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## RESEARCH ARTICLE

## Goat Husbandry Practices followed by Farmers in the Vicinity of Ranthambore Tiger Reserve, India

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## ABSTRACT

*The study was performed among 30 villages near the Ranthambore Tiger Reserve, with 12 livestock rears chosen from each village, thus making 360 total respondents who were exposed to a structured interview schedule. The study explored that only 60 farmers were rearing goats as a source of their livelihood. Goat keepers followed the nuclear family hence average household size and herd size of goat were around 4 and 14 per household, respectively. Existing goat practices were grouped in four categories; breeding, feeding, health care, and management practices. Inbreeding, common signs of estrus, mating time after heat detection etc. were common practices adopted by the respondents. Among feeding practices farmers adopted practices such as allowing the kid to suckle teats of his mother, offering milk at the rate of 10 per cent of body weight, and stall feeding followed by grazing up to 8 hours. Farmers were quite aware of health care practices but farmers were not having a good house structure for their animals and were not good at keeping records of their animals. Age, family size, family education status, social participation, community cohesiveness and mass media exposure were significant for the followed of goat husbandry practices.*

**Key words:** Ranthambore Tiger Reserve, Goat, Practices, Husbandry, Farmers, Adoption.

Goats are multi-functional and contribute significantly to India's rural economy. Goat farming is critical in ensuring the livelihood of a significant number of small farmers, particularly women, landless and marginal farmers (*Singh et al., 2013*). India ranks second with 148.88 million population of a goat after China. In India Rajasthan state ranks first in the population of goats with 20.84 million population of goat (20<sup>th</sup> livestock census). Goat husbandry is vital to the livelihood of smallholders in Rajasthan, as they serve as a valuable asset and provide on time of need (*Sabapara, 2016*). The very old proverb “the goat is the poor man cow” still holds true in the counties like India. Goat husbandry is indeed very important in uplifting poverty towards prosperity. Surrounding villages of any protected area depend on livestock because they easily could get fodder round the year in the protected area. Around 200 million tribal population lives around forest area of India which contribute 20 per cent population

of India and their livelihood depends on the forest area and grazing for their animal in the forest area. Ranthambore tiger reserve was established as Sawai Madhopur Game Sanctuary in 1955, initially covering an area of 282 km<sup>2</sup> (109 sq mi). It was declared one of the Project Tiger reserves in 1973 and became a national park on 1 November 1980. In 1984, the adjacent forests were declared the Sawai Man Singh Sanctuary and Kailadevi Sanctuary. Ranthambore Tiger Reserve is a 170-km-long strip of forest which is hardly 10-12 km in width. Four protected domains come beneath the umbrella of Ranthambore Tiger Reserve. These are Ranthambore National Park, Kailadevi Wildlife Sanctuary, Sawai Madhopur Wildlife Sanctuary and Sawai Mansingh Wildlife Sanctuary. The Tiger Reserve was expanded in 1992 to encompass adjacent forest areas such as Kailadevi Sanctuary (in north) and Sawai Mansingh Sanctuary (in the south), along with adjoining forest areas.

RTR is existing in the eastern state Rajasthan

of India. It is the world's driest tiger habitat, with temperature ranging from 1 degree Celsius to 480 degrees Celsius and annual rainfall averaging between 600 and 900 millimetres. Hill ranges, perennial and Monsoon Rivers, undulating ravines and plains render the area favorable for many different species. One of Ranthambore's most prominent features is the Aravalli hill range. This is one of the world's oldest hill ranges, dating back over 4 billion years. Farmers of the vicinity of RTR effortlessly have accessibility to feed and fodder for their animals because they are close to the reserve area and its premise. Ranthambore Tiger Reserve has the largest population density, with 300 villages totaling one million people in their Eco-sensitive region of RTR. It is essential to know their existing goat husbandry practices; with this in consideration the present research was undertaken in the surrounding villages of Ranthambore Tiger Reserve of India.

