MORPHOLOGICAL CHARACTERIZATION OF KUTTA – THE NATIVE SHEEP BREED FROM NORTHERN PAKISTAN

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ABSTRACT

This study investigated the morphological features of a local sheep breed harbouring at Swat, locally called “Kutta or Arerhai or Watani”. Data were collected on 207 animals (174 ewes and 33 rams) of different ages in 59 different flocks at the native tract. Traits studies included: Head and neck traits, back and tail traits, teats and testes, height, length and depth traits, coat covert and colouring. Kutta was characteristically black coat colour; however some white spots on face and limbs were uncommon. Kutta was a small sized breed, possessed a small sized, thin short tail sheep with an average weight of 23.2±0.34 kg (males: 26.0±0.56 kg; females: 22.9±0.41 kg) and slightly convex nose. Males were horned and females were polled. Birth weight averaged 1.3±5.32 kg and ranged between 1.0±0.00 and 1.4±0.09 kg. Average body length was 23.9±0.34 cm. Sex and age were important contributors to differences in most traits; however, location differences also affected few of the traits. Location differences existed for weight traits and animals at Kabal, Biha and Sakhra were slightly bigger and heavier as compared to Kalam, Malamjaba, Marghuzar and Shawar Valleys. Sex and age contributed significantly to weight differences. Animals had medium size head, with slightly bulging forehead, tapering face and shining eyes. Ewes were characteristically polled; however, rams carried horns, 24.9±0.93 cm long, affected by sex, age and their interaction significantly. In mature males, horns run backward, and grow outward some how spirally. Adult population had fully developed, floppy (semi pendulous) laterally protruded, and free of any pricks, small sized ears with an average length of 10.5±0.22 cm and blade-width of 5.3±0.08 cm, and was not affected by any factor. Lambs in Biha had higher respective body weight while lambs in Marghuzar and Kabal were inferior to the remaining valleys.

Key Words: Kutta sheep, Morphological Characteristics, Swat

INTRODUCTION

Thousands of farm animal breeds have been developed over millennia to thrive under specific conditions (FAO, 2000). Nearly 20% of the documented breeds are considered to be under the risk of extinction (FAO, 2000). Among the total 7600 breeds so far documented in the Global databank Animal Genetic Resource (AnGR), 11% got extinct and only 38% are out of the risk of extinction. Astonishingly, approximately 35% are not yet properly known (described) (FAO, 2007) and it is feared they may get extinct before they are attempted for identification. Many nations of the world are losing their genetic heritage, which could be otherwise critical for both food security and sustainable development. According to an estimate industrial livestock operations are growing twice as fast as traditional mixed farming system, and six times as fast as traditional grazing system, which could resultantly limit the development and promotion to a few species and breeds among the domesticated AnGR.

The primary task for those concerned with the conservation and maintenance of farm genetic diversity is to understand, collate and make useable all available information on agricultural genetic resources. Among the major principles as laid down by Javis et al., (2000), include collecting baseline and the morphological features of the breed, performance evaluation and analysis etc. Although the scope of morphological characterizing breeds is limited (FAO 2007), yet it is the first step for any breed to be identified to be brought into identification list and further promotion. In Pakistan, no organized efforts since have been made for bringing the over looked breeds into the identified list, except a fresh attempt where a native breed (Kari) in the Hindukush ranges was characterized extensively (Ahmad, 2008). The current study is a fresh attempt to morphologically characterize a native breed of
sheep in Swat, locally known as Kutta, or Watanai or Arerhai. This will help bring on the national inventory and will facilitate the policy makers to include on the national livestock census.

**MATERIALS AND METHODS**

**Sampling Respondents for Survey**

This study investigated the morphological features of a local sheep breed from Swat called “Kutta”. Data were collected on 207 animals (174 ewes and 33 rams) of different ages spread over 59 different flocks in seven valleys in the native tract. The marketing of the Kutta sheep were also investigated.

