

Morphological Characterization of Karakul Sheep in North Part of Afghanistan

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Abstract

Karakul sheep are native breed in north part of Afghanistan; they have good adaptation and play the vital role at the income of country. This study was designed to characterize morphologically Karakul sheep in their home tract and production system. Data were collected from the breeding area to study lodging, all part of body measurement, handling workout and productive and reproductive proficiency of Karakul sheep. Mean flocks are 500 head, data collected randomly for phenotype characterization from 10 flocks, from every flock selected 10 ewes in different age (1 - 4 years) and one ram. Ram and ewes keeping together, before one-month season of breeding ram and ewes separating together until season of breeding, sometime lambing occurring out of season. Flock grazing around 11 hours daily, shearing is practiced two times a year, average wool production around 2 - 2.5 kg per clip. Internal parasite and two stomach (genetic disease) in lamb were the main reason for higher mortality rate, the breed is medium in size with a mean body weight of 47.6 ± 0.5 kg, average length of body 46.0 ± 0.2 cm and body height 67.0 ± 0.7 cm. Majority of animals have black and grey colour and also other colour like with, sapphire and mix can find in the flock. Sapphire have good market, it is expensive. Around all of ewes polled and some of rams are polled and some are having horn, Karakul sheep have pendulous ears and long fat tail, good store for fat, have similar function to camel's hump.

Keywords

Karakul, Sheep, Phenotype and Measurement

1. Introduction

Sheep were among the first animals domesticated by humankind somewhere between nine and eleven thousand years ago (Watchlist, 2007). There are several

important characteristics in the wild sheep that made it suitable for domestication. These characteristics include appropriate size for rearing, a relative docile and social nature, early sexual maturity, and high reproduction rates. Today the domestic sheep (*Ovis aries*) largely depend on human for its health and survival (Krebs & Krebs, 2003). Sheep can play an important role for the developing economy of Afghanistan by producing mutton and good quality wool. The total sheep population in Afghanistan is around 8.8 million. Most of shepherds in Afghanistan are nomadic pastoralists, however, majority of sheep breeds are specific to their location. The mountains area in Afghanistan has good pasture in the summer. The winter is comparatively long and where feed resources are scarce. About 60% of the total land area (40 million hectare) in the country is Pastures. Out of this about fifteen million hectare of lowlands is used as winter pasture and twenty-five-million-hectare mountainous range are used as spring and summer pastures (Azimi, 2007). There are about nine different sheep breeds reported in Afghanistan including Arabi 13%, Baluchi 5%, Kandahari 8%, Gadik 1%, Turki 9% Ghaljaye 17%, Hazaragei 7% and Karakul 30% (Rashiq, 2004).

In the domain of fur fashion, clothes made of the pelts of fetal and recent karakul lambs have increased great popularity in recent years. These pelts come from the karakul sheep, a breed raised mostly for its fur. A hodgepodge of names are used to define this fur in the skin trade. Occasionally the terms for fetal lamb and newborn lamb fur are used interchangeably (Asamoah-Boaheng & Kofi Sam, 2016). Therefore, with these all scenarios and the current global animal genetic resource mix up through inbreeding, interbreeding and environmental change it is important to characterize over different agro-ecological zones. The objective of this study is to documentation of Karakul sheep breed at the north part of Afghanistan. Since the aim of this study is to identify the phenotype characterization of karakul sheep.

2. Materials and Methods

The studies were carried out in three steps:

2.1. Field Survey a Sampling Strategy

First the census survey, then finding the farm practices and finally characterization of Karakul sheep (for morphological characters). The study universe was the Balkh province which is part of the breeding tract for the breed which in the north part of Afghanistan. The breed population size was estimated along with the general information about the herd size, breed characterization and performance. These herds were thoroughly studied on the basis of their breeding history, breeding strategy, geographical location. Morphological identification points were used, for the identification of purebred animals, as individual shepherd.

