Farming practices and morphometric characterization of Andaman Local Goat

Jai Sunder*, A. Kundu, M.S. Kundu, T. Sujatha and Arun Kumar De

Animal Science Division, ICAR-Central Island Agricultural Research Institute, Port Blair, A & N Islands-744 105, India
Received: 02-04-2018 Accepted: 02-06-2018 DOI: 10.18805/ijar.B-3615

ABSTRACT

Andaman Local Goat (ALG) is an indigenous goat breed of Andaman and Nicobar islands. The present study was designed to characterize the ALG for its phenotypic characters, feeding and management system. Study revealed that these goats are medium to short in stature with colour combination of black, brown and white. Ears are flat and leaf-like, medium-sized and drooping. Both sexes have small horns, curved upward and backward. Flock size per family ranges from 5 to 35. Age at first mating, weight at first mating, age at first kidding, weight at first kidding, service period, kidding interval and gestation period were 260.0±15.0 days, 8.49±0.89 kg, 420.0±12.0 days, 13.26±1.61 kg, 101.20±11.23 days, 300.0±20.0 days and 147.0±2.0 days respectively. The common diseases observed were parasitic infestation, diarrhoea, bloating, grass poisoning, orf, and tetanus. The risk of extinction of the breed is increasing in these islands due to decrease in the number of breedable male and reduction in the total population. Efforts for conservation of this indigenous breed should be strengthened to save this breed from extinction.

Key words: Andaman Local Goat, Conservation, Farming practices, Growth performance, Reproductive performance

INTRODUCTION

Goat (65324) constitutes about 42.21% of the total livestock population (154733) of the Andaman and Nicobar Islands and is an integral part of the livestock system and is mostly owned by settlers and distributed in different islands (19th Livestock Census; 2012). There are four distinct population of goats available in these islands, viz. Andaman local goat, Teressa goat, Malabari and its crosses and Barren Island goat (Inbaraj et al., 2017). All the goats available in these islands are of meat type and there is a high demand for chevon in these islands. The price of the goat meat ranges from Rs.600 to Rs.700 per kg and this shows that there is a huge demand for goat and its products. The goats constitute an important productive asset of landless, marginal, and small landholders of these islands and it generates a flow of income and employment throughout the year (Sunder et al., 2016a). Majority of goats in these islands resemble Black Bengal goat and were brought from Bengal and adjacent areas of India in different phases of inhabitation and rehabilitation of migrated/settled people (Sunder et al., 2016b). These goats are well adapted to the island condition and are widely distributed throughout Andaman Islands. These goats are locally called as Andaman Local Goat (ALG). Characterization and conservation of indigenous germplasm is very important, since the indigenous breeds are well acclimatized to the local environmental condition (Halimani et al., 2012; Kundu et al., 2017; Paengkoum et al., 2017). Indigenous goats also possess higher disease resistance ability compared to the exotic germplasm (Bett et al., 2009; Singla et al., 2018). The physical and morphological characteristic of any breed is very important to recognize as a distinct breed (Selolo et al., 2015). Therefore, the study to characterize and conservation of the indigenous goat breed is very important to propagate the germplasm to improve the livelihood of the poor farmers. Basic information about the characterization of ALG is lacking and very few studies have been conducted on growth performance and blood parameters of this goat (Yadav et al., 2002; Saha et al., 2004). Therefore, the present study was conducted to record the physical and morphological parameters of Andaman local goat so as to recognise these goats as one of the goat breeds of India.

MATERIALS AND METHODS

The survey was conducted in the different villages of Andaman Islands. The climate of the surveyed area is humid tropic with average rainfall of about 3000 mm, average minimum and maximum temperature of about 23.34°C and 30.16°C respectively. A total of 28 villages of South Andaman and Middle Andaman with a population of approximately 3000 goats were selected to conduct the survey. Baseline information about the goat owners, socio-economic status of the goat owners, farming practices, flock size, feeding, housing, diseases etc. were collected from the individual farmers based on the face to face interview using a farm survey questionnaire. Measuring tape was used to record the length and girth measurements of the goats and weight of individual animal was measured with an electronic balance. The information on reproductive parameters and mortality rate was recorded. Different body dimensions that
Table 1: Population status of Andaman local goat.

