Study of Reproductive Traits of Does in Different Altitudes of Rolpa District

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ABSTRACT

Goat is a domesticated small ruminant, primarily reared by small farmers for meat production, across the country. Productivity of goat is often low, which could be related to several genetic and non-genetic factors. A field study was carried out to characterize, evaluate and estimate the effect of non-genetic factors on the reproductive performance of hill goats during December, 2015 to August 2016 in different eco-zones at Rolpa district of mid-western Nepal. Altogether 482 dams of different age groups were identified for this study. Reproductive performance were collected based on field monitoring and measurements within different altitudes of Rolpa district. Least square analysis was performed using Harvey (1990) computer software package, and means were compared using DMRT. Results revealed that the mean age of first heat in does (299 days), age at first kidding (493 days), gestation length (150 days), kidding interval (251 days), postpartum estrus (91 days), and kidding rates were (1.54 per doe), respectively. Altitude significantly influenced (P<0.001) along with parity (P<0.05) with respect to age of first heat in does. Significance difference of of kidding interval (P<0.05) was significantly influenced within different altitude of goat farming. Similarly, colour and altitude also significantly differed (P<0.05) with respect to kidding rates of does Thus the results of this study suggest that the performance of low altitude goat flocks was better than mid and high altitude goat flocks in Rolpa district in terms of production and reproduction traits. This result could be attributed to superior genotype along with better management practices followed by the farmers in Rolpa district.

***Keywords**: Altitude, Doe, Weaning, Kidding interval, Parity*

INTRODUCTION

Nepal is an agricultural country where about 66 percent of its population is involved in agricultural occupation. Agriculture contributes to around 27.1 percent of the gross domestic product (GDP) of Nepal, of which, the livestock sector contributes about 11.5

percent of the total GDP and 25.7 percent of the agricultural GDP (AGDP) as reported by MOAD (2018). Goat farming is being the most popular means of self-employment among the youths in the country. Current statistics regarding to goat population indicated that there are more than 11.64 million of goats in the country (MOAD, 2018). Among the agricultural commodities, livestock plays an important role in agricultural development and economic upliftment of the country. Goat farming has been practiced by a large section of population in rural areas of Nepal. The recent population of goat is about 11.64 million and total meat contribution was 6.9 thousand metric tonnes per year (MOAD, 2018). The rate of increment in goat population during last 15 years (2008 to 2018) was reported 3.74 percent per year contributing about 20.1% to the total meat production in the country (MOAD, 2018). Goats breed in Nepal are quite different with locational difference. There are gradients of topography, environment and climatic conditions vary from South to North, and each breed evolved is acclimatized corresponding to each topographical zone (Pradhan and Gurung1985). In Nepal there are four commonly documented breed of goats as Chyangra, Sinhal, Khari and Terai goats. Chyangra goats are found in 2400 meters in high Himalayans, while Sinhal found in high hill ranging 1500-3000 meters from sea level. Khari are available across the hills of Nepal while Terai goats are available in Terai region of Nepal. Chyangra (1%), Sinhal (16%), Khari/hill goat (56%) and remaining 27% are of Terai and other breeds (Pokharel and Neopane, 2008).

MATERIALS AND METHODS

This chapter deals with the site of study, data collection and recording procedures, data analysis techniques, description of data sets and models used for analyzing the recorded traits.

Time and Location of the study

This study was carried out from September, 2015 to August 2016 in Rolpa district of mid-western Nepal. Rolpa covers an area of 1,879 km² with population (2016) of 221,177. Rolpa is drained southward by the Madi River from a complex of 3,000 to 4,000 meter ridges about 50 kilometers south of the Dhaulagiri Himalaya (Statoids, 2014). The Rolpa district lies at the height of 701m to 3639 meters above the sea level. The total area is 189385 hectares out of which 59854.5 hectares of land is used for crop farming, forest consists 84474 hectares, pasture consists 32698.8 hectare, wild plants and forages 9620.8 hectare and rivers and rocks 1251.9 hectares. The average temperature in Rolpa district is maximum (31.2 Celsius), minimum (3.6 Celsius) and annual rainfall is 441mm (CBS, 2016).