2.2. Flock Composition and General Data Collection

Information was collected for every purebred flock present in the area through.

General personal interviews information for each flock i.e. flock size, breed, shepherding system, flock structure, breeding plan, management practices, reproductive performance, feeding regime, health problems, mortality and marketing was recorded on a post tested questionnaire.

2.3. Morphological Characterization and General Trait Measurement

To characterize the breed 110 individual (10 males and 100 females) from different location within the breeding tract were randomly sampled. The morphological appearance and general trait measurement i.e. height, body measurements (ear length and width, neck length and girth etc.) were recorded on the format, developed as per guidelines from FAO (1996).

2.4. Statistical Analysis

The field data was analysed for morphological parameter. Arithmetic means and percent distribution of field data was calculated using computer software program SPSS 10.0. In addition, difference in different parameter among different flocks and morphometric traits among different sheep category were calculated using One-way analysis of variance (ANIVA) test.

3. Result and Discussion

Low information regards the sheep production and their incomes in Afghanistan. Karakul sheep, a middle size used for different propose; pelt, wool and mutton; Karakul breed present in north part of Afghanistan, contributes about 30% to the total sheep population in the country (Rashiq, 2004). This breed is well adapted to cold winter and warm summer, Karakul breed not adapted other part of country and lose the quality of pelt.

Population structure: The total sheep population in Afghanistan 8.8 million and total population of Karakul sheep in Afghanistan is around 2.571 million (Rashiq 2004), majority of which is distributed in north part of Afghanistan (Balkh, Jawzjan and Fariab) (Mason, 1996). Samples were collected randomly from the breeding tract (Dih day and Nahrishahi district) for data collection. Out of the total surveyed population 100% were pure Karakul breed. Firmly on the adviser laid by FAO (2007), the significant pure breeding of Karakul sheep suggested that the population is out of risk.

Flock structure and size: Karakul sheep in north part of Afghanistan were raised in large flocks. Flock size ranged from 100 to 1000 sheep with a mean value of 500 individuals per flock (Khan & Iqbal, 2001). However, the average flock size was larger than other sheep populations in neighbours country e.g. Indian sheep breeds Shahabadi (Chandran et al., 2013) and Coimbatore (Devendran et al., 2010) and Pakistani sheep breeds (Ibrahim et al., 2011).

The Karakul flocks were mazy of ewes, breeding ram and lambs. The data show lamb less than ewe in the flock because male lamb while new born slaugh-

tering for pelt and the rate of mortality in female lambs are high. Average ewe to ram ratio was 50:1, however ewe to ram ration was comparable with Pakistani sheep breeds, Balkhi, Hashtnagri and Michni (Ibrahim et al., 2011) Indian Shahabadi sheep (Chandran et al., 2013), although, similar them.

Husbandry practices: Sheep were appointed under the movable shepherding system i.e. flocks are in spring kept near city and while pasture low land finished moving to mountain area the duration moving different place. Majority of Karakul sheep farmers were large, landholder and the main occupation are shepherding. Some farmers also hold goats and cattle along with sheep. Animal husbandry practices in the region were based on a little input, little output system.

Grazing and feeding practices: All seasons (spring, summer, fall and winter) Karakul sheep flocks entirely depend upon grazing (Khan & Iqbal, 2001). At this time, the flocks were allowed to graze up to 3.5 ± 0.2 km for 11.0 ± 0.1 h/day. Flocks generally pasture on the hilly and low land its dependent on season of year. Majority the state of pasture was reportedly good in summer and fall but poor in spring and winter. During winter sheep, sometime need to feed with hay, wheat straw, tree leaves and barley and also during winter some weak sheep keeping at home (Khan & Iqbal, 2001). Quasi nutrition drilling is engaged for Pakistani sheep breeds setup under sedentary system (Ibrahim et al., 2011). Anyway, in conflict some of the Indian sheep breeds individual depend upon grazing throughout the year (Devendran et al., 2010; Chandran et al., 2013).