<table>
<thead>
<tr>
<th>Islands</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Andaman District</td>
<td></td>
</tr>
<tr>
<td>Port Blair</td>
<td>3822</td>
</tr>
<tr>
<td>Rural</td>
<td>10579</td>
</tr>
<tr>
<td>Little Andaman</td>
<td>3800</td>
</tr>
<tr>
<td>Ferrargunj Tehsil</td>
<td>9363</td>
</tr>
<tr>
<td>Total</td>
<td>27564</td>
</tr>
<tr>
<td>Middle &amp; North Andaman</td>
<td></td>
</tr>
<tr>
<td>Rangat Tehsil</td>
<td>8990</td>
</tr>
<tr>
<td>Mayabunder Tehsil</td>
<td>5396</td>
</tr>
<tr>
<td>Diglipur tehsil</td>
<td>15653</td>
</tr>
<tr>
<td>Total</td>
<td>30039</td>
</tr>
</tbody>
</table>

Source: DAHVS, A&N Administration

RESULTS AND DISCUSSION

Baseline information on goat farmers: It was found that ALG was mainly reared by the small and marginal farmers. The study showed that 45.37% of the goat farmers belonged to the marginal landholding farmers, whereas 33.43%, 10.44%, 5.99% and 4.77% farmers belonged to small landholding, medium landholding, large landholding and landless farmers respectively. The family size of the goat farmers was mainly medium size (58.50%) followed by small size (36.11%) and large size family (5.37%). The average family size was found to be 5-8 which is considered as medium family size. Education level was found to be mainly at the level of higher secondary (37.61%) followed by primary level (36.41%), senior secondary level (3.88%) and degree level (2.3%). However, 19.7% of the farmers were illiterate. The average income from the goat farming was calculated as Rupees 38,000 per family.

Distribution of Andaman Local Goat: As per the 19th Livestock census (2012), the population of the Andaman local goat is 57480, of which, population of breedable male is 9995 and breedable female is 25523. Andaman local goat is mainly distributed in the Andaman group of islands. Out of the total population, almost 88% of the Andaman local goat population is available in the North, Middle and South Andaman districts (Table 1).

Breed characteristics: It was observed that there is no appreciable trait or distinct physical character in the Andaman local goat (Fig.1). However, the morphological traits which have been recorded are given below.

Colour: Coat colour pattern varied from black, brown and mixed black and white. The predominant coat colour was black (90%) with admixture of black, brown and white (10%).

Muzzle: The colour of the muzzle was found to be black and grey to light black. Majority (85%) of goats have grey to light black colour muzzle.

Eye lids: Colour of the eyelids was light brownish, white or tan (female) to light black (male).

Hoof: Colour of hoof was greyish white or tan (female) to light black and white mixed (male).

Head profile: In the present study, most (85%) of the goats had straight head while others (15%) had slightly convex head profile.

Ears: Majority of the goats had moderately erect ears on sides and drooping downwards for both male and female.

Wattles: In the present study, very few (10%) of the goats had wattles in both sexes.

Horns: Horns were noticed in both sexes. Two number of horns were present in the surveyed goats. The orientation was flat at base and pointing towards backward. Usually starting from base and bending back (curvature) along with/behind the head or straight with slight curvature towards back/side wards. Size of the horn (cm) was observed to be small i.e. 12.53±2.65 (male) and 4.2±0.58 (female) respectively.

Beard: Very few animals (6%) of the surveyed goat population showed the presence of beard; mainly in the male goat.

Tail: Tail was medium in length and curved upward with average size i.e. 5.35±1.05 cm.

Body measurement: The biometric dimensions (cm) of Andaman local goats at different age and sex have been
Table 2: Body Measurements (cm) of Andaman local goat.

