

*Original Research***Existing Breeding Management Practices Followed by Pantja Goat Keepers in Tarai Region of Uttarakhand****B. S. Khadda^{1*}, Brijesh Singh², D.V. Singh³, S. K. Singh², C. B. Singh², J. L. Singh⁴ and A. H. Dar⁵**

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Abstract

A bench mark survey was conducted to collect the base line information from the Pantja goat rearers regarding to various breeding management practices with special reference to Pantja goats under field condition of Udham Singh Nagar and Nainital districts of Tarai region of the Uttarakhand during a period of two year (April, 2015 to March, 2017). Majority of goat keepers (94.42%) practiced heat detection and 99.98 per cent followed behavioral symptoms of goat for detection of heat in goats. Majority of goat rearers (58.60%) possessed an own buck for breeding purposes. The main breeding season was observed by 59.07% goat keepers in winters followed by 34.11% in summers and 6.82% in rainy season. Pregnancy diagnosis was followed by 90.70% of the goat keepers. The overall mean and their standard error for age at first mating, weight at first mating, age at first kidding, weight at first kidding, service period, kidding interval were found to be 255.66±2.29 days, 14.82±0.17 kg, 408.22±5.04 days, 19.15±0.25 kg, 151.70±1.08 days, 296.83±1.43 days, respectively. It may therefore be concluded that the goat keepers of the region were not fully aware about improved breeding management practices and Pantja breed of goat has an immense production potential.

Key words: Breeding Management, Goat Keepers, Heat Detection, Productive Life, Service Period

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Introduction

Livestock sector plays an important role in the national economy and in the socio-economic development of the country. The contribution of livestock sector to the national economy in terms of Gross Domestic Product is 3.9 per cent at current prices (BAHFS, 2013). Goats have been an integral component of India's livestock economy, hence development of goat production is considered to be a pathway for inclusive agricultural growth as out of 138 million operational holdings, the small and marginal holdings (below 2.00 ha) together constituted 85% (GOI, 2014) and these holdings are the main custodian (> 75% of total goat population). There is significant growth in population of goats across the agro-climatic regions in India.

Breeding management plays a very significant role in exploiting real potential of goats. Breeding management practices like proper methods and symptoms of heat detection, insemination at appropriate time, following pregnancy diagnosis and timely treatment of anoestrous/ repeaters animals that promote their productivity. Given the genetic potential of the goats, its production depends mostly on the managerial practices, which exhibits high variation across agro-climates. Understanding the goat management practices followed by goat keepers is necessary to identify the strengths and weaknesses of the rearing systems and to formulate suitable intervention policies. Keeping in view, above a study was conducted to find out the existing breeding management practices followed by Pantja goatherds of Udham Singh Nagar and Nainital districts of *Tarai* region of Uttarakhand.

Materials and Methods

A bench mark survey was conducted to collect the base line information from the Pantja goat rearers regarding to various breeding management practices with special reference to Pantja goats under field condition of Udham Singh Nagar and Nainital districts of *Tarai* region of the Uttarakhand during a period of two year (April, 2015 to March, 2017). Multistage sampling method was adopted for the selection of respondents. Four clusters (Bhimtal, Tilpuri, Bara and Kunda) were selected from two districts (Udham Singh Nagar and Nainital). Total one hundred thirteen villages were surveyed on the basis of availability of Pantja goats. An individual farmer rearing Pantja goats formed the unit of a sample. A list of goat rearing families of the selected villages was prepared with the help of village Pradhan and Patvari and mostly all Pantja goat rearers were selected for survey from each village. Thus 645 selected respondents (372 of U. S. Nagar and 273 of Nainital district) were interviewed and the desired information was collected. The data were collected by personal interview techniques through an interview schedule by administering a developed questionnaire and also by direct observation in the farmer's flocks. Before administering interview schedule to the sample subjects, specific objectives and the purpose of the survey was explicitly explained. The questions in the schedule were presented to them in their own dialect

ensuring than they perceive the questions correctly. The existing management practices relating to breeding management were separately enlisted. Personal particulars of the respondents included name, category, age, village; Tehsil, religion, main occupation, education, number of family members, etc. were recorded. Breeding is an important factor of goat production. The following information was incorporated in the survey schedule pertaining to breeding practices regarding methods and symptoms of heat detection, source of breeding buck, used in flock and selection criteria, main breeding season, stage of heat at which goat were allowed for mating, adoption of pregnancy diagnosis, treatment of anoestrous/repeaters, age and weight at first mating and kidding, service period, kidding interval, productive life of doe and buck, pregnancy ratio of the flock and per cent of twining and triplet birth, etc. The responses to each of the question in the schedule were coded and tabulated respondent wise in a master sheet. The qualitative data were quantified accordingly and tabulated to draw meaningful inferences. Therefore, appropriate tables were prepared, keeping in view the specific objectives of the study. The collected data were subjected to basic statistical analysis as per Snedecor and Cochran (1994). Chi Square (χ^2) was used to observe the effect of districts on different goat management practices.

$$\chi^2 = \sum_{i=0}^p \sum_{j=1}^q \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \sim \chi^2_{(p-1)(q-1)}$$

Where, statistic χ^2 has $(p-1)(q-1)$ d.f.