Sampling procedure and sample size

The datas were collected on the basis of Pocket areas of goats distributed within different altitude at Rolpa district. The selected high altitude VDCS were (Jaimakshala and

Pakhapani) followed by mid altitude VDCS (Gairigaun and Libang) and low altitude VDCS (Masina and Jhenam). The elevations of high, mid and low altitude from the sea level in Rolpa district are at the range of 3639, 1375 and 701 m respectively. The elevation of selected areas for this research low, mid and high altitudes were 800-1000, 1200-1400 and 1500-1800 m respectively from the sea level. The two wards were selected from each VDCS. From each ward at least 40 does with reproductive parameters were recorded. The reproductive parameters of does were parity, age at first heat (puberty), age at first kidding, gestation length, kidding interval and post-partum estrus. Within the population, in each selected site, sampling goats were identified randomly. A data recording format was developed to collect data and information related to growth performance, reproductive performance and litter traits of hill goats reared in the study area.

Statistical analysis

Collected data were entered in the computer using MS- Excel and converted into text documents i.e. Text (MS-DOS). To study the main causes of variation and effects of non-genetic factors on productive and reproductive traits, as well as to overcome the difficulty of disproportionate subclass numbers, data were analyzed by least squares procedure using Harvey, (1990) which is based on least squares technique of variance analysis. The pair wise comparison of the least square mean comparison was made using DMRT (Duncan's Multiple Range Test) (Duncan, 1955) as modified by Kramer (1957).

Models used to analyze the collected data

A fixed effect model given by Handerson (1953) was used to analyze the body weights of kids at different stages of growth.

Model I (fixed effect model) for dam weight and reproductive traits

$$\mathbf{Y_{ijklmn} = \mu + a_i + b_j + c_k + d_l + e_{ijklmn}}$$

Where, μ is the overall mean

a_i is the effect of i^{th} altitude (i=1,2 and 3)

b_j is the effect of j^{th} type of breed (j = 1, 2and3)

c_k is the effect of k^{th} type of colour (l= 1,2,3and 4)

d_l is the effect of parity (k= 1,2,34,5,6,7 and 8)

e_{ijk} is the random element assumed (error mean) to be normally and independently distributed among the sampled population.

RESULTS AND DISCUSSION

This chapter describes the study results focusing to the growth performance, morphological traits, reproductive traits, and litter traits as well as production systems of goats.

Body weight of does

The mean body weight of doe was 38.26±0.61 as mentioned in below Table (1). The data were collected and analyzed from one to seven-year-old does. Joshi *et al.* (2003) reported that the average body weight of Khari, Khapari and Khabari does were 20-40, 34.4±10.2 and 27.4±6.6 kg respectively.

Table 1. Least square means for body weight (kg) of does in Rolpa district, Nepal, 2015/16

Factors	LS±SE	NO	Significant Level
Overall	38.26 ±0.61	482	
Altitude			***
LA	39.40 ±0.72[a]	162	
MA	37.55 ±0.65[ab]	160	
HA	36.81 ±0.77[b]	160	
Breed			**
Khari	34.73 ±0.63[b]	223	
Khapari	39.23 ±0.67[a]	180	
Khabari	37.80 ±0.82[a]	79	
Colour			NS
Black	38.80±0.66	192	
Brown	38.02±0.64	183	
White	38.87±0.10	41	
Mixed	37.33± 0.87	66	
Parity			***
1	35.14 ±0.45[b]	189	
2	36.27 ±0.37[b]	282	
3	43.36 ±0.16[a]	11	

Note: **significant at 1% (P<0.01) ***significant at 0.1% (P<0.001), NS-non significant, LS mean- Least square mean, SE- Standard error of mean. NO is the number of observations.

Teat length of does

The overall average teat length of goats was 6.19±1.39 cm. The various factors effecting the teat length of does are presented in Table (2). Hashan *et al.* (2010) reported jamunapari 8.5cm ±1.5cm long teat length. Fasulkov *et al.* (2014) local Bulgarian breed, 2 to 8 years of age, weighing 45-60 kg. Sixty teats were examined by ultrasonography using a 7.5 MHz linear transducer and the "water bath" technique. Ultrasound measured parameters were teat canal length and diameter, diameter in the region of Furstenberg's rosette, widest teat cistern diameter and teat wall thickness. Ultrasound scans were done during the 1st, 3rd and 5th months of lactation. The experiment revealed the mean teat length of goat to be 6.75 cm.

