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The Reproductive Performance of Native Osmanabadi Goat of India

*Monali Wakchaure, Mohammad Faheem Siddiqui
and Akshay Sonawane*

Abstract

Among the goat breeds of India, Osmanabadi goat breed is one of the most popular goat breed of the arid and semi-arid region of Maharashtra state. Historically this breed is known to exist on Deccan Plateau since decades. The name Osmanabadi is derived from its origin, i.e. Osmanabad district in Maharashtra state. The breeds is distributed mainly in 2 southern states of India viz. Western Telangana and North Eastern Karnataka state and are having largest contribution to meat production in Southern India as their meat is very tasty when compared with local breeds. The Osmanabadi breed is suited to all types of rearing systems, the most ideal being the semi-intensive system (grazing and closed enclosure) where higher production has been observed compared to extensive (grazing system) and intensive systems (zero grazing system). Osmanabadi goats reared in the Maharashtra, Karnataka and Telangana border region had been analysed with reproductive parameters and found that, the female kids attend puberty at the age of 349.8 ± 6.9 days with 17.45 ± 0.23 Kg body weight. The average gestation period found was 152.24 ± 0.24 days. The mean age at first kidding was found to be 494.4 ± 8.1 days. The average duration of post-partum anoestrus period was 67.34 ± 6.31 days which was responsible for short inter-kidding interval which shows high profile reproductive efficiency. The mean kidding interval recorded as 232.62 ± 5.45 days. Majority of kidding resulted in single births (87.27%) and with only 12.73% of multiple births. Breeding season and kidding season of Osmanabadi goats was observed from the month of June to September and November to February as a major.

Keywords: Osmanabadi goats, Reproductive performance

1. Introduction

India is one of the few countries in the world to make a rich contribution to the international pool of genes for livestock and to the improvement of animal production worldwide. India possesses an enormous goat population numbering 148.88 million [1], which is the second highest in the world after China and contribute about 27.80% of the total livestock population of India. As per the census report of the Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India (2019), India is a rich repository of goat genetic capital with 23 well-recognised goat breeds and these breeds have evolved in relation to various geographical and climatic situations. In different agro-climate

areas, these different breeds are of particular importance and have evolved unique adaptation characteristics over the years in order to survive and simultaneously produce sustained production under the agro-climate conditions of their habitats. In general, these breeds have been named after their place of origin and in some instances based on their prominent features.

Goats are one of the oldest domesticated species, and have been used for their milk, meat, hair and skins over much of the world. Ruminants are of great economic importance in livestock industry and small ruminants play very important role in the socio-economic status of the society. In fact, goat plays a significant economic role for the farming communities living in lowland, midland and highland provinces. Goat, being small sized and more prolific animal, requires minimum capital and maintenance costs with less risk in investment. Goats play an important role in the food and nutritional security of millions of rural people especially to the landless, marginal and small farmers. Further this is sturdy and adaptable animal and is known to provide sustainable source of income to more than 40% of below poverty line rural population. This is one of the indications of rural farmer preference to this animal for employment and income generation. The socio-economic value of goat rearing as compared to other livestock species, for poor farmers is immense. Goats and sheep are also among the main meat producing animals in India, whose meat is readily preferred. They also produce variety of other products, which are especially useful in the semi-arid and arid climatic conditions [2]. In India and other developing countries, the domestic goat (*Capra hircus*) is an important livestock species. It is popularly known as the “poor man’s cow” because it provides a good source of meat, milk, fibre, and skin [3]. From very early times in human civilisation, goats have served agricultural, economic, cultural and even religious functions. Archaeological evidence suggests that at the start of the Neolithic period in the Fertile Crescent, the goat was one of the first animals to be domesticated by humans around 10,000 years ago [4, 5]. India posse’s large number of goats which can be classified in to 23 different breeds adaptable to various climatic conditions. Among the various Indian goat breeds Osmanabadi goat breeds as one of the most popular goat breed of the arid and semi-arid region of Maharashtra state. Historically this breed is known to exist on Deccan plateau since decades. The name Osmanabadi is derived from its origin, i.e. Osmanabad district in Maharashtra state.

The goats are usually kept under extensive management and reared on natural vegetation, but due to shrinkage of grazing land and as is blamed for soil erosion and desertification, the maintenance of flocks under extensive system is threatened. However, Semi-intensive and intensive systems of goat rearing with small flocks are gaining momentum. In extensive system of management, the animals are reared on poor and degraded grazing lands resulting in low production and reproduction. The Osmanabadi breed is suited to all types of rearing systems, the most ideal being the semi-intensive system (grazing and closed enclosure) where higher production has been observed compared to extensive (grazing system) and intensive systems (Zero grazing system).