Shearing practices: Shearing was done two time a year in May and September same to reported by Khan and Iqbal (2001). Same shearing rehearsal are famous for Indian (Devendran et al., 2010; Yadav et al., 2011) and Pakistani (Ibrahim et al., 2011) sheep populations, however other Indian sheep breeds are sheared 3 times a year (Arora et al., 2007; Chandran et al., 2013).

Breeding practices: In Karakul sheep breed rams and ewes keeping together, before one-month season of breeding separate rams from ewes, in Hazaragie sheep breed two system of breeding practice restrict and continuous breeding programs (Musavi et al., 2011) and also similar to Pakistani sheep breeds (Ibrahim et al., 2011). Breeding season in Karakul sheep start from 15 of September up to end of November continue. Lambing season starting from March, while rams and ewes keeping together some time breeding occurring without season lambing will be any season of year. This continuous breeding strategy in Karakul flocks was similar to the uncontrolled and random mating practice followed by some Indian shepherds in their flocks (Devendran et al., 2010; Chandran et al., 2013). The Karakul sheep used only pure Karakul ram, in some Karakul flock practises inbreeding for produced sky color of pelt and sometime homozygosity also occurring. Age of ram used for breeding 1 - 5 years was similar to Indian (Raja et al., 2012; Chandran et al., 2013) and Pakistani sheep breeds (Ibrahim et al., 2011).

Health management and disease prevalence: About 60% of the flocks take normal vaccination versus common diseases, respects, none of them were de-

wormed. Facility of veterinary service is limited due to veterinary treatment to diseased animals was very limited due to deficiency of veterinary hospitals and lack of information. Two stomachs in lamb were the main reason for higher mortality rate in lambs age 4 - 6 months. The lambs have two stomachs and the processing of feed digestion take long time, this disease just occurring in some flock of Karakul. For identification reason of these diseases need long time and different practice of breeding system, on average 30% of lambs and 12% adult ewes die per flock per year. Mortality level in lambs and adults were in accommodation with Hazaragie breed (Musavi, et al. 2011), Indian Coimbatore sheep flocks (Devendran et al., 2010), however, higher than Indian Shahabadi sheep (Chandran et al., 2013) and Pakistani sheep breeds (Ibrahim et al., 2011).

Reproductive efficiency under different breeding program: Distinct proliferation parameters registers from the flocks as follows; age at first lambing 2 years, gestation length 5 month and lambing efficiency around 90%. Age at first lambing reported for Karakul sheep was different with Hazaragie sheep in Afghanistan (Musavi, et al. 2011), was similar to Pakistan sheep breeds (Ibrahim et al., 2010) and Indian (Yadav et al., 2011; Raja et al., 2012). Notwithstanding the young ewes keep for breeding, the lambing yield Karakul sheep was similar to the stated for Pakistani sheep populations.

Fur, wool and meat production: Karakul prepared rather than the elegant pattern soft rawhide from the new born of lambs; majority farmers killed the male lambs and keep females, it's the main material export from Afghanistan to different country they make from this pelt different fashion cloths, while age of lambs more than four weeks the quality of pelt going down after that not used for pelt, those lambs kept after six months sealing to market for meat. Some farmers slaughtering ewes during 4 months of pregnancy and take the pelt, this pelts are expensive. Karakul sheep also producing wool, majority color of wool black and grey, whit colour has good market it uses for carpeting industry, quantity wool of Karakul is high and long fibres (2 - 2.5 kg per clip).

Body colour and fibre cover: Karakul sheep are majority black and grey, however, white, sapphire and mixture of those colour also found, but sapphire colour pelt have good marketing. Majority of the body parts of Karakul sheep are covered with fleece. Head, ear, face and feed region area covered by hair and other part of body like loin, back, neck, belly and limbs covered with fleece and wool mix. In mutually sheep flock found in other muggy countries like Indian and Pakistan are generally covered with fleece (Raja et al., 2012 and Ibrahim et al., 2011) (Table 1).