**Morphological Examination of Sheep**

Data on morphological traits such as head (head length, mouth width, ears length, ears blade width, horns length orientation and colour. Tail length, general body description (body length, height at wither and rump, body depth at heart and belly. coat cover and colour were collected using guidance suggested by FAO (1986). The colour, shape and physical appearance were studied with naked eye observation. Metric traits were measured with the help of the Hanging animal weighing scale, measuring frame (locally designed), measuring tape, meter sticks, Vernier Calliper and digital camera (8 mega-pixel).

**Data Analysis**

Univariate analyses were performed using generalized linear model. Non-parametric data were analyzed using chi-squared statistic and the continuous data through GLM. Least square means were computed for each variable in the model. Metric traits were analyzed using a linear model having effects of location (1-7), sex (1-2), age (1-6) and interaction of sex and age.

Mathematical form of the model is as under

\[ Y_{ijkl} = \mu + L_i + S_j + A_k + (S\times A)_{jk} + e_{ijkl} \]

Where:

- \( Y_{ijkl} \) = Individual observation
- \( \mu \) = Mean
- \( L_i \) = Effect of the \( i^{th} \) location
- \( S_j \) = Effect of the \( j^{th} \) sex of sheep
- \( A_k \) = Effect of the \( k^{th} \) age of the sheep
- \( (S\times A)_{jk} \) = Interaction of sex and age
- \( e_{ijkl} \) = Random error

**RESULTS AND DISCUSSION**

Data collected on 207 adult animals (174 females and 33 males) in seven valleys from Swat District was analysed for morphological characterization of the native sheep breed –Kutta. Traits included: head and neck traits; back and tail traits; teats and testes; height length and depth traits; coat colour and coverings.

**Coat Colour and Coverings**

All the animals had dark black coat colour, however, white or brown patches were existed on face, forehead and sometimes on the lower limbs. Wool covered the whole body except face, limbs and testes, where the limbs were covered with hairs.

**Head, Neck, Back and Tail Traits**

Estimated marginal means of majority of Morphometric traits and the effect of location, sex, age, sex to age is presented in Table I-II. Kutta was a small sized breed, possessed a small sized, thin short tail sheep with an average weight of 23.2±0.34 kg (males: 26.0±0.56 kg; females: 22.9±0.41 kg) and slightly convex nose. Location differences existed for weight traits and animals at Kabal, Biha and Sakhra were slightly bigger and heavier as compared to Kalam, Malamjaba, Marghuzar and Shawar Valleys. Sex and age contributed significantly to weight differences.
Animals had medium size head, with slightly bulging forehead, tapering face and shining eyes. The skull was comparatively wide, narrowed at the lower facial parts and the head was 21.8±0.32 cm long, which was affected by location (P<0.01), age (P<0.001) and age by sex (P<0.001). Mean mouth width was 12.2±0.26 cm and was affected by age (P<0.001) and age × sex (P<0.05). Ewes were characteristically polled; however, rams carried horns had 24.9±0.93 cm mean length, affected by sex, age and their interaction significantly. In mature males, horns ran backward, and grew outward some how spirally. Horns coloured black, cylindrical shaped, roughly triangular in cross section and pointed at the tip. Adult population had fully developed, floppy (semi pendulous) laterally protruded, and free of any pricks, small sized ears with an average length of 10.5±0.22 cm and blade-width of 5.3±0.08cm, and was not affected by any factor. The head is supported by the neck having length of 33.3±0.59 cm and girth of 40.0±0.55 cm which was affected by location, sex, age and age × sex. The back was slightly curved downward; ending in a thin tail had mean length 25.1±0.70 cm, affected by age, sex and their interaction.