The knowledge of specific physical characteristics and production efficiency of this breed is the need of the hour to avoid indiscriminate breeding and to preserve sustainable productivity. Therefore, this review focuses on physical characteristics and production performance of Osmanabadi goat in India.

2. History and name of breeds

Osmanabadi goat mainly originated in Tuljapur taluka of Osmanabad District and Udgir taluka of Latur district of Maharashtra, both were earlier under the

Osmanabad district hence the name Osmanabadi became popular among the farmers. This goat is also known as Deccani. As these districts were earlier included in erst while Nizam State of Rule which was popularly known as Deccan State and hence the Osmanabadi breed was also synonymed as Deccani. The history of origin of Osmanabadi goat breed dates back to 150 years in the breeding tract of Marathwada region. The Osmanabad district being named after the Nizam Ruler of Hyderabad Deccan Estate Mir Osman Ali Khan the 7th Ruler of Nizam dynasty, hence the goat breed being named on the basis of breeding tract and origin from Osmanabad district as Osmanabadi (Seeri Hind and Tareekh-e-Khursheed, M. K. Shazli, 1968).

3. Distribution of breeds

The Osmanabadi breed distributed over greater part of central peninsular region, comprising the semi-arid areas or sub-tropical zones of Maharashtra, Andhra Pradesh and Karnataka states. It covers the major part of southern Maharashtra especially Osmanabad, Latur, Nanded, Parbhani, Hingoli, Beed, Jalna and Aurangabad district of Marathwada region and adjoining parts of Telangana and Karnataka State.

4. Breeding tract and climate

Osmanabad and Latur districts of the Marathwada region of Maharashtra state are the breeding areas for Osmanabadi goats [6]. The Osmanabadi breed has also been found to migrate to neighbouring areas. The breeding tract comprising Latur and Osmanabad districts is spread over 18°-05' to 18°-07' N Latitude and 73°-25' to 77°-25' E Longitudes and 17°35' 18°40' N Latitude and 75°16' to 76°40' E Longitude respectively in the deccan plateau [7]. Latur district is situated at 540 to 638 m height from mean sea level. The altitude of Osmanabad district is 600-611 m above mean sea level. The tract's agro-climate condition has been categorised as a subtropical zone and falls within a scarcity zone. Cereals, oilseeds, and pulses are the main crops grown in the Latur and Osmanabad districts, leading to harvests in the Kharif and Rabi seasons. The crops taken in Kharif are Jowar (*Sorghum bicolor*), udid or blackgram (*Phaseolus mungo*), tur or pigeonpea (*Cajanus cajan*), maize (*Zea mays*), post-monsoon sunflower (*Helianthus annuus*), Rabi jowar (*Sorghum bicolor*), wheat (*Triticum sp.*), bengal (*Cicer arietinum*), and safflower (*Carthamus tinctorius* Linn.) in Rabi. The great bulk of the ration for ruminants is Jowar kadbi (*Sorghum bicolor*). In addition, mung or greengram (*Phaseolus aureus*), udid or blackgram (*Phaseolus mungo*), wheat (*Triticum sp.*), tur (*Cajanus cajan*) and groundnut (*Arachis hypogea*) crop residues are also used for animal feeding.

5. Management practices

Raskar *et al.* [8] was observed that 83.33% goat keepers provided housing only during night hours to protect them from the wild animals and theft, whereas 16.67% goat keepers provided day and night housing. The goats were kept in close housing (84.62%) as well as in open housing (15.38%). In case of close housing, the roofs were made up of locally available materials like tur straw, jowar straw, sugarcane trash, tree leaves, dry grasses (78.21%) and 21.79% goat houses were with tin sheds. In open houses the goats were kept under trees, open areas and fenced with thorny bushes etc. Majority of the goat keepers (98.72%) used kutcha type of floor

in goat houses, while only 1.28% goat keepers provided pucca type of floor in shelter. In small flocks (3-4 animals) there was no separate housing and goats lived with the owner and shared the houses. Raskar *et al.* [8] was found that 73.72% farmers constructed the shelters separately, while 26.28% farmers maintained shelter as part of their houses to safeguard the animals during night time. The goat sheds were mostly half walled (77.56%) and few were full walled (22.44%) with 79.49% well ventilation mainly due to higher percentage of half walled structures. In few cases (20.51%) structures had poor ventilation (closed structure).