Outward of different body part: Ewes Karakul sheep like to domesticated sheep breed are usually polled and around half of ram polled and half of horned. The animals have straight nose and flat forehead, also low frequency visible with slightly bulging nose. Teeth are true on gum in all of dude; shape of ear pendulous and semi pendulous, in all of individuals were observed shining eyes. Karakul have long fat tail and it good store for fat, have similar function to camel's

Table 1. Colour of different part of body in Karakul sheep (%).

Part of body		Colour				
		Black	White	Grey	Mixture	Sapphire
Forehead	Overall	10.2	6.4	55.6	22.5	5.3
	Ram	26.7	10.0	28.6	33.4	1.3
	Ewe	30.0	12.4	24.2	31.4	2.0
Face	Overall	41.0	-	22.1	31.9	5.0
	Ram	34.5	2.0	44.6	18.9	-
	Ewe	37.0	2.7	40.0	17.2	3.1
Ear	Overall	21.8	2.0	45.7	30.5	-
	Ram	23.4	1.5	51.3	23.8	-
	Ewe	26.2	2.3	49.0	22.5	-
Neck	Overall	13.6	1.0	38.5	30.4	16.5
	Ram	14.0	2.1	16.9	34.0	33.0
	Ewe	32.9	4.0	27.3	14.0	21.8
Loin	Overall	18.9	4.7	19.8	38.5	18.1
	Ram	22.1	1.0	24.7	34.6	17.6
	Ewe	30.0	3.2	15.1	23.0	28.7
Back	Overall	21.7	4.0	18.9	27.4	28
	Ram	12.3	3.4	32.7	26.9	24.7
	Ewe	14.8	5.6	32.1	29.3	18.2
Belly	Overall	10.0	16.3	34.1	25.7	13.9
	Ram	13.9	11.0	22.4	37.6	15.1
	Ewe	14.3	9.5	32.1	27.9	16.2
Limbs	Overall	30.3	6.3	21.4	35.6	6.4
	Ram	34.1	4.6	27.5	24.8	9.0
	Ewe	36.6	4.7	23	27.1	8.6

hump. Fat tail pendulous near to land and end of tail have curvature like S shape (**Table 2**).

Sheep width ($P < 0.001$) and body length ($P < 0.05$) was much significantly comparing the age of each groups. Also male are significantly ($P < 0.001$) large than female. Mean body length is similar to Pakistani (Ibrahim et al., 2011), and Indian (Yadav et al., 2011 and Raja et al., 2012) and larger than Hazaragie sheep breed in central Afghanistan (Musavi et al. 2011) (**Table 3**).

Animal compared different age groups and the body girth and height at heart was significant ($P < 0.05$) but in girth at belly and height at rump were similar.

Table 2. Mean measurements (cm) for head and neck traits in Karakul sheep.