<table>
<thead>
<tr>
<th>Sex/Traits</th>
<th>Particulars</th>
<th>Measurement at Birth</th>
<th>3 Month</th>
<th>6 Month</th>
<th>9 Month</th>
<th>12 Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (n=57)</td>
<td>BL</td>
<td>25.11±0.26</td>
<td>36.75±0.61</td>
<td>45.62±0.83</td>
<td>48.29±0.48</td>
<td>54.46±0.05</td>
</tr>
<tr>
<td></td>
<td>BH</td>
<td>26.32±0.07</td>
<td>36.22±0.42</td>
<td>51.02±0.90</td>
<td>54.49±0.71</td>
<td>58.33±0.03</td>
</tr>
<tr>
<td></td>
<td>HG</td>
<td>26.55±0.09</td>
<td>40.72±0.53</td>
<td>49.30±0.26</td>
<td>57.92±0.36</td>
<td>62.22±0.01</td>
</tr>
<tr>
<td>Female (n=49)</td>
<td>BL</td>
<td>24.75±0.24</td>
<td>36.51±0.33</td>
<td>40.55±1.74</td>
<td>44.41±0.44</td>
<td>51.21±0.01</td>
</tr>
<tr>
<td></td>
<td>BH</td>
<td>25.54±0.14</td>
<td>34.67±0.35</td>
<td>43.94±0.45</td>
<td>47.2±0.55</td>
<td>53.06±0.05</td>
</tr>
<tr>
<td></td>
<td>HG</td>
<td>25.79±0.01</td>
<td>40.29±0.67</td>
<td>45.80±0.62</td>
<td>54.26±0.34</td>
<td>61.60±0.06</td>
</tr>
<tr>
<td>Overall (n=106)</td>
<td>BL</td>
<td>24.93±0.15</td>
<td>36.55±0.24</td>
<td>43.08±1.66</td>
<td>49.25±0.45</td>
<td>52.83±0.94</td>
</tr>
<tr>
<td></td>
<td>BH</td>
<td>25.93±0.22</td>
<td>35.48±0.34</td>
<td>47.48±0.36</td>
<td>50.34±0.21</td>
<td>53.17±0.09</td>
</tr>
<tr>
<td></td>
<td>HG</td>
<td>26.17±0.22</td>
<td>40.54±0.24</td>
<td>47.55±1.47</td>
<td>56.22±0.32</td>
<td>61.91±0.18</td>
</tr>
</tbody>
</table>

BL: Body length, BH: Body height, HG: Heart girth

Fig 2: Causes of mortality in Andaman Local goat.
breeding and upgradation of Andaman local goat for higher body weight is being done. Age at first mating, weight at first mating, age at first kidding, weight at first kidding, kidding interval, service period and gestation period were 249.18±7.04, 11.05±0.23 kg, 397.28±5.05 days, 15.85±0.13 kg, 285±22.0 days, 95±15.43 days and 146.67±0.1999 days respectively (Table 4). Kidding percentage of 145.43 and the kidding rate of 1.45 was recorded in the present stock of Andaman local goats. The percentage of singles, twins, triplets and quadruples were 40.00, 53.55, 4.46 and 1.98 respectively in the present population under study during the period.

Table 4: Reproduction Performance in Andaman Local Goats

<table>
<thead>
<tr>
<th>Traits</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at first Mating (days)</td>
<td>249.18±7.04</td>
</tr>
<tr>
<td>Weight at first mating (Kg)</td>
<td>11.05±0.23</td>
</tr>
<tr>
<td>Age at first kidding (Days)</td>
<td>397.28±5.05</td>
</tr>
<tr>
<td>Weight at first kidding (Kg)</td>
<td>15.85±0.13</td>
</tr>
<tr>
<td>Service Period (Days)</td>
<td>95±15.43</td>
</tr>
<tr>
<td>First kidding Interval (Days)</td>
<td>285±22.0</td>
</tr>
<tr>
<td>Gestation Period</td>
<td>146.67±0.1999</td>
</tr>
</tbody>
</table>