The goat house did not have well drained system for urine (98.72%) and only 1.28% had the proper drainage for urine, particularly noticed in pucca type of flooring structures. Shinde [9] reported 93.04% farmers provided housing for Osmanbadi goats during night hours only with 70.44% and 29.56% closed and open housing, respectively. It was further revealed that 98.27% had kutcha floors and only 1.28% pucca floor provided to the goats. Singh [10] and Gokhale *et al.* [11] reported that 66% of farmers maintained shelters as part of their residence.

6. Physical characteristics

6.1 Coat colour pattern

Osmanabadi goats have different coat colour patterns. According to the colour and presence or absence of horns, Osmanabadi goats were classified into five types. There is no specific name for these types, except Kali (Black), Morkani (White spotted ear), Hondi (Polled). The distribution of goats in surveyed area revealed that S1 (Kali) was 62.16%, S3 (Hondi) 17.12%, S2 (Morkhani) 10.68%, S4 (Hondi Morkani) 3.09% and proportion of remaining goats having different colour combinations i.e. S5 was 6.95%, [7].

Thus the majority of Osmanabadi goat population was comprised of breed sub-type S1 and S3 (79.28%); while the proportion of breed sub-types S2 and S4 was comparatively negligible than the first two subtypes. The breed sub-type S5 might be developed due to the admixture of different coat colours and breed combination in the population. The eyelids and hooves of Osmanabadi goat was 100% black for all categories of goats studied. Prakash and Balain [7] reported that the common colour of Osmanabadi goat was black and a mixture of white and black or red. Similarly, Ruben [12] reported that the coat colour of Osmanabadi goats was complete black or mixture of black and brown colour. Anonymous [13] recorded the distribution of Osmanabadi goats according to different breed sub-types in three districts and reported 82.60, 11.19, 2.67, 0.75 and 2.84 percent of the goats in the respective five breed sub-types.

The colour of muzzle was found black in 100% goats under survey. Deokar *et al.* [14], Verma *et al.* [15], Kumar *et al.* [16] and Kuralkar *et al.* [17] also observed the black colour of muzzle in Osmanabadi, Gohilwadi, Kutchi and Berari goats, respectively. It was observed that eyelids and hooves colour in Osmanabadi goat was 100% black for all categories of goat studied. Deokar *et al.* [14] reported black colour of eyelids and hooves in Osmanabadi goats, while, Deokar *et al.* [18] reported white colour of eyelids in Sangamneri goats and white (69.12%) and black (30.88%) hooves in Sangamneri goats.

6.2 Horn pattern

Horns were noticed in both the sexes in majority (79.54%) of Osmanabadi goats while 20.46% goats were polled, [7]. The 100% Osmanabadi goat had grey

colour of horns. The length of horns in adult goats averaged to 7.48 ± 0.52 cm. Osmanabadi goats had straight horn (64.40%), while, 35.60% had curved horn, [7]. The orientation of horn was mostly backward (48.55%) followed by upward (44.17%) and very less downward (7.28%) orientation. Presence of horns in both the sexes was also reported in Osmanabadi goat [14], Sangamneri goat [18], Jakhrana goat [8] and Surti goat [19]. The straight horn was reported by Motghare *et al.* [20] and Deokar *et al.* [14] in Osmanabadi as 67.17% and 98.57%, respectively, Deokar *et al.* [18] in Sangamneri (30.68%) and Deshpande *et al.* [21] in Surti (52.45%) goats. Kumar *et al.* [16] reported curved horn in Kutchi goats, while, Verma *et al.* [15] reported slightly twisted type horn in Gohilwadi goats. Motghare *et al.* [20] reported orientation of the horns in Osmanabadi goat was mostly upward (100%). Deokar *et al.* [14] reported maximum percentage had backward orientation (55.22%) followed by upward (36.40%) and only 8.38% had downward orientation.

6.3 Head, ear and tail patterns

The ear orientation of Osmanabadi goat was pendulous (drooping) with medium length (14.90 ± 0.26 cm), [7]. As regards the orientation of ears of Osmanabadi goats in the breeding tract, not a single case of erect ears was recorded. However, very few cases of horizontal ears were recorded. Majority of Osmanabadi goats had convex forehead (95.24%), [7]. The percentage of absence of wattle in Osmanabadi goats was 100%. Likewise the overall percentage of the goats not having beard was 100%. This clearly indicated that both wattle and beard characteristics were not the common feature of Osmanabadi goats. Deokar *et al.* [14], Deokar *et al.* [18] and Deshpande *et al.* [21] reported pendulous ear, convex forehead and absence of beard and wattle in majority of cases in Osmanabadi, Sangamneri and Surti goats, respectively. Tail pattern in Osmanabadi goat was observed as curved (96.27%) and only 3.73% goat has straight tail. Deokar *et al.* [14] reported 99.91% straight tail in Osmanabadi goats.

