.37x_1+0.20x_2+0.52x_3-28.00$
2	$Y= 0.80x_1+0.005x_2+0.096x_3-17.40$	$Y= 0.03x_1+0.50x_2+0.29x_3-32.1=25$
3	$Y= 0.29x_1+0.29x_2+0.01x_3-6.67$	$Y= 0.45x_1+0.25x_2+0.16x_3-24.71$
4	$Y= 0.68x_1+0.04x_2+0.06x_3-9.96$	$Y= 0.45x_1+0.24x_2+0.08x_3-20.12$
>4	$Y= 1.021x_1+0.12x_2+0.0005x_3-35.37$	$Y= 0.31x_1+0.51x_2+0.008x_3-20.68$

x_1 = Height at withers ; x_2 = Abdominal girth and x_3= Body length.

Table 3 shows no differences (P≥0.05) in measured and predicted BW in Shorani sheep males and females at different ages. No differences between measured and predicted BW were also found in sheep (Khalifa, 2002; Bashir, 2007; Elimam and Babikir 2011) and is beneficial where it is difficult to find and operate weighing machines and is likely to improve sheep management and marketing in these areas.

Table 3. Mean measured and predicted body weight (kg) in Shorani sheep in Elabassia Tagali area in the Nuba Mountains, South Kordofan State, Sudan.

Age (years)	Males		Females	
	Measured	Predicted	Measured	Predicted
<1	24.90±0.35	24.97±0.18	24.40±0.36	24.42±0.24
1	35.30±0.23	34.38±0.17	32.80±0.27	32.48±0.52
2	40.10±0.43	40.57±0.37	37.70±0.31	37.18±0.12
3	42.50±0.30	42.20±0.95	38.30±0.30	37.60±0.90
4	44.80±0.29	44.35±0.48	38.80±0.20	38.60±0.80
>4	43.70±0.27	43.38±0.33	38.50±0.32	38.52±0.72

Table 4 shows Shorani flock characteristics. Mean flock size was high and females dominated flocks, especially young ages. Shorani flock size was high and reflected the importance of sheep production in the area. Shorani flock size was higher than Garag sheep in Um Hani area (Bashir, 2007). Flock size is determined by many factors including available pasture, labour and wealth and varies among areas in the Sudan. The higher females percentage in flocks was also found in Garag sheep in Umm Hani area (Bashir, 200) and Tagger goats in Eldaleng area in Nuba

Mountains (Mudawi, 2002). This showed a change in animal production systems and owners are interested in producing animals and not as prestige, as before. The low percentages of males in flocks were mainly due to culling and marketing at early ages. Female to male ratio was high and close to that for Tagger goats in Eldaleng area (Mudawi, 2002). This change in production systems should be encouraged and promoted for optimum sheep production.

Table 4. Shorani flock characteristics in Elabassia Tagali area in the Nuba Mountains, South Kordofan State, Sudan.

Parameters	
Flock size (heads)	102.37±11.36
Flock structure (%):	
Young males	023.48±03.10
Adult males	005.05±00.56
Young females	022.38±02.48
Adult females	049.09±04.89
Females: males	002.505

Table 5 shows Shorani reproductive performance. Ages at puberty and first mating were relatively higher in males. Shorani age at puberty was higher than Garag sheep (Bashir, 2007) and this may be due to genetical, nutritional and managerial differences. Shorani age at first lambing was 13.33 month and lambing interval was 7.16 month. Shorani age at first lambing was good and close to that for Garag sheep in Um Hani area (Bashir, 2007) and Tagger goats in Eldaleng area (Mudawi, 2002). However, it was lower than Desert sheep and higher than Nilotic sheep in traditional areas (Devendra and Mc Leroy, 1982). This showed that it was within the range for Desert and Nilotic sheep.

Shorani lambing rate was 60% and twinning rate was 35.5%. Shorani lambing and twinning rates were not satisfactory. Shorani lambing rate was lower and twinning rate was higher than Desert sheep and they may be due to genetic and/ or nutritional factors and should be improved for better performance. Shorani gestation period was close to that for Garag sheep in Um Hani area (Bashir, 2007). Shorani lambing interval was very

good and close to that for Garag (Bashir, 2007) and lower than Desert sheep in Elhuda Research Station (Suliman and Eissawi, 1984). This insures annual lambing or two lambings per year. Shorani longevity was very high in females than males and was mainly because females were kept to old ages for reproduction. However, it was shorter than Desert sheep in Elhuda Research Station (Suliman and Eissawi, 1984). Males longevity was less than Garag in Um Hani area (Bashir, 2007) indicating variations in husbandry in the two areas. Shorani higher pre-weaning mortality rate was also reported by Devendra and Mc Leroy (1982) and may be due to harsh environments, low milk yield and poor hygiene and management. Mortality rate could be reduced by proper feeding, hygiene and management.