Table I. Factors affecting different body measurements in Kutta sheep

<table>
<thead>
<tr>
<th>Trait</th>
<th>N</th>
<th>Environmental factors</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Location</td>
<td>Sex</td>
<td>Age</td>
</tr>
<tr>
<td>Body weight</td>
<td>207</td>
<td>*</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Head length</td>
<td>207</td>
<td>**</td>
<td>NS</td>
<td>***</td>
</tr>
<tr>
<td>Mouth width</td>
<td>207</td>
<td>NS</td>
<td>NS</td>
<td>***</td>
</tr>
<tr>
<td>Horn Length</td>
<td>33</td>
<td>NS</td>
<td>***</td>
<td>**</td>
</tr>
<tr>
<td>Ear length</td>
<td>207</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Ear blade width</td>
<td>207</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Neck length</td>
<td>207</td>
<td>**</td>
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<td>*</td>
</tr>
<tr>
<td>Neck girth</td>
<td>207</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Tail length</td>
<td>207</td>
<td>NS</td>
<td>***</td>
<td>*</td>
</tr>
<tr>
<td>Body height at wither</td>
<td>207</td>
<td>NS</td>
<td>NS</td>
<td>***</td>
</tr>
<tr>
<td>Body height at rump</td>
<td>207</td>
<td>NS</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Body length</td>
<td>207</td>
<td>NS</td>
<td>NS</td>
<td>**</td>
</tr>
<tr>
<td>Girth at heart</td>
<td>207</td>
<td>NS</td>
<td>***</td>
<td>NS</td>
</tr>
<tr>
<td>Girth at belly</td>
<td>207</td>
<td>NS</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td>Body depth at heart</td>
<td>207</td>
<td>NS</td>
<td>NS</td>
<td>***</td>
</tr>
<tr>
<td>Body depth at belly</td>
<td>207</td>
<td>NS</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Rump width at front</td>
<td>207</td>
<td>NS</td>
<td>NS</td>
<td>***</td>
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<tr>
<td>Rump width at back</td>
<td>207</td>
<td>NS</td>
<td>*</td>
<td>***</td>
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<tr>
<td>Rump length</td>
<td>207</td>
<td>***</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>No of teats</td>
<td>174</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Extra teats</td>
<td>174</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Teats length</td>
<td>174</td>
<td>NS</td>
<td>NS</td>
<td>***</td>
</tr>
<tr>
<td>Distance b/w two teats</td>
<td>174</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Scrotal circumference</td>
<td>33</td>
<td>NS</td>
<td>NS</td>
<td>**</td>
</tr>
<tr>
<td>Testes length</td>
<td>33</td>
<td>NS</td>
<td>NS</td>
<td>*</td>
</tr>
</tbody>
</table>