Table 2. Least square means for teat length (cm) of does in Rolpa district, Nepal, 2015/16

Factors	LS±SE	NO	Significant Level
Overall	6.19 ±1.39	482	
Altitude			*
LA	5.76 ±1.67[b]	162	
MA	7.03 ±1.47[a]	160	
HA	5.79 ±1.80[b]	160	
Breed			NS
Khari	5.96±1.52	223	
Khapari	6.37±1.47	180	
Khabari	6.22±1.93	79	
Colour			**
Black	5.30 ±1.52[b]	192	
Brown	5.43 ±1.47[b]	183	
White	8.10 ±2.31[a]	41	
Mixed	5.89 ± 1.77[ab]	66	
Parity			NS
1	6.37±1.01	189	
2	6.03±0.83	282	
3	5.13±1.4	11	

Note: * significant at 5% (P<0.05), **significant at 1% (P<0.01), NS-non significant, LS mean- Least square mean, SE- Standard error of mean. NO is the number of observations.

Udder circumferences of does

The following section describes the detail about the udder circumferences of does representing Rolpa district. The average udder circumference from one to seven-year-old does in this study was 29.46±1.43 cm. The various factors affecting the udder circumference of does are presented in below Table (3). The udder is a very important gland in reproducing animals and for milk production. Several studies have confirmed that udder and teat characteristics are important determinants of milk yield and ease of milking or milking ability in dairy animals (Akpa *et al.,* 2013). Udder and teat characteristics have been shown to be influenced by several factors such as genotype, breeding and management systems (Milerski *et al.,* 2006). Abu *et al.* (2013) also reported udder circumference of West African dwarf goats on average 22.60±0.78 cm reared under semi-intensive and 22.69±0.82cm reared under extensive systems of management. This result is similar finding with this study.

Table 3. Least square means for udder circumference (cm) of doe in Rolpa district, Nepal, 2015/16

Factors	LS±SE	NO	Significant Level
Overall	29.46 ±1.43	482	
Altitude			***
LA	31.90 ±1.80[a]	162	
MA	32.76 ±1.60[a]	160	
HA	23.74 ±1.93[b]	160	
Breed			NS
Khari	29.33±1.52	223	
Khapari	29.79±1.67	180	
Khabari	29.28±2.05	79	
Colour			***
Black	29.92 ±1.67[a]	192	
Brown	30.86 ±1.60[a]	183	
White	30.88 ±2.51[a]	41	
Mixed	26.21 ± 2.18[b]	66	
Parity			NS
1	29.64±1.09	189	
2	29.03±0.88	282	
3	29.71±1.60	11	

Note: ***significant at 0.1% (P<0.001), NS-non significant, LS mean- Least square mean, SE- Standard error of mean. NO is the number of observations.

Age at first heat on does

This is an important economic trait of goats that determines their productive lifespan. The overall age at first heat of does was 299.19±0.83 days. Fauque *et al*. (2010) studied reproductive traits of black bengal goats at bangladesh. The good management system might be the cause to show the early signs of heat in does. The study revealed that the age at first heat range between 123-294 days. He studied age at first heat in three consecutive seasons. On first, second and third season the age at first heat in does were recorded as 152.29, 216.16 and 193.2 days respectively. The effects of season and feeding level on age at first heat were significant (P<0.01) but rearing system did not affect (P>0.05) the age at first heat. Amin *et al.* (2000) also observed the age of first heat in randomly bred Black Bengal goat to be 241.23±15.18 days. The factors effecting age at first heat on does are presented in below Table (4).

Table 4. Least square analysis of means (days) of first heat in does at Rolpa district, Nepal 2015/ 2016

Factors	LS±SE	NO	Significant Level
Overall	299.19 ±0.83	482	

Altitude			***
LA	288.62±0.39[b]	162	
MA	331.76 ±0.35[a]	160	
HA	289.15 ±0.42[b]	160	
Breed			***
Khari	298.54±0.34[b]	223	
Khapari	323.71 ±0.37[a]	180	
Khabari	300.01±0.45[b]	79	
Colour			NS
Black	297.36±0.36	192	
Brown	300.10±0.15	183	
White	319.28±0.54	41	
Mixed	279.71± 0.47	66	
Parity			*
1	316.8 ±0.24[a]	189	
2	294.62±0.20[b]	282	
3	292.80±0.88[b]	11	

Note: * significant at 5% (P<0.05), ***significant at 0.1% (P<0.001), NS-non significant, LS mean- Least square mean, SE- Standard error of mean. NO is the number of observations.

Age at first kidding

The overall age of first kidding age of hill goats was 493.99±0.81 days as mentioned detail in below Table (5). This finding is somewhat closely resemblances with the findings of Joshi *et al.* (2003) where the author reported that the age at first kidding of Khari, Khapari and Khabari goats were 478, 577 and 564 days respectively. However, Pandey SR (2009) reported that the age at first kidding of Khari, Khapari and Khabari goats were 549, 696 and 588 days respectively. The age at first kidding was reported in between 387-693 days among the various production patterns and goat breeds (Zarkawi and Abu-Saker, 2013).