E_{ij} is the expected frequency corresponding to i^{th} , and j^{th} cell

O_{ij} is the observe frequency

Results and Discussion

Existing Breeding Management Practices

The data related to existing breeding management practices followed by goat keepers are presented in Table 1. The results of present study revealed that majority of goat keepers (94.42%) followed heat detection practice regularly based upon behavioral signs of estrus. Among the various behavioral symptoms of heat detection, majority (75.33%) of goat keepers relied on mucus discharge and bleating followed by mounting on other goats (12.32%), frequent micturation (9.38%) and other symptoms (3.12%). These findings are in agreement with the findings of Sharma (2005) and Kumar (2011). Majority of goat rearers (58.60%) possessed their own buck for breeding purposes whereas, 41.40 per cent goat rearers used an outsider breeding buck for matting. The proportion of goat rearers having own breeding buck was higher among goat rearers of Nainital district (60.81%) as compared to Udham Singh Nagar district (56.99%).

Table 1: Breeding practices followed by goat keepers district wise

Particulars	Districts		Overall (N=645)	χ^2 value
	U. S. Nagar (N=372)	Nainital (N=273)		
Heat Detection				
Yes	346 (-93.01)	263 (-96.34)	609 (-94.42)	3.306
No	26 (-6.99)	10(-3.66)	36(-5.58)	
Methods of Heat Detection				
Symptoms	345(-99.71)	263(-100)	608(-99.98)	0.761
Teaser/	1	0	1	
Scientific	-0.29	0	-0.2	
Symptoms of Heat Detection				
Mucus discharge + bleating	252(-72.83)	206(-78.33)	458(-75.33)	1.336
Frequent micturation	34(-9.83)	23(-8.75)	57(-9.38)	
Mounting	46(-13.29)	29(-13.43)	75(-12.32)	
Any other	14(-4.05)	5(-2.31)	19(-3.12)	
Source of Breeding Buck				
Own flock	212(-56.99)	166(-60.81)	378(-58.6)	0.945
Outside	160(-43.01)	107(-39.19)	267(-41.4)	
Breeding Buck Used in Flock				
1-2 Years	31(-14.62)	29(-17.47)	60(-15.87)	2.729
2-3 Years	96(-45.28)	84(-50.6)	180(-47.62)	
> 3 Years	85(-40.1)	53(-31.93)	138(-36.51)	
Selection Criteria of Breeding Buck				
Breed	56(-15.06)	53(-19.41)	109(-16.9)	2.299
Appearance	23(-6.18)	14(-5.13)	37(-5.74)	
Both	293(-78.76)	206(-75.46)	499(-77.37)	
Availability of Improved Buck				
Yes	154(-41.4)	86(-31.5)	240(-37.21)	6.60*
No	218(-58.6)	187(-68.5)	405(-62.79)	
Main Breeding Season				
Winter	217(-58.33)	164(-69.23)	381(-59.07)	1.094
Summer	132(-35.49)	88(-32.23)	190(-34.11)	
Rainy	23(-6.18)	21(-7.69)	44(-6.82)	
Mating Time After Noticing				
< 12 hours	34(-9.14)	43(-15.75)	77(-11.94)	8.285*
12-24 hours	246(-66.13)	176(-64.47)	422(-65.43)	
> 24 hours	92(-24.73)	54(-19.78)	146(-22.63)	
Pregnancy Diagnosis				
Yes	326(-87.63)	259(-94.87)	585(-90.7)	9.775**
No	46(-12.37)	14(-5.13)	60(-9.3)	
If Yes, then				
Own judgments	296(-90.8)	247(-95.37)	543(-92.82)	4.522*
V.O. / LI	30(-9.2)	12(-4.63)	42(-7.18)	

Figure in parenthesis indicate percentage and *Significant (P<0.05), **Significant (P<0.01)

The results also indicated that goat keepers having more numbers of breedable goats maintain their own breeding buck and those having smaller flocks mostly used the outsider breeding buck for mating the goats. These findings are in accordance with the findings of Sharma (2005), Kumar (2011) and Singh *et al.* (2014). Maximum (47.62%) goat rearers used a breeding buck for a period of 2-3 years while, 36.51 per cent goat rearers used a breeding buck for more than 3 years and only 15.87 per cent of goat keepers used the breeding buck for 1-2 years. Present findings are in agreement with those reported by Gurjar *et al.* (2007) and Kumar (2011). Contrasting findings by Sorathiya *et al.* (2016) have been reported which stated that 67.33% respondents changed the bucks after one year. Both physical appearance and breed characteristics as criteria to select breeding buck was practiced by 77.37 per cent respondents while, 16.90 per cent used breed and only 5.74 per cent goat rearers used only physical appearance as criteria for selection of breeding buck.