Head and neck traits Overall			Overall Age (Years)			
			1	2	3	4
Head length	Overall	16.3 ± 0.1	14.2 ± 0.2	15.4 ± 0.1	16.7 ± 1.2	19.2 ± 0.1
	Ram	16.4 ± 0.5	15.2 ± 0.1	15.9 ± 0.3	16.7 ± 0.6	18.0 ± 0.3
	Ewe	16.4 ± 0.6	15.3 ± 0.1	15.9 ± 0.4	16.8 ± 0.2	17.7 ± 0.0
Ear length	Overall	13.4 ± 0.2	12.1 ± 0.2	12.8 ± 0.7	14.0 ± 0.4	14.8 ± 0.5
	Ram	13.1 ± 0.2	12.0 ± 0.3	12.9 ± 0.2	13.7 ± 0.4	13.9 ± 1.2
	Ewe	12.8 ± 0.7	11.7 ± 0.5	12.3 ± 0.6	13.6 ± 0.2	13.9 ± 1.0
Neck length	Overall	32.8 ± 0.2	30.1 ± 0.4	32.3 ± 0.3	33.8 ± 0.6	35.1 ± 0.6
	Ram	33.8 ± 0.5	32.4 ± 0.5	33.1 ± 0.7	34.0 ± 0.6	35.9 ± 0.2
	Ewe	32.7 ± 0.5	31.3 ± 0.5	32.8 ± 0.3	33.0 ± 0.2	33.9 ± 0.3
Neck girth	Overall	32.7 ± 0.7	30.2 ± 0.1	32.0 ± 0.3	33.8 ± 0.6	35.1 ± 0.5
	Ram	33.5 ± 0.5	32.1 ± 1.0	33.4 ± 0.1	33.8 ± 0.5	34.9 ± 0.6
	Ewe	32.2 ± 0.7	29.8 ± 0.5	31.6 ± 0.8	33.0 ± 1.0	34.7 ± 0.3
Head girth above eyes	Overall	15.07 ± 0.5	14.3 ± 0.5	14.8 ± 0.3	16.0 ± 0.2	15.2 ± 0.4
	Ram	15.8 ± 0.7	15.1 ± 0.7	15.8 ± 0.5	16.0 ± 0.4	16.6 ± 0.5
	Ewe	15.7 ± 0.7	14.3 ± 0.5	15.7 ± 0.7	16.3 ± 0.6	16.8 ± 0.2
Head girth below eyes	Overall	25.2 ± 0.2	24.5 ± 0.7	24.8 ± 0.6	25.1 ± 0.3	25.7 ± 0.6
	Ram	25.3 ± 0.2	24.6 ± 0.7	25.0 ± 0.3	25.8 ± 0.1	25.9 ± 1.2
	Ewe	24.9 ± 0.5	24.0 ± 0.3	24.7 ± 0.5	25.3 ± 0.1	25.8 ± 0.3
Distance from ear to ear	Overall	12.9 ± 0.7	12.3 ± 0.1	12.7 ± 0.4	13.1 ± 0.4	13.8 ± 0.1
	Ram	13.4 ± 0.4	12.7 ± 0.6	13.0 ± 0.2	13.8 ± 0.3	14.3 ± 0.3
	Ewe	13.0 ± 0.0	12.0 ± 0.4	12.8 ± 0.4	13.2 ± 0.3	14.0 ± 1.2

Table 3. Mean measurements (cm) for body size and weight in Karakul sheep.

Body size Overall			Age (Years)			
			1	2	3	4
Body length	Overall	46.0 ± 0.2	44.3 ± 0.7	45.6 ± 0.5	46.0 ± 0.4	48.2 ± 0.1
	Ram	45.5 ± 0.2	44.0 ± 0.6	45.1 ± 0.4	46.2 ± 0.5	46.8 ± 0.7
	Ewe	45.1 ± 0.5	43.7 ± 0.1	44.5 ± 0.7	45.8 ± 0.2	46.6 ± 0.3
Body width at belly	Overall	30.9 ± 0.0	28.3 ± 0.6	30.2 ± 0.4	32.0 ± 0.1	33.1 ± 0.2
	Ram	33.1 ± 0.1	31.1 ± 0.2	32.6 ± 0.5	33.7 ± 0.6	35.0 ± 0.1
	Ewe	30.7 ± 0.7	28.3 ± 0.7	30.8 ± 0.4	31.2 ± 0.4	32.7 ± 0.3