Table 5. Least square means for age at first kidding (days) of does in Rolpa district, Nepal, 2015/16

Factors	LS±SE	NO	Significant Level
Overall	493.99 ±0.81	482	
Altitude			***
LA	475.42 ±0.38[b]	162	
MA	524.42 ±0.34[a]	160	
HA	482.11 ±0.41[b]	160	
Breed			**
Khari	506.20 ±0.33[b]	223	

Khapari	509.64 ±0.36[a]	180	
Khabari	505.55 ±0.43[b]	79	
Colour			NS
Black	490.64±0.35	192	
Brown	499.46±0.34	183	
White	512.25±0.53	41	
Mixed	471.77± 0.46	66	
Parity			NS
1	506.46±0.24	189	
2	490.94±0.19	282	
3	483.94±0.86	11	

Note: **significant at 1% (P<0.01) ***significant at 0.1% (P<0.001), NS-non significant, LSD-Least significant difference, LS mean- Least square mean, SE- Standard error of mean. NO is the number of observations.

Gestation length

The overall mean gestation length of hill goat as reflected in this study was 150.04±0.11 days, with the range of 147 to 154 days. This finding was also in agreement with the results of study conducted by Pokharel and Neopane (2008) in Hill-goats. The various factors affecting the gestation period of does are presented in below Table (6).

Table 6. Least square means for Gestation Length (days) of does in Rolpa district, Nepal, 2015/16

Factors	LS±SE	NO	Significant Level
Overall	150.04 ±0.11	482	
Altitude			NS
LA	150.12±0.12	162	
MA	149.99±0.11	160	
HA	150.00±0.14	160	
Breed			
Khari	149.98±0.11	223	NS
Khapari	150.14±0.12	180	
Khabari	149.99±0.14	79	
Colour			NS
Black	150.12±0.12	192	
Brown	149.95±0.15	183	
White	150.09±0.18	41	
Mixed	149.95± 0.15	66	
Parity			NS
1	150.09±0.82	189	
2	150±0.06	282	

3	150±0.29	11	

Note: NS-non significant, LS mean- Least square mean, LSD-Least significant difference, SE- Standard error of mean, NO are the number of observations.

Kidding Interval of does

The overall mean kidding interval was 251.27±0.40 days mentioned detail in Table (7). However, Pokharel and Neopane (2008) also reported lower kidding interval of central Terai goats (218±5 days) which was in agreement with the findings of this study. According to Kamal and Nikhaila (2009) another factor which can lead to long open period is under nutrition which extends Kidding Interval. The high level of feeding after kidding shortens the interval from first breeding to conception and thus reduces Kidding Interval. Quality and quantity of feed have effect on Kidding Interval which seems to be shorter (250 days) for goats under plenty feed and longer (314 days) for goats under feed shortage. Rolpa farmers might have supplied good quality feed to does during breeding to conception. A study done by Alphonsus *et al*. (2010) in Nigeria found the KI to be 6.9 months (207 days), which is close to 204 days reported by Sodiq (2014) in Indonesia on goat raised under traditional management.

Table 7. Least square means for kidding interval (days) of does in Rolpa district, Nepal, 2015/16

Factors	LS±SE	NO	Significant Level
Overall	251.27 ±0.40	394	
Altitude			*
LA	247.01 ±0.19^{b}	113	
MA	259.49 ±0.17^{a}	140	
HA	247.62 ±0.20^{b}	141	
Breed			NS
Khari	244.23±0.17	178	
Khapari	260.31±0.13	151	
Khabari	254.57±0.21	65	
Colour			NS
Black	248.23±0.17	159	
Brown	223.71±0.12	142	
White	226.45±0.26	37	
Mixed	217.01±0.23	56	
Parity			NS
1	230.40±0.13	106	
2	224.62±0.09	279	
3	209.10±0.42	9	

Note: * significant at 5% (P<0.05), NS-non significant, LS mean- Least square mean, LSD-Least significant difference, LSD-Least significant difference, SE- Standard error of

mean. NO is the number of observations.