Majority of goat keepers (62.79%) reported that the improved breeding bucks were not available in the study area while only 37.21 per cent goat keepers had improved buck. The reason behind it was seen in the fact that Pantja buckling was being castrated at an early age to develop them as a source of delicious meat. More or less similar findings were reported by Gokhale *et al.* (2002) Sharma (2005) and Jana *et al.* (2014). The overall results showed that more than half of goat rearers (59.07%) observed heat during winter season followed by summer (34.11%) and rainy season (6.82%). The findings of the present study are in agreement with those reported by Singh (2015). Contrary to these findings Rai and Singh (2004), Singh *et al.* (2009) and Kumar (2011) have reported that majority of the goats showed oestrus in the months of June and July which resulted in maximum kidding during November- December. This may be due to variation in climate and availability of feed and fodder within area specific. The overall data showed that 11.94, 65.43 and 22.63 per cent of the respondents mated the goats in early heat (<12 hours), mid heat (12-24 hours) and late heat (> 24 hours) respectively. Present findings are in agreement with those reported by Singh (2015). The data pertaining to the practice of pregnancy diagnosis was followed by 90.70% of the goat keepers, whereas, remaining 9.30% of the respondents did not follow pregnancy diagnosis practices for the goats. Among the pregnancy diagnosis practices adopted, 92.82 per cent pregnancy diagnosis were done by the own judgment followed by those done by qualified veterinarian/livestock inspectors (7.18%). These findings are in accordance with the observations of Sharma (2005) and Kumar (2011). Data regarding the treatment of anoestrus and repeat breeding problem, majority (70.39%) of the respondents were not properly treated their problematic does with the help of veterinary doctor and stockman while, only 29.61% respondents reported that they treated to their does in case of anoestrous and repeat breeding. The proportion of goat rearers who were well aware to provide treatment were maximum at 34.43 per cent belongs to Nainital district. The corresponding value of Udham Singh Nagar district was 26.08 per cent. The present value is higher than those reported by Gurjar *et al.* (2008)

and Kumar (2011). The association between district and breeding management practices followed by goat keepers' viz. heat detection practice, methods of heat detection, symptoms of heat detection, source of breeding buck, breeding buck used in a flock, selection criteria of breeding buck and breeding season was found to be non-significant whereas, availability of improved buck, mating time after noticing, pregnancy diagnosis and treatment of anoestrous/ repeaters was significant.

Reproductive Performance

The data regarding to reproductive performance of Pantja goats are depicted in Table 2. The overall mean and their standard error for age at first mating have been observed to be 255.66 ± 2.29 days. The mean age at first mating among districts was studied and found to be lower (247.04 ± 8.53 days) in Nainital and higher (264.27 ± 3.20 days) in Udham Singh Nagar. The results of the study are in agreement with the findings reported by Yadav and Khadda (2009) for Sirohi breed, Sabapara *et al.* (2011) for Surti goats, Senapati (2013) for Black Bengal goats and Singh (2016) for Pantja goats. The present value is lower than that reported by Ahmad *et al.* (2007) in Beetal goats (386.29 days) and Gurjar *et al.* (2007) in Sirohi goats (16.05 months). The overall mean and their standard error for weight at first mating have been observed as 15.33 ± 0.12 kg. The mean body weight at first mating has been observed as 14.82 ± 0.17 kg in U.S. Nagar and 15.84 ± 0.54 kg in Nainital district. The results of the present study are in agreement with the findings reported by Singh (2016) for Pantja goats. The present values are higher than those reported by Senapati (2013) in Black Bengal goats (10.48 ± 0.15 kg) and lower than those reported by Rao *et al.* (2009) in Ganjam goat (22.97 kg).