(Key: NS = Non-Significant, * = P < 0.05, ** = 0.01, *** = 0.001)
 Trait | Sex | N | 1 | 2 | 3 | 4 | 5 | 6 | Overall  
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 
Body weight | ♂ | 33 | 21.0±0.56 | 22.5±0.69 | 20.8±0.46 | 20.3±1.47 | 21.0±0.56  
♀ | 174 | 17.4±0.13 | 19.5±0.35 | 22.7±0.38 | 22.3±0.21 | 23.8±1.27 | 23.8±1.26 | 22.9±0.41  
Means | 207 | 19.0±0.27 | 21.3±0.33 | 22.8±0.16 | 22.9±0.59 | 23.8±1.90 | 23.8±1.26 | 23.2±0.34  
Head length | ♂ | 33 | 21.0±0.56 | 22.5±0.69 | 20.8±0.46 | 20.3±1.47 | 21.0±0.56  
♀ | 174 | 17.4±0.13 | 19.5±0.35 | 22.7±0.38 | 22.3±0.21 | 23.8±1.27 | 23.8±1.26 | 22.9±0.41  
Means | 207 | 19.0±0.27 | 21.3±0.33 | 22.8±0.16 | 22.9±0.59 | 23.8±1.90 | 23.8±1.26 | 23.2±0.34  
Mouth width | ♂ | 33 | 12.7±0.85 | 13.5±0.43 | 13.1±0.27 | 13.4±0.85 | 13.9±1.19 | 12.7±0.85 | 13.0±0.19  
♀ | 174 | 11.8±0.19 | 13.7±0.21 | 11.5±0.16 | 13.7±0.18 | 13.9±1.19 | 12.7±0.85 | 13.0±0.19  
Means | 207 | 12.2±0.43 | 13.8±0.21 | 12.2±0.16 | 13.5±0.43 | 13.9±1.19 | 12.7±0.85 | 13.0±0.19  
Horns length | ♂ | 33 | 25.4±2.51 | 23.9±1.18 | 25.0±0.79 | 25.4±2.5 | 24.9±0.93 |  
♀ | 174 | 10.9±0.20 | 11.5±0.57 | 11.2±0.18 | 11.0±0.19 | 10.1±1.33 | 9.5±0.94 | 10.6±0.21  
Means | 207 | 10.8±0.48 | 10.5±0.24 | 10.2±0.18 | 10.9±0.48 | 10.1±1.33 | 9.5±0.94 | 10.5±0.22  
Ear length | ♂ | 33 | 5.0±0.34 | 5.2±0.16 | 5.4±0.11 | 5.1±0.35 |  
♀ | 174 | 5.1±0.17 | 5.2±0.08 | 5.3±0.06 | 5.4±0.17 | 6.3±0.49 | 5.0±0.34 | 5.5±0.08  
Means | 207 | 5.1±0.17 | 5.2±0.08 | 5.3±0.06 | 5.4±0.17 | 6.3±0.49 | 5.0±0.34 | 5.5±0.08  
Neck length | ♂ | 33 | 30.4±0.77 | 24.8±0.57 | 25.1±1.54 | 21.5±4.27 | 25.0±0.70 |  
♀ | 174 | 21.4±0.69 | 20.3±0.79 | 19.4±0.60 | 19.0±0.65 | 19.0±2.05 | 21.5±3.05 | 21.9±0.70  
Means | 207 | 25.4±3.08 | 30.4±1.45 | 30.4±0.47 | 30.4±3.10 | 29.2±1.71 |  

Body Height, Length and Depth

Mean body height at withers and rump was 48.0±0.74 and 52.8±0.81 cm, affected by sex (P<0.05), age (P<0.001) and age × sex (P<0.01) (Table I & III). Withers and back were generally flat. Body length averaged 64.4±0.41 cm affected by age (P<0.01) and age × sex (P<0.05). Average girth at heart and belly were 70.7±0.55 and 86.2±0.77 cm respectively, affected by only age (P<0.001) and sex in case of belly girth. Heart girth was more in male, contrary to belly which is higher in female.

Body depth at heart and belly were 24.5±0.50 and 31.0±0.58 cm respectively. Both were affected by age (P<0.001) and age × sex (P<0.05) whereas body depth at belly was by an additional factor of sex also. The bony frame seemed apparently firm to support the animal in grazing over steep flanks and in escaping from the wild predators, if any. Rump was 12.5±0.16 cm long; wide down at the distal end, comparatively wider at front (14.1±0.24 cm) and narrow down at the distal end (13.7±0.25 cm). Rump length was affected by location (P<0.001), age (P<0.05), sex (P<0.001) and age × sex (P<0.01). Rump width at front was affected by age (P<0.001), whereas rump width at back was additionally affected by sex (P<0.05).
Teats and Testes

Ewes had two laterally placed teats with average length of 3.6±0.14 cm; on the average 8.5±0.08 cm apart (Table IV). Testes length was 13.9±0.24 cm and mean scrotal circumference was 16.9±0.20 cm in rams. Teats in ewes were laterally placed on the udder with average length of 2.0±0.04 cm and 8.1±0.03 cm distance between them. Testes length increased with age (P<0.001). Yearling Kutta had average teat length of 2.1±0.10 cm which increased to 5.0±0.47 cm at the age of 6 years.