Postpartum estrus of does

The overall mean post-partum estrus interval of the hilly goat flock was 91.22±0.94 days with the range of 88 to 96 days. The postpartum period is characterized by uterine involution and restoration of ovarian functions, since both should occur to establish a new pregnancy. The completion of uterine involution was defined as the day when the diameter of the uterus returned to the original non-pregnant size as observed during the normal estrous cycle Postpartum period start from parturition and lasts until uterine involution is completed and female resumes ovarian activity (Garcia, *et al.* 2008). The interval between parturition and the first post-partum estrus is an important trait which contributes to the productive efficiency of a doe. The involution of the post-partum uterus was one of the economic important limitations in achieving the goal of suitable kidding interval. Postpartum estrus period was 77.00+4.04 and 95.33+2.60 days as reported by Sadat (2014) under semi-intensive production are in close with little difference to the present study in Kamohri goats (Greyling, 2004).

Table 8. Least square means for postpartum estrus (days) of does in Rolpa district, Nepal, 2015/16

Factors	LS±SE	NO	Significant Level
Overall	91.22 ±0.94	482	
Altitude			NS
LA	89.20±0.44	162	
MA	96.44±0.40	160	
HA	88.01±0.48	160	
Breed			NS
Khari	92.83±0.39	223	
Khapari	88.62±0.42	180	
Khabari	92.19±0.51	79	
Colour			NS
Black	90.54±0.41	192	
Brown	91.35±0.40	183	
White	91.27±0.62	41	
Mixed	91.70± 0.54	66	
Parity			NS
1	89.71±0.28	189	
2	95.12±0.23	282	
3	88.82±0.10	11	

Note: NS-non significant, LS mean- Least square mean, SE- Standard error of mean. NO is the number of observations.

Kidding rate of does

The average kidding rates is 1.54±0.16 in this study. Average kidding rate of Rolpa goat was 1.54±0.16. HMG/N, (1993) had also reported similar value of kidding rate (i.e. 1.47) of local hill goats. The kidding rate of Khari, Khapari, Khabari breed were 1.41±0.15, 1.58±0.17 and 1.59±0.20 respectively. Pandey SR (2009) reported that the kidding rate of Khari, Khapari, Khabari goats were 1.70, 1.31, 1.44 respectively. However, Neopane (2000) reported the higher kidding rate of central Terai goat (1.60) and Tamrakar and Chapagain (2000) also reported similar value of kidding rate of Terai (1.60) and Barbari Goats (1.63) reared at RARS, Nepalgunj. The detail of kidding rates is presented in below Table (9).

Table 9. Least square means for kidding rate of does at Rolpa district, Nepal, 2015/16

Factors	LS±SE	NO	Significant Level
Overall	1.54 ±0.16	482	
Altitude			NS
LA	1.55±0.18	162	
MA	1.52±0.16	160	
HA	1.51±0.17	160	
Breed			NS
Khari	1.41±0.15	223	
Khapari	1.58±0.17	180	
Khabari	1.59±0.20	79	
Colour			*
Black	1.40 ±0.17^{bc}	192	
Brown	1.55 ±0.16^{ab}	183	
White	1.86 ±0.23^{a}	41	
Mixed	1.29 ±0.19^{bc}	66	
Parity			NS
1 Year	1.52±0.15	56	
2 Year	1.55±0.18	88	
3 Year	1.59±0.25	6	

Note: * significant at 5% (P<0.05), NS-non significant, LSD-Least significant difference, LS mean- Least square mean, SE- Standard error of mean. NO is the number of observations.

DISCUSSION

This study was designed to characterize and evaluate the productive and reproductive performance of hill goat reared under farmers' condition in Rolpa district of Nepal during December, 2015 to July 2016. The other objectives were to study the effect of non-genetic factors like altitude, colour, age, sex, parity etc in relation to the existing goat production

system. Periodic observations on morphological traits, productive and reproductive performance were measured and recorded. The high altitudes VDCS were (Jhamksala and Pakhapani) followed by mid altitude VDCS (Gairigaun and Libang) and finally to low altitude VDCS (Masina and Jhenam). The elevation of selected high, mid and low altitude from the sea level in this research is at the range of 3639, 1375, 701 m respectively. The elevation of selected goat pocket areas for this research at low, mid, high altitudes were 800-1000, 1200-1400, 1500-1800 m respectively from the sea level. The two wards were selected from each VDCS. There were three recognized breeds Khari, Khapari (Khari*Jamunapari) and Khabari (Khari*Barbari). However, Chyangra, Boers and Terai crosses were also observed in a few numbers. The data of 482 does were collected from different altitudes of Rolpa districts. Farmers and technicians claimed the selected goats of being pure Khari, (Khari and Jamunapari) 50% cross breed and (Khari and Barbari) 50% cross breed. However, characterization of such breeds at molecular level was not carried at Rolpa district. So, it could not be understood so far their DNA level.