## METHODOLOGY

In India there are 50 Tiger Reserve covering 71027.10 km<sup>2</sup> area and 140 protected areas inhabiting within Tiger Reserve area. Across the Tiger Reserve, there are approximately 56247 families living in 751 villages. Until 2017, 12327 families in 173 villages were relocated or resettled. Out of 50 tiger reserve of India Ranthambore Tiger Reserve has the highest 300 surrounding settlements with the majority of farmers relying heavily on intensive agriculture and livestock farming for their livelihood and highest crop raiding by the wild animals also happened in the locality of Ranthambore Tiger Reserve. Ranthambore Tiger Reserve was selected purposively due to high number of communities in the proximity of Ranthambore Tiger Reserve, with the highest crop ravaging and livestock depredation occurred in that area so the study was conducted in the surrounding villages of Ranthambore Tiger Reserve (RTR) to identify existing goat husbandry practices followed by the goat rearers insurrounding villages of Ranthambore Tiger Reserve. Ranthambore Tiger Reserve is divided mainly into two zones: the core zone (Ranthambore National Park) and the buffer zone (Kaila Devi Wildlife Sanctuary). Both zones were chosen for this study. There are around 300 villages in the eco-sensitive region of Ranthambore Tiger Reserve so for the study 30 villages were chosen randomly from both zone, and 12 livestock rearers from each village

were chosen at random for the study, so thus total 360 respondents were interviewed. So it was found that only 60 respondents were rearing goats and consider it part of their livelihood With the help and guidance of specialists and a focus group discussion among goat farmers. Practices were categorized into 4 categories namely Breeding, Healthcare, Feeding, and Management practices and in socio economic status age, family size, education, community cohesiveness, distance of the respondents from the park boundary wall, land holding etc. has been explored in this study and correlation coefficient were used to see the correlation of independent variables like age, education, community cohesiveness etc. with a dependent variables the data were collected by personal interview among the respondents during the period of November 2021 to January 2022 and Data were tabulated and analyzed with frequency, percentage, mean and standard deviation. Simple correlation coefficient was used to check the correlation between socio-economic and goat husbandry practices followed by the goat farmers.

## RESULTS AND DISCUSSION

*Socio-economic status of goat keepers* : The socio-economic scenario of goat keepers is presented (Table 1). The average age of goat keepers was 44.73 years, and they believed in the nuclear family because their family size was 3-4. A similar finding was also reported by *Gamit et al., (2020)*. The average year of formal education of family members was used to determine family education status, and it was discovered that the respondents average year of formal schooling was fairly good but *Roy and Tiwari (2016)* revealed low level of family education status among the goat keepers. Goat herders had poor social

**Table 1. Socio-Economic profile of the goat keepers (N=60)**

Particulars	Mean±SD
Age (Year)	44.73±11.44
Family Size (number)	3.80±0.71
Education status of the family (year)	9.85±3.16
Social Participation (number)	0.58±1.17
Extension Contact (number)	3.62±3.65
Community Cohesiveness (score 7 to 14)	12.43±0.67
Distance of the home from RTR boundary (Km)	1.03±0.56
Herd Composition of goat (number)	13.90±7.39

**Table 2. Distribution of the farmers based on the adoption of goat breeding practices (N=60)**

Practices	No.	%
<i>A common sign of estrus in goat (Multiple Response)</i>		
Restlessness	44	73.33
Mucus discharge	44	73.33
Mounting	58	96.67
Wagging of tail	49	81.67
<i>Allow for insemination or mating of a goat after heat detection</i>		
Just after observing the heat symptoms	13	21.67
Within 12 hours (Early heat period)	30	50.00
Between 12 to 18 hours (Mid heat period)	11	18.33
After 18 hours (Late heat period)	6	10.00
<i>Practices adopt for insemination or mating of goat</i>		
AI	0	0.00
Mating with selected owned buck	35	58.33
Mating with progeny tested buck	14	23.33
Mating with available buck	11	18.33
<i>No. of service (Insemination or mating) in a one estrus/ heat period</i>		
One	35	58.33
Two	16	26.67
Three if long heat period	9	15.00
<i>No. of service (insemination) per pregnancy of goat</i>		
One	22	36.67
Two	31	51.66
Three	7	11.67
<i>Practices being followed if animal not showing the heat/ estrus symptoms</i>		
Offer mineral mixture	21	35.00
Fed local vegetation (zadi, butian) as told by experienced farmers	31	51.67
Body massage particularly near to vulva	8	13.33
<i>Practices/methods of pregnancy diagnosis</i>		
Non-return to estrus	38	63.33
Live weight increase	17	28.33
Consult with veterinarian	5	8.33
<i>Practices being followed to maintain service period</i>		
Offer feed supplements	41	68.33
<i>Fed balance ration according to animal requirements</i>		
	19	31.67
<i>If Placenta is not dropped in normal time (within two hours), what practices are being followed</i>		
Offer Lukewarm water	33	55.00
Offer desi kada (Sonth, mathi, namak, gur, Azaiwan)	15	25.00
Call experienced farmers for removal of placenta	12	20.00

participation and extension contact, with 0.58 and 3.62, respectively, according to the study, but they have a very good community cohesiveness. Farmers had fear of the wild animal because the boundary wall of the RTR was close to their household. The average distance between their household and the RTR was 1.03 kilometres, according to the results. The average herd of the goats was 13.90. These results are consistent with those of *Chaturvedani et al., (2017)*.