Table IV. Least squares means for Teat and Testes Traits (cm) in Kutta sheep

<table>
<thead>
<tr>
<th>Trait</th>
<th>Sex</th>
<th>N</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teats length</td>
<td>♂</td>
<td>174</td>
<td>2.1±0.10</td>
<td>2.6±0.11</td>
<td>3.1±0.09</td>
<td>3.3±0.10</td>
<td>5.0±0.66</td>
<td>5.0±0.47</td>
<td>3.6±0.14</td>
</tr>
<tr>
<td>Distance b/w two teats</td>
<td>♂</td>
<td>174</td>
<td>8.0±0.08</td>
<td>8.6±0.09</td>
<td>8.4±0.07</td>
<td>8.5±0.08</td>
<td>8.8±0.55</td>
<td>8.8±0.39</td>
<td>8.5±0.08</td>
</tr>
<tr>
<td>Scrotum circumference</td>
<td>♂</td>
<td>33</td>
<td>16.5±0.51</td>
<td>16.0±0.23</td>
<td>17.5±0.51</td>
<td>17.7±0.51</td>
<td></td>
<td></td>
<td>16.9±0.20</td>
</tr>
<tr>
<td>Testes length</td>
<td>♂</td>
<td>33</td>
<td>13.9±0.63</td>
<td>13.4±0.29</td>
<td>14.9±0.20</td>
<td>13.9±0.63</td>
<td></td>
<td></td>
<td>13.9±0.24</td>
</tr>
</tbody>
</table>

In male, testes had a mean length of 13.9±0.34 cm. Age and age × sex were among the significant factors for the testes length and scrotal circumference (Table I) for Kutta breeding rams aging 1 to 4 years.
Majority of the sheep breeds in Pakistan are white (Husnain, 1985) yet, brown, red or black coloured sheep are also found, however, dark black colour characterise Kutta sheep. White and brown patches are however common. Kutta has maximum resemblance in colour and appearance with Kaghani sheep, which is considered as one of the threatened breeds (Ahmad, 2008). Molecular studies based on SSR markers revealed that these two breeds are among the closest in the province (Ahmad 2008). The situation emphasizes designing a sound conservation strategy based on current population status and trend.

Medium ears were comparatively larger than Kari, Buchi and Damani (Khan et al., 2005). Horns shape somehow resembled Kari, Bibrik and Balochi but were comparatively smaller in size. Body weight, height and length were comparatively larger than those reported for Kari, yet lower to many indigenous breeds (Isani and Baloch, 1996) Generally breeds from plain areas are heavier: such as Kajli and Balkhi may weigh more than 70 kg but breeds native to mountainous terrain of the country are light: such as Kail may weigh 35-40 kg on the average (Khan, 2003) which is still larger than the Kutta. Breeds such as Garole have been reported to be the lightest breed, weighing 8.08±0.11 and 8.68±0.11 kg for rams and ewes, respectively, as reported by Pan and Sahoo (2002).

In some of the other traits some similarity with other breeds exists however, age differences were according to expectations. Location differences however, suggested that animals at Biha were comparatively larger and heavier than the other locations indicating the possibility of presence of variation in different ecotypes probably because of factors such as topography, feed and fodder resources variation. Presently major utility of the breed is limited to wool production feeding local cottage industry for manufacturing hand woven cloth; locally called “Lamsay and sharri”. Mutton is the main economic trait and is of considerable importance. Migratory farmer are normally dependent upon their flocks and therefore give considerable attention to its breeding. A ram of good reputation was usually based on apparent phenotype which was highly valued amongst the Ajars. About 43% of the rams were sold on eid and about 29% on their sickness. None of the ram was reported arc sold for cash and consumed at home however approx 29% were sold upon their reduced productivity (old age).

CONCLUSION AND RECOMMENDATIONS

Kutta is a small sized, thin tail breed of sheep, black coated, where males are horned and females polled. Location differences existed for most of the height and weight traits; however these are insufficient to differentiate these in to different strains. Sex and age and their combined effect were more pronounced on many traits. The breed was seasonal in oestrous manifestation and invariably gestated in 5 months. The breed is recommended to be listed on the national inventory and may be included in the forthcoming livestock. However, performance for conventional and non-conventional traits (disease resistance and adoptability to harsh conditions, organic produce and their quality, and fluctuation feed supply etc) needs to be focused to explore its genetic worth. Molecular studies will prove helpful in exploring its worth further.

REFERENCES