Table 5. Shorani sheep reproductive and productive performance in Elabassia Tagali area in the Nuba Mountains, South Kordofan State, Sudan.

Parameters	
Age at puberty (month):	
Males	08.50±0.08
Females	08.03±0.03
Age at first service (month):	
Males	09.58±0.08
Females	08.40±0.08
Age at first lambing (Month)	13.33±0.08
Lambing rate (%)	60.01±0.51
Twining rate (%)	35.50±0.09
Lambing interval (month)	07.16±0.06
Mortality rate (%):	
Pre-weaning	21.50±0.56
Post-weaning	14.25±0.94
Longevity (years):	
Males	03.48±0.09
Females	09.05±0.05
Gestation period (month)	05.00±0.01

REFERENCES

Bashir, A.A.A. 2007. Characteristics of Garag sheep in UmHani area, Sudan. M. Sc Thesis, Department of Animal Science, Faculty of Agricultural Sciences, University of Gezira, Wad Medani, Sudan.

Devendra, C. and G. B. Mc Leroy. 1982. Goat and Sheep Production in the Tropics. Longman Group, London, U.K.

Elimam, M.E. and M.F.F. Babikir. 2011. Phenotype and carcass characteristics of Shugor sheep in Rahad Scheme, Sudan. Gezira Journal of Agricultural Science 10 (1): 130-142.

Khalifa N.B.H. 2002. Characteristic and Performance of Garag Sheep and Nubian Goats in Kenana Sugar Company, Sudan. M. Sc. Thesis, Faculty of Agricultural Sciences, University of Gezira, Wad Medani, Sudan..

Mason, I.I. and I.D. Maule. 1960. The Indigenous Livestock of Eastern and Western Africa. Common Wealth Agriculture Bureaux, Farnham Royal, Bucks, England.

Mudawi, T.M.A. 2002. Performance characteristics of Tagger goats in south Kordofan State, Sudan. M. Sc. Thesis. Department of Animal Science, University of Gezira, Wad Medani, Sudan.

Survey Department, Elabassia Tagali. 2002. South Kordofan State, Sudan.

Sulieman, A.H. and M.A.Eissawi. 1984. Studies on live weight and pre-weaning growth rate in some tribal breeds of Sudan Desert sheep. Sudan Journal of Veterinary Sciences and Animal Husbandry 24: 121-126.

الصفات الشكلية ، نظام الرعاية وأداء أغنام الشوراني في منطقة العباسية تقلي في جبال النوبة، ولاية جنوب كردفان، السودان

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الخلاصة

تمت دراسة الصفات الشكلية ونظام الرعاية وأداء أغنام الشوراني في 10 قرى في منطقة العباسية تقلي في جبال النوبة في محلية رشاد في ولاية جنوب كردفان بالسودان. ازداد وزن الجسم وقياساته مع العمر وكانت أعلى في الذكور حتى عمر 4 سنوات وعمر عامين في الإناث. كان أثر النوع على وزن الجسم كبيرا على الارتفاع عند الكتف حتى عمر عامين في الذكور وعمر 3 أعوام في الإناث. وكانت الأثر على محيط البطن كبيرا حتى عمر عامين. كانت الذكور والإناث عديمة القرون. وتباينت الألوان كثيرا وكان معظمها أبيضا ، بنيا ثم أبيضا مع بني. استخدمت معادلات انحدار خطية مختلفة لتقدير وزن الجسم باستخدام قياسات الارتفاع عند الكتف ومحيط البطن وطول الجسم مع عدم وجود اختلافات بين الأوزان المقاسة والمقدرة في الذكور والإناث في أعمار مختلفة. كان حجم القطيع مرتفعا (11.36±102.37) وسادث الإناث القطعان، خاصة الشابة. كان عمر البلوغ (بالشهور) 8.5 ± 0.08 و 8.03 ± 0.03 في الذكور والأناث على التوالي. كان العمر عند التلقيح الأول (بالشهور) 9.58 ±0.08 و8.40 ±0.08 في الذكور والإناث على التوالي. كان العمر عند الولادة الأولى 13.33 ±0.08 شهرا والفترة بين الولادتين 7.16 ±0.06 شهرا. كانت نسبة الولادة 60.01±0.51% ونسب التوائم 35.5. ± 0.09 %. كانت نسب المفوق قبل الفطام (21.50±0.56%) أعلى مما بعد الفطام (14.25±0.96%). كان البقاء في القطيع شديد الارتفاع في الإناث (9.05±0.05 عاما) من الذكور (3.48±0.09 عاما). كانت فترة الحمل 5± 0.01 شهراً.