*Existing goat breeding practices* : Goat breeding practices were divided into nine categories i.e. common sign of estrus in goats, allowing insemination after heat detection, practices adopt for mating, etc. Findings of the different existing goat breeding practices adopted by the goat rearers are presented in Table 2. The study revealed four signs of estrus in the goat i.e. restlessness, mucus discharge, mounting, and wagging tail. The mounting of a goat on another animal was reported by the majority of goat caretakers (96.67%), followed by wagging tail (81.67%), restlessness (73.33%), and mucus discharge (73.33%). Around 50.00 per cent of farmers allow mating of their animal within 12 hours after heat detection whereas just after monitoring the heat symptoms, between 12 hours to 18 hours and after 18 hours followed by 21.67 per cent, 18.33 per cent, and 10.00 percent farmers, respectively. None of the goat keepers followed the AI (Artificial Insemination) method of insemination to the goat. A majority (58.33 %) of the goat farmers mated their goat with the owned buck followed by the mating with villager's buck (23.33%) and relatives buck (18.33%). Whereas, the majority (58.33%) of the respondents have followed one service in the heat period of the goat followed by two or three services by the 26.67 per cent and 11.67 per cent respondents, respectively. Around half of the respondents (51.66%) said they mated their goat twice per pregnancy. If the animal is not showing any signs of heat, around 51.67 percent of respondents provided the animals some local vegetation as advised by experienced farmers, 35 percent offered mineral mixture, and a few (13.33%) followed procedures such as body massage around the vulva of the goat. The majority of goat keepers (63.33%) identified whether the animal was pregnant or not by not returning to estrus, followed by an increase in live weight and a consultation with a veterinarian (17% and 5%, respectively). These findings are similar to *Tanwar and Rathore (2017)*. The majority of farmers (68.33%) adopted practices such

**Table 3. Distribution of the farmers based on the adoption of existing goat feeding practices (N=60)**

Practices	No.	%
<i>Newly born kid allowed to suckle the teats of his mother</i>		
Just after birth	12	20.00
Within 2 hours	35	58.33
After dropping the placenta	7	11.67
When kids able to suckle their mother	6	10.00
<i>Quantity of milk is allowed/offered to kids up to the one month age</i>		
10 per cent of kid body weight	40	66.67
15 per cent of kid body weight	13	21.67
20 per cent of kid body weight	7	11.67
<i>Common practices in the feeding of goat</i>		
Stall feeding & grazing up to 4 hours	19	31.67
Stall feeding & grazing up to 8 hours	32	53.33
Stall feeding only	3	5.00
<i>Quantity of extra feed/ration fed to pregnant goat</i>		
Up to 30 gm kg concentrate	14	23.33
30 gram to 60 gram concentrate	35	58.33
60 gram to 100 gram concentrate	11	18.33
<i>Existing sources of greenfodder (Multiple Response)</i>		
Green leaves	60	100.00
Green grass	60	100.00
Leguminous crops (Berseem, Lucerne, Cowpea)	60	100.00
Non leguminous crops (Jowar, Bajra, Maize, Oats)	31	51.67
<i>Quantity of common salt is being fed to animals</i>		
Up to 10 gram/day	19	31.67
10-20 gram/day	37	56.67
20-30 gram/day	7	11.67
<i>Frequency of offer water to your animals in a day</i>		
One	15	25.00
Two	41	68.33
Thrice	4	6.67

as supplying feed supplements, followed by balanced ration according to animal requirements by 31.67 per cent of respondents for the maintenance of service period of goats. In the case of a retained placenta, the majority (55.00%) of goat farmers adopted practices such as offering animals lukewarm water, 25 per cent offered Desi Kada and Wheat Ghugri (Local name) with a mixture of jaggery to animals, and 20 per cent goat farmers took the services of experienced farmers to remove the placenta.