Continued

Height at withers	Overall	67.0 ± 0.7	66.0 ± 0.2	66.8 ± 0.3	67.2 ± 0.1	68.3 ± 0.5
	Ram	67.3 ± 0.3	65.7 ± 0.6	67.0 ± 0.2	67.8 ± 0.1	68.6 ± 0.7
	Ewe	66.4 ± 0.2	64.4 ± 0.7	66.1 ± 0.1	67.2 ± 0.4	68.0 ± 0.5
Height at rump	Overall	66.4 ± 0.4	65.5 ± 0.4	66.4 ± 0.2	66.8 ± 0.4	67.0 ± 0.4
	Ram	69.3 ± 0.5	67.3 ± 0.1	69.4 ± 0.3	70.0 ± 0.3	70.7 ± 0.4
	Ewe	67.3 ± 0.5	66.7 ± 0.6	67.0 ± 0.3	67.5 ± 0.1	68.2 ± 0.0
Body girth at heart	Overall	84.5 ± 0.5	80.3 ± 0.4	83.6 ± 0.5	85.4 ± 0.3	88.7 ± 0.5
	Ram	83.4 ± 0.4	79.3 ± 0.6	81.6 ± 0.5	86.0 ± 0.1	86.8 ± 0.4
	Ewe	80.4 ± 0.2	75.5 ± 0.3	79.4 ± 0.6	82.8 ± 0.1	84.0 ± 0.0
Body girth at belly	Overall	104.1 ± 0.2	100.0 ± 0.1	104.3 ± 0.2	104.5 ± 0.7	107.7 ± 0.5
	Ram	103.2 ± 0.0	98.3 ± 0.7	102.5 ± 0.4	105.3 ± 0.6	106.7 ± 0.0
	Ewe	99.8 ± 0.5	96.3 ± 0.6	98.4 ± 0.1	102.4 ± 0.2	102.3 ± 0.5
Rump length	Overall	18.1 ± 0.2	17.3 ± 0.1	17.7 ± 0.3	18.6 ± 0.0	18.8 ± 0.4
	Ram	17.6 ± 0.5	16.3 ± 0.5	17.1 ± 0.2	18.2 ± 0.3	18.9 ± 0.1
	Ewe	16.5 ± 0.2	15.6 ± 0.3	16.7 ± 0.1	16.8 ± 0.8	17.0 ± 0.5
Body weight (kg)	Overall	44.3 ± 0.2	40.3 ± 0.4	44.1 ± 0.7	46.0 ± 0.4	46.9 ± 0.7
	Ram	47.6 ± 0.5	42.1 ± 0.2	45.5 ± 0.3	49.6 ± 1.3	53.4 ± 1.5
	Ewe	44.3 ± 0.4	41.4 ± 0.2	43.7 ± 0.3	45.0 ± 0.5	47.1 ± 0.6

Table 4. Mean measurement (cm) of reproductive organs in Karakul sheep.

Body part		Age (year)			
		1	2	3	4
Teat length	3.4 ± 0.7	3.2 ± 0.2	3.5 ± 0.3	3.5 ± 0.1	3.7 ± 0.4
Teat to teat destination	8.5 ± 0.4	8.3 ± 0.1	8.7 ± 0.3	8.0 ± 0.4	9.3 ± 0.1
Scrotum diameter	5.6 ± 0.7	5.6 ± 0.3	5.5 ± 0.4	5.8 ± 0.7	5.8 ± 0.5
Testes length	12.9 ± 0.7	12.4 ± 0.6	12.5 ± 0.3	13.3 ± 0.0	13.7 ± 0.6

Ram were little lower at wither than at rump. Average body height registered in Karakul sheep was lower than Turkey sheep breed (Rashiq, 2004), larger than Hazaragie sheep breed (Musavi et al., 2011), less than Indian (Raja et al., 2012; Yadav et al., 2011) and Pakistani (Ibrahim et al., 2011) sheep breed. Likewise wither height in Karakul was rather than Zambian fat-tailed sheep (Pares-Casanova et al., 2013). Further body part measurements were like between different sex and age categories of the breed.

Male and female reproductive instrument: Mean worthiness for ram and ewe reproductive organs for Karakul sheep breed are present in Table 4. The sampled female attracted good enlarged udder with average size and good determined teats, 9 cm away from each other on mean. Measurement values for testes and teats did not significant through different age groups of rams and ewes.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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