Goat keeping provides a potential source of employment and income especially to the small and marginal farmers (Boyazoglu et al., 2005). The farming system of any breed is very important to understand its productivity and production performance and thereby to formulate appropriate plan for improving the production system (Tilman et al., 2002). Phenotypic characteristics are important in breed identification and characterization as first step of breed characterization is to measure variation of morphological traits. The Flock of ALG was found to be in the range of 5 to 35 with an average flock size of 8.38 per family. Unlike mainland India, the flock size in this island is generally small and farmers also prefer to maintain the small flock size due to labour constraints, easy maintenance and resource constraints. The flock size of Punjab province of Pakistan is reported to be ranging from 4 to 7 (Muhammad et al., 2015). The mean flock size per farming household in South Africa was 25.27±22.78 (Mdlandla et al., 2017). Distribution pattern showed that Andaman local goats are mainly distributed in the Andaman group of islands, however, some populations are also found in the Nicobar group of islands. The major concentration of the ALG is mainly found in Diglipur (27.17%) and Port Blair (Rural) (18.36%) Tehsil. They are preferred for its excellent chevon quality and black colour is mostly preferred by the people for religious functions. Specific choices for goat coat colours have been reported among farmers of different parts of the world (Manton 2005; Gwaze et al., 2009).

The goat has been recorded as the earliest animal to be domesticated by human and is mainly reared by the rural farming community throughout the world (Galal 2005; Dubeuf and Boyazoglu 2009; Escareño et al., 2012). In the Andaman & Nicobar Islands, the ALG has been found to be mainly reared by the settler population. The phenotypic appearance of the ALG resembles the Black Bengal goats due to the reason that these goats were brought to the islands by the Britishers during the penal settlement and over a period of several decades, the ALG has adapted to the island climatic conditions and are popularly known as Andaman local goat. A morphological trait of any breed plays an important role for identification of the breed characteristics (Yakubu and Ibrahim 2011). Andaman local goats have predominant black colour while admixture of white and brown is also common (Saha et al., 2004; Sunder et al., 2016a). The predominant (90%) coat colour was black with admixture of black, brown and white (10%). Similarly, the three colour variant of black, brown and white Bengal goats were also reported by Tudu et al., (2016). Wide range of coat colours for different Ethiopian goat population has been reported by Gatew et al., (2015). In the present study, most (85%) of the goats had straight head and others (15%) had slightly convex head profile which is in corroboration with the finding of Tudu et al., (2016). They reported that overall...
average of 70% of the goats had straight head. The ear type was observed to be moderately erect on sides and drooping downwards for both male and female. Similar observations were also reported in the Black Bengal goats (Tudu et al., 2016). The patterns of horns were flat at base and pointing towards backward. Size of the horn was observed to be small i.e. 12.53±2.65 cm (male) and 4.2±0.58 cm (female) respectively. Wattles were found to be present in only 10% of the surveyed goats which is in line to the findings of Tudu et al., (2016), where they reported presence of low percentage of wattles in the white (9%), brown (8.67%) and in black colour (8.40%) varieties of Black Bengal goats. The presence of beard in the ALG (6%) are also found to be similar to the Black Bengal goats, wherein black colour showed (6.8%), followed by brown and white (6%) colour variant of Black Bengal goats (Tudu et al., 2016).

The body weight of the male goats are more than the female goats which is in conformation with the other traits viz, HW, CG, BL. Similar results were also reported by other workers in terms of the body weight and other body size characters (Saha et al., 2004; Mazumder and Mazumder 1983; Ruvuna et al., 1988, Bhattacharya 1989). The growth performance of the ALG revealed that the average body weight at birth, 3, 6,9,12 months of age was found to be very low. These goats are considered as short stature with medium sized body weight. Similar growth parameters were also reported by Pal et al., (2016), wherein, they have also reported the low body weight in the Black Bengal goat mainly found in the coastal areas of the West Bengal. Average body weight of indigenous goats of Ethiopia was reported to be 12.73 ± 0.13 kg (Tesfaye 2009). The low productivity could be due to lack of sufficient superior breeding animals, low grazing areas, socio-economic condition of the farmers, lack of adoption of scientific farming, lack of awareness about recent technologies, poor extension support, limited commercialization of goat farming and poor marketing channel and facilities (lack of organized slaughter house).