*Existing goat feeding practices* : Existing goat

feeding practices are categorized into seven categories and sub-categories. The results in Table 3 revealed that the majority (58.33%) of farmers allowed kids to suckle the teats within two hours of a kid's birth, whereas 20 per cent, 11.67 per cent, and 10 per cent goat keepers reported just after birth, after dropping the placenta, and when kid is able to suckle his mother, respectively. 48.6 per cent of the farmers provides colostrum feeding to their animals (Yadav & Nagar, 2021) and Yadav (2019) observed that mean score of feeding of colostrum to the newly born kids is 0.94 which indicate that goat farmers having good knowledge and providing colostrum to the new born kid. The result illustrates that the majority (66.67 %) respondents followed practices such as a feeding milk to kids up to one month at a rate of 10 per cent of their body weight, while 11.67 and 21.67 per cent followed practice of offering milk to kids at rates 20 per cent and 15 per cent of their body weight, respectively. Despite the fact that 31.67 respondents practised stall feeding and grazing for up to 4 hours, nearly half of the respondents (53.33 %) practised stall feeding and grazing for up to 8 hours per day. Similar finding was reported by the Deshpande et al., 2010. Only 5% of goat farmers feed their animals exclusively in stalls. Exclusively 5 goat owners accepted only stall feeding for their goats, according to Singh et al., 2021. Goats were kept by marginal and landless farmers and they relied on grazing to feed their animals (Rawat et al., 2015). The stall feeding method was used by those with a small herd size. In case of pregnant goats, the majority of respondents (58.33%) preferred 30 to 60 gram concentrated feed for their animals, followed by 30 gram and 60 to 100 gram among 23.33 per cent and 18.33 per cent respondents, respectively. Deepanka et al., (2021) observed that majority (88.33 %) dairy farmers used to offer concentrate to dairy animals. Even though all of the respondents have a supply of green fodder, nearly half of them (51.67%) do not have any leguminous crops as a source of green fodder. About 56.67 per cent of respondents offered their animals 10-20 gram of salt per day followed by up to 10 and 20-30 gram/day among 31.67 per cent and 11.67 per cent respondents, respectively. Goat keepers were having good sources of water like river and ponds, so the majority (68.33%) were offering water to animals twice and 25 per cent once a day, and only 6.67 per cent of goat farmers were offering thrice a day.

**Table 4. Distribution of the farmers based on the adoption of existing goat health care practices (N=60)**

Practices	No.	%
<i>The common practice you follow just after calving of a newborn kid</i>		
Clean nostrils and mouth which helps the calf breathing	60	100.00
Allow the mother to lick the kid clean	60	100.00
Cleaning of feet of a newborn kid	60	100.00
Rubbing the body of new born kid	60	100.00
<i>Practise follow in navalchord management of new born kid</i>		
Simply cut by available knife/blade and apply dryfreshash	38	63.33
Tie naval cord with a thread around a few inches from the base and cut the remaining cord with a clean instrument	15	25.00
After cutting the naval cord apply iodine solution on navel and repeat after 12 hours.	7	11.67
<i>A common practice in the treatment of a case of a diseased animal</i>		
Localquack	12	20.00
Initially self-medication&later consultation with a veterinarian	35	58.33
Complete self-medication with indigenous material	13	21.67
<i>Vaccination of the goat</i>		
Vaccination by Govt./NGOs	46	76.67
No vaccination	14	23.33
<i>Practices being followed in controlling External parasites of animals</i>		
Proper cleaning of the goat shed	48	80.00
A spray of insecticide solutions on animal body and animal shed	13	21.67
<i>Practices being followed in controlling internal parasite of goat</i>		
Self-treatment	37	61.67
Self-treatment then consult with a veterinarian	23	38.33

*Existing health care practices* : Adopted health care methods among goat keepers are divided into six categories and subcategories. Results are presented in Table 4. All of the goat farmers had adopted the methods such as cleaning nostrils and mouth, allowing the mother to lick the kid clean, cleaning of feet of the newborn kid, and rubbing body of the newborn kid. The majority (63.33 %) of the farmers had adopted the practice of tying naval cord with a thread around just few inches from the bottom and cut the remaining cord with a clean instrument of a naval

chord of a newborn kid but 25 per cent of respondents simply cut it by the help of knife/blade and apply dry fresh ash on a naval cord and only 11.67 per cent goat rearers adopted the practice of applying iodine solution on naval and its repetition after 12 hours. If the animal gets sick majority (58.33 %) of them followed self-medication and if they were failed to treat then they consult with the veterinarian. And while 20 per cent of people believe in local quacks for therapy, 21.67 per cent treat their animals using indigenous knowledge. Whereas majority (76.67 %) respondents did vaccinate their animals which are provided by either government or NGOs but 23.33 per cent of respondents did not vaccinate their animals. A finding reported by *Sivachandiran et al., 2020* shows that goat rearers had low adoption of vaccination due to a lack of awareness among them. *Roy and Tiwari (2018)* revealed that majority (90.00 %) goat keepers adopted vaccination for their animals. For the external parasite of the animal, 80 per cent of the farmers adopted the practice of proper cleaning of the goat shed followed by a spray of insecticide solution on the animal body and shed by 21.67 per cent but in case of internal parasite, 61.67 per cent respondents did completely self-treatment whereas 38.33 per cent followed self-treatment initially and then sought advice from a veterinarian if it failed.