6.4 Body measurements and body weight

Raskar *et al.* [8] reported the least square means for height at withers, heart girth, body length, ear length, horn length and body weight for 3 months of age were 40.69 ± 0.55 cm, 37.61 ± 0.54 cm, 32.08 ± 0.55 cm, 11.69 ± 0.27 cm, 0.39 ± 0.15 cm and 6.29 ± 0.35 kg, respectively, in Osmanabadi goats. A survey on the Osmanabadi goat in its breeding tract was performed by Raskar *et al.* [8], i.e. The Latur and Osmanabad districts of Maharashtra's Marathwada region. Two blocks were selected from each district, namely Latur (B1) and AUSA (B2) blocks from the districts of Latur and Tuljapur (B3) and Osmanabad (B4) blocks from the districts of Osmanabad, and ten villages were considered from each block. The effect of location was significant source of variation for height at withers, chest girth, body length, ear length and body weight. DMRT (Duncan's multiple range test) showed that Block B1 goats had higher body weight, chest girth, body length, height at withers than goats of the other blocks. The effect of block was significant source of variation for body weight, chest girth, body length, height at withers and ear length. The least squares mean for height at withers, heart girth, body length, ear length, horn length, and body weight for 6 months of age were 55.04 ± 1.11 cm, 52.67 ± 1.11 cm, 46.36 ± 0.15 cm, 13.36 ± 0.44 cm, 2.91 ± 0.39 cm and 15.49 ± 0.57 kg in Osmanabadi goats, [7]. The effect of block was significant source of variation for height at withers, chest girth, body length and ear length. Block had significant source of variation for all the traits except horn length and body weight. The least

square means for height at withers, heart girth, body length, ear length, horn length, and body weight for 12 months of age were 62.45 ± 0.87 cm, 60.03 ± 1.07 cm, 50.01 ± 1.08 cm, 15.58 ± 0.44 cm, 3.30 ± 0.67 cm and 19.56 ± 0.92 kg, respectively, in Osmanabadi goats, [7]. The effect of block was significant source of variation for chest girth, body length, ear length and body weight except horn length and height at wither. The effect of sex was significant source of variation for chest girth, body length and ear length. Raskar *et al.* [8] observed that the least square means for height at withers, heart girth, body length, ear length, horn length and body weight for 24 months of age were 71.00 ± 0.87 cm, 70.48 ± 0.91 cm, 58.34 ± 0.93 cm, 17.18 ± 0.37 cm, 6.51 ± 0.56 cm and 29.50 ± 0.64 kg, respectively, in Osmanabadi goats. The effect of block was significant source of variation for height at withers, chest girth body length and body weight except horn length and ear length. The effect of sex was significant source of variation for chest girth, body length and height at withers. The least square means for height at withers, heart girth, body length, ear length, horn length and body weight for 36 months of age and above were 73.12 ± 0.61 cm, 74.55 ± 0.67 cm, 62.10 ± 0.67 cm, 17.24 ± 0.24 cm, 7.48 ± 0.52 cm and 32.77 ± 0.60 kg, respectively, in Osmanabadi goats, [7]. The effect of sex was significant source of variation for all traits except ear length. Block had significant source of variation for all the traits except chest girth, horn length and ear length, whereas colour type had non-significant effect on all the traits in adult age group of Osmanabadi goats. Ravimurugan *et al.* [22] reported higher body weight, height at withers, body length, chest girth and horn length in Pallai Adu male goat than the female. The mean body height, length, girth and weight of Osmanabadi goats indicated that they belong to medium sized goat category. The Osmanabadi goat is medium sized meat breed thriving well in tropical wet and dry climate.

6.5 Performance

The average age at first kidding and kidding interval is 523 and 214 days respectively. Goats of this breed have very efficient reproduction and in well managed flocks [23], with 30% twinning and 2% triplets. The daily milk yield ranged from 700 gm to 1500 gm under well managed village flocks with lactation length of 130-150 day. Raskar *et al.* [24] and Sahare *et al.* [8] found that in Osmanabadi goat maintained under farm condition, kidding percentage and twinning ability was 55.87% and 10.52% respectively.

6.6 Age at puberty

The mean age at puberty was recorded as 349.8 ± 6.9 days and ranged between 180 and 510 days. Kamble *et al.* [25] reported similar findings 335.3 ± 13.0 days while Lawer *et al.* [26] reported 219.34 ± 0.72 days pubertal age in Osmanabadi goats.