Table 2: Means and their SE for reproductive performance of Pantja goat

Particulars	District		Overall (N=645)
	U. S. Nagar (N=372)	Nainital (N=273)	
Age at first mating (days)	264.27 ± 3.20	247.04 ± 8.53	255.66 ± 2.29
Weight at first mating (kg)	14.82 ± 0.17	15.84 ± 0.54	15.33 ± 0.12
Age at first kidding (days)	414.68 ± 7.96	401.75 ± 8.77	408.22 ± 5.04
Weight at first kidding (kg)	19.09 ± 0.22	19.15 ± 0.25	19.12 ± 0.19
Service period (days)	153.54 ± 1.42	149.15 ± 1.55	151.70 ± 1.08
Kidding interval (days)	298.94 ± 1.73	293.96 ± 2.29	296.83 ± 1.43
Productive life of doe (years)	6.70 ± 0.08	6.66 ± 0.09	6.68 ± 0.07
Productive life of buck (years)	5.05 ± 0.09	4.89 ± 0.11	4.97 ± 0.08
Pregnancy ratio of female flock (%)	78.51 ± 1.20	80.22 ± 1.26	79.49 ± 1.13
Infertility ratio of female flock (%)	21.49 ± 1.20	19.78 ± 1.27	20.63 ± 1.13
Twining birth (%)	56.22 ± 1.02	60.88 ± 1.05	58.19 ± 0.74
Triplet birth (%)	2.65 ± 0.34	3.12 ± 0.57	2.88 ± 0.26

The overall mean and their standard error for age at first kidding have been observed 408.22 ± 5.04 days. The district wise average age at first kidding have been observed 414.68 ± 7.96 days in Udham Singh

Nagar district and corresponding figures were 401.75 ± 8.77 days in Nainital district. These findings are almost similar to Yadav and Khadda (2009), Sabapara *et al.* (2011) and Singh (2015) in different breeds of goats. The present value is higher than those reported by Senapati (2013) in Black Bengal goats (379 ± 2.39 days) and lower than those reported by Ahmad *et al.* (2007) in Beetal goats (522.38 days), Verma *et al.* (2009) in Pantja goat (569.6 ± 15.3 day), Singh *et al.* (2009) in Zalawadi goats (22.17 ± 0.16 months) and Rao *et al.* (2009) in Ganjam goat (618.88 days).

The overall mean and its standard error for weight at first kidding have been observed as 19.12 ± 0.19 kg. The district wise average weight at first kidding has been observed as 19.09 ± 0.22 kg in Udham Singh Nagar district and corresponding value was 19.15 ± 0.25 kg for Nainital district. The present value is higher than that reported by Senapati (2013) in Black Bengal goats (14.44 ± 0.14 kg) and lower than that reported by Rao *et al.* (2009) in Ganjam goat (22.97 kg). The overall mean and its standard error for service period were 151.70 ± 1.08 days. The district wise average service period was 153.54 ± 1.42 days in Udham Singh Nagar district and 149.15 ± 1.55 days in Nainital district. These observations were similar to that of Pathodiya *et al.* (2004), Yadav and Khadda (2009) and Singh (2015). The present value is higher than that reported by Sabapara *et al.* (2011) in Surti goats (2.90 ± 0.20 months) and by Senapati (2013) in Black Bengal goats (61.60 ± 1.55 days).

The overall mean and its standard error for kidding interval has been observed as 296.83 ± 1.43 days whereas, district wise average kidding interval of Udham Singh Nagar and Nainital districts were 298.94 ± 1.73 and 293.96 ± 2.29 days respectively. These findings were in conformity with those of Pathodiya *et al.* (2004), Rao *et al.* (2009), Verma *et al.* (2009), Sabapara *et al.* (2011) and Singh (2015) in different breeds of goats. The present value is higher than those reported by Senapati (2013) in Black Bengal goats (204.90 ± 2.09 days) and lower than those reported by Ahmad *et al.* (2007) in Beetal goats (350.50 days) and Singh *et al.* (2009) in Zalawadi goats (11.28 ± 0.87 months). The overall mean and its standard error for productive life of does and breeding bucks were 6.68 ± 0.07 and 4.97 ± 0.08 years respectively. The district wise average productive life of doe and breeding buck was 6.70 ± 0.08 , 5.05 ± 0.09 and 6.66 ± 0.09 and 4.89 ± 0.11 years in Udham Singh Nagar and Nainital districts respectively. Similar findings were observed by Singh (2015). The overall mean and their standard error for pregnancy and sterile ratio of the flock were 79.49 ± 1.13 and 20.63 ± 1.13 per cent respectively. Present findings are in agreement with those reported by Singh (2015). The overall mean and its standard error for twinning and triplet birth rates were 58.19 ± 0.74 and 2.88 ± 0.26 per cent respectively. More or less similar findings have been reported by Singh (2016). The present values are lower than those reported by Ahmad *et al.* (2007) in Beetal goats (77.76 and 12.19 per cent).

Conclusion

Based on results of present study it was concluded that the goat keepers of the region were not fully aware about improved breeding management practices. Pantja breed of goat has an immense production potential. The maximum potential has not been realized due to subsistence type of production system adopted by the goat keepers. It can be achieved by following improved husbandry practices, which will not only improve the productive and reproductive performance of the goats but also improve the socio-economic conditions of the goat rearers.

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