*Existing goat management practices* : The revealed result presented in Table 5 illustrates that majority (51.67 %) respondents were having a kutcha house with a sanitary condition, but 43.33 per cent respondents were having a kutcha house with non-sanitary condition and result also revealed that 8.33 per cent respondents did not have a separate house for their animal. The majority (75.00%) respondents had kutcha floor in non-sanitary condition whereas 25 per cent respondents were having kutcha floor in a clean sanitary condition. About 56.67 per cent of respondents had a village pond as a source of water followed by bore well/hand pump, and river by 28.33 per cent and 15.00 per cent respondents, respectively. Most of the respondents (68.33%) did milking twice a day followed by thrice, and once by 21.67 per cent and 8.33 per cent respondents, respectively. The finding shows that 60 per cent goat farmers follow knuckling method for milking followed by 21.67 per cent who use full hand milking and 18.33 per cent who use striping milking. These results are in agreement with *Sabapara et al., (2014)*. Results further revealed that

**Table 5. Distribution of the farmers based on the adoption of existing goat management practices (N=60)**

Practices	No.	%
<i>Housing structure for goat</i>		
Kutchha house non-sanitarycondition	26	43.33
Kutchha house in clean sanitarycondition	31	51.67
No separate house	5	8.33
<i>Housing floor for goat</i>		
Kutchha floor in a non-sanitarycondition	45	75.00
Kutchha floor in clean sanitary condition	15	25.00
<i>Source of water for animal</i>		
Village pond/ tank	34	56.67
Borewell/handpump	17	28.33
River /canal	9	15.00
<i>No of milking in a day</i>		
Once	5	8.33
Twice	41	68.33
Thrice	13	21.67
<i>Method of animal milking</i>		
Knuckling	36	60.00
Fullhand	13	21.67
Striping	11	18.33
<i>Disposal of animal carcass</i>		
Carcass disposed at maximum distance from village and water source	14	23.33
Contractor of dead animals	46	76.67
<i>Kid be allowed to suck the milk under a natural system</i>		
1-2 month	4	6.67
2- 3 months	47	78.33
whole lactation	9	15.00
<i>The records kept of animals</i>		
Birth record	21	35.00
No record	39	65.00

the majority (76.67%) of goat keepers consult with the contractor of dead animal for the disposal of animal carcass followed by 23.33 per cent who disposed the carcass at maximum distance from village and water source. About 78.33 per cent goat farmers let their kids to suck the milk from their goats in the natural system for 2-3 months, 6.67 per cent respondents for 1-3 months, and 15 per cent for the entire lactation. Only 35 per cent of the farmers had a record of their animal's birth, while the remaining 65 per cent had not kept inf record.

*Relationship between existing goat husbandry practices and Socio-personal Profile of the goat keepers* : It can be accessed from the Table 6 that

**Table 6. Relationship between existing goat husbandry practices and Socio-personal Profile of the goat keepers**

Independet variables	'r'
Age	.017**
Education	0.02
Family size	.059**
Family education status	.054**
Livestock insurance	0.033
Crop insurance	0.050
Social participation	0.038*
Extension contact	0.179
Community cohesiveness	.07**
Distance from the boundary wall of reserve area	0.30
Mass media exposure	.071*

\*\* Correlation is significant at the 0.01 level  
\*Correlation is significant at the 0.05 level

age, family size, family education status, community cohesiveness were found highly significant ( $p < 0.01$ ) with goat husbandry practices and mass media exposure and Social Participation were found significant ( $p < 0.05$ ) with goat husbandry practice at 0.05 level. Meena *et al.* (2022) found among the Raika pastoralist that family size, mass media exposure and family education status were significantly correlated with a adoption of improved goat husbandry practices.

## CONCLUSION

The significant proportion of goat rearers in the vicinity of Ranthambore Tiger Reserve are aware of how to identify estrus in goats, but no one is aware of Artificial Insemination (AI) in goats. Goat farmers are cautious when it comes to feeding of their animals. In terms of health-care approaches, farmers continue to rely on self-treatment and local quacks to manage problems in their animals. Farmers had kutchha houses, and only a few of them kept records of their animals. This is due to a lack of understanding, and further scientific training and education is required to improve goat keepr livelihood.

## CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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