6.7 Weight at puberty

The weight at puberty in Osmanabadi goats occurred when the does attained an average body weight of 17.45 ± 0.23 kg, [27]. Smith [28] stated that, Angora goats should weigh 32-41 kg before being bred and recommended that breeding should be delayed until the animal has attained 60% or more of its adult body weight. It was also evident from the study that the age at puberty ranged between 6 and 17 months and it is highly probable that Osmanabadi goats attaining puberty at an

early age had a better growth rate resulting in a better body weight cumulating in the onset of puberty.

6.8 Gestation period

The average gestation period in Osmanabadi goats was determined as 152.24 ± 0.24 days and it ranged from 137 to 158 days. The average duration of gestation in goats is generally reported as 147-155 days [4]. The gestation period was recorded as 150.08 days by Pathodiya *et al.* [4] and as 146.23 ± 0.49 days by Swami *et al.* [29] in Sirohi goats. In Ganjam goats gestation length was 148.26 ± 0.31 days, in Bengal type goats of Orissa it was 146.27 ± 0.37 days and in Ghumsur goats of Orissa it was 145.03 ± 0.48 days (Rao and Patro [30]). Mandakmale *et al.* [31] observed the gestation period to be 149.96 ± 0.82 days for Osmanabadi goats under field conditions and Bhusan and Rai [32] found it to be 151.33 ± 1.48 days in Jakhrana.

6.9 Age at first kidding

The first kidding in Osmanabadi goats occurred as early 330 days in some does and as late as 650 days in few others [27]. The mean age at first kidding was determined as 494.4 ± 8.1 days similar to the reports in other breeds [24]. Mandakmale *et al.* [31] observed the age at first kidding of 377.15 ± 2.67 days in Osmanabadi goats under field conditions. In Malabari it was observed to be 13.72 ± 0.10 months [33] and 531 days [34]. In Jamunapari goats first kidding was 700 ± 9.1 days (Rout *et al.* [35]), observed at 23 months (Rout *et al.* [36]).

6.10 Inter-kidding period

The mean kidding interval in Osmanabadi Does was recorded as 232.62 ± 5.45 days and ranged between 181 to 310 days, [27]. A similar kidding interval has been reported by Markendeya and Devanagare [37] in Osmanabadi goats. Mabari goats also appear to have a kidding interval similar to Osmanabadi does [38]. Raghavan *et al.* [33] reported the average kidding interval as 9.47 ± 0.11 months in Malabari goat breed of Kerala while Raghavan *et al.* [34] recorded kidding interval as 315 days (Figures 1 and 2; Table 1).



A

B

Figure 1.
Pure Osmanabadi breed (A) Osmanabadi Buck and (B) Osmanabadi doe.



Figure 2.
Osmanabadi doe with its four kids.

Sr.No.	Traits	Average	Source
1	Age at Puberty	335.3 ± 13.0	Kamble <i>et al.</i> [25]
2	Age at First service	370 ± 14	Kamble <i>et al.</i> [25]
3	Age at First Conception	233.02 ± 0.89	Lawar <i>et al.</i> [26]
4	Age at First Kidding	0.081 ± 0.010	Patil <i>et al.</i> [38]
5	Kidding Interval	0.0317 ± 0.098	Patil <i>et al.</i> [38]
6	Gestation Period	0.292 ± 0.086	Patil <i>et al.</i> [38]

Table 1.
Average reproductive performance of Osmanabadi goats.

7. Conclusion

Generally, various factors such as genetic, development systems and management practices have influenced the productive and reproductive success of indigenous goats. The following recommendations have been forwarded from the aforementioned conclusion:

1. The ability to better adjust the climate for indigenous goat breeds; a regulated crossbreeding and selection policy should be established in line with the conservation of local adaptive characteristics of the breeds.
2. In particular, farmers should be provided with training and knowledge to increase the reproductive output of goats and farmers' livelihoods through improved management practises.

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Conflict of interest

Authors declare no conflict of interest.

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Author details

Monali Wakchaure^{1*}, Mohammad Faheem Siddiqui² and Akshay Sonawane³

1 Department of LPM, G.M.D. Arts B.W. Commerce and Science College,
Nashik, Maharashtra, India

2 Department of Livestock Production and Management, College of Veterinary and
Animal Sciences, Parbhani, Maharashtra, India

3 Hester Bioscience Ltd., Ahmedabad, Gujarat, India

*Address all correspondence to: monali.wakchaure17792@gmail.com

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