Morphological attributes, productive, and reproductive performance were collected based on field monitoring and measurements. Least square analysis was performed using Harvey (1990) computer software package. Information on goat production systems were collected by employing a semi-structured questionnaire and analyzed using SPSS.

The non-genetic factors like altitude, color, sex, season and parity were considered for morphological and reproductive parameters of does. The overall mean for body weight of does were 38.26±0.61 kg. Low altitude body weight of does 39.40±0.72 kg were significantly heavier ($P<0.001$) than that of mid altitude doe (37.55±0.65 kg) and high altitude doe (36.81±0.77 kg). Khapari does body weight (39.23±0.67 kg) were significantly heavier ($P<0.01$) than that of Khari (34.73±0.63 kg) and Khabari (37.80±0.82 kg). Parity of does also differed significantly ($P<0.001$) to the body weight of does. The non-genetic factors like altitude, colour, age, were considered for morphological traits of goats. The non-genetic factors like altitude, color and parity were considered for reproductive performance of does.

The overall mean of age at first heat was 299.19 ±0.83 days. The age of first heat in mid altitude (331.76±0.35) days was significantly higher ($P<0.001$) than that of high altitude (289.15±0.42) days and low altitude (288.62±0.39) days. The age of first heat in Khari (298.54±0.34) days was significantly higher ($P<0.001$) than that of Khapari (323.71±0.37) days and Khabari (300.01±0.45) days.

The overall mean for age at first kidding of does was 493.99±0.81 days. The age at first kidding at mid altitude (524.42±0.34) was significantly higher ($P<0.001$) than that of low altitude (475.42±0.38) and high altitude (482.11±0.41) days respectively. The age at first kidding for Khari, Khapari and Khabari breeds were 506.20±0.33, 509.64±0.36 and

505.55±0.43 days respectively. Age at first kidding differed significantly (P<0.001) with respect to breed.

The overall mean for gestation length was 150±0.11 days. The kidding interval of mid altitude (251.49±0.17) days was significantly (P<0.05) higher than that of low altitude (247.01±0.19) days and high altitude (247.62±0.20) days. The mean for post-partum estrus was 91.22±0.94 days. The overall mean for Kidding rate of does was 1.54±0.16. The kidding rates of Khapari, Khari and Khabari does were 1.58±0.17, 1.41±0.15 and 1.59±0.20 respectively. Kidding rates differed significantly (P<0.5) with respect to coat colour of does. The overall mean kidding interval was 251.27±0.40 days. The overall mean for body length of does were 74.29±0.99 cm. There was differed significantly (P<0.001) with respect to altitudes. The overall least square mean for heart girth of does were 74.21±0.66 cm. It differed significantly (P<0.001) within altitude, breed (P<0.05) and parity (P<0.05). The overall least square mean of wither height of does were 68.19±1.85 cm. The overall mean for teat length of does were 6.19±1.39 cm. Teat length differed significantly (P<0.05) with respect to altitude and (P<0.01) within Colour. The overall mean for udder circumference of does were 29.46±1.43 cm. It also differed significantly (P<0.001) within altitude and colour. Goat farming was practiced as a subsistence occupation with three distinct systems of feeding i.e. extensive grazing, stall feeding, and grazing plus stall feeding supplementing little maize grains and flour as per availability. Majority of the farmers depended on the community forest as well as on their own farmland for collecting fodder and forages. Major problems of goat farming in Rolpa district were occurrence of epidemic disease, lack of veterinary and technical advice, and attack of wild animal. Thus the results of this study suggest that the performance of low altitude goat flocks was better than mid and high altitude goat flocks in Rolpa district in terms of production and reproduction traits. This result could be attributed to superior genotype along with better management practices followed by the farmers in Rolpa district.

CONCLUSION

Results revealed that the mean age of first heat in does (299 days), age at first kidding (493 days), gestation length (150 days), kidding interval (251 days), postpartum estrus (91 days), and kidding rates were (1.54 per doe), respectively. Altitude significantly influenced (P<0.001) along with parity (P<0.05) with respect to age of first heat in does. Significance difference of of kidding interval (P<0.05) was significantly influenced within different altitude of goat farming. Similarly, colour and altitude also significantly differed (P<0.05) with respect to kidding rates of does Thus the results of this study suggest that the performance of low altitude goat flocks was better than mid and high altitude goat flocks in