The availability of good quality breeding males in the flock is very important for genetic improvement of the flock (Santos et al., 2017). In the present study it was found that availability of good quality buck was a constraint because farmers generally sell the good bucks as they are generally more aggressive. The reproductive parameters revealed that the age at first mating in the ALG is very early i.e. 249.18±7.04 days, which might be due to the early maturity and mixing of the male and female in the same herd/shed and lack of scientific knowledge about the proper age for breeding. Similar observation was also reported in the Black Bengal goat reared in the coastal zone of the West Bengal (Tudu et al., 2016). On the contrary, the average age at first kidding (AFK) for tropical goats including Ethiopian indigenous goats has been reported to be longer and ranges between 12 and 24 months (Dereje et al., 2015; Abraham et al., 2017). In case of Sahelian goat of Central Chad, the average age of first kidding was found to be 16.5 months (Mopaté et al., 2014). The percentage of singles, twins and triplets were 57.14, 75.71 and 4.28 respectively in the present population under study. The rate of twinning is very common among the Black Bengal goats as reported by Pal et al., (2016) and Tudu et al., (2016). The high fecundity and multiple births in the ALG is similar to the different colour variants of Black Bengal goats and the similar observation were reported by Kanauja et al. (1986), Misra and Sinha (2001) and Tudu et al., (2015). The age at first kidding (days) was found to be less (397.28±5.05), resulting in less body weight of the doe (15.85±0.13) and kid (1.40±0.01) at the time of first kidding. Due to lack of knowledge about the reproductive parameters the kidding interval was also found to be very high i.e. 285±22.0 days. The disease pattern in the ALG indicated that very few diseases are prevalent in the islands. Except the incidence of gastrointestinal parasitic infestation, the incidence and prevalence of bacterial and viral diseases are very rare (Sunder 2014).

As per the FAO (1999), despite the fact that the indigenous breeds contribute largely towards the economy of the rural farmers, approximately 30% of the farm animal breeds including goat are at risk of extinction. Due to improper breeding and crossbreeding, the population of the indigenous breeds are at risk and decreasing (Nsoso and Morake 1999). The risk of extinction of the ALG is increasing in these islands due to decrease in the number of breedable male and reduction in the total population. Generally, farmers are selling goats (irrespective of male and female) at the age of 7 months onwards due to which there is a lack of superior breeding animals for improvement in the breed status. Lack of grazing lands, feed and fodder scarcity are some of the constraints which limits the goat production in these islands. Lack of livestock feed and fodder has been reported to be a major limiting factor for livestock farming in India especially in arid and semi-arid regions (Suresh et al., 2012). One of the main constraints in goat production is inadequate feeds (Kosgey 2004). As the study area is in remote islands, the availability of commercial goat feed was very less and the cost was also high. During the religious ceremony in the temples, male goats are sacrificed in the early age which also led to the risk status of the breed. The Andaman local goats are usually reared under extensive/semi-intensive system with almost negligible supplementation of mineral mixtures, growth tonic and concentrate feeding. It is very important to maintain indigenous animal genetic identity of these Islands from conservation of biodiversity point of view.

**CONCLUSION**

Conservation and improvement of Andaman Local Goat is the need of the hour and it can pave the feasibility of improving other non-descript breeds of the area through proper breeding plan. In the present study, morphometric characterization of Andaman Local Goat was carried out which is a very essential step towards registration of this.
indigenous goat breed. Documentation of the farming practices for this goat will be helpful to design strategy for conservation of this breed.

ACKNOWLEDGEMENT

The authors are highly thankful to the Director, ICAR-Central Island Agricultural Research Institute, Port Blair for providing the facilities to carry out this work. We sincerely thank the AICRP- Goat Improvement Programme for providing the financial assistance to carry out the work.

CONFLICT OF INTEREST

The author confirms that there are no known conflicts of interest associated with this manuscript.

REFERENCES

19th livestock census (2013). Andaman and Nicobar Administration, Port Blair, Andaman and Nicobar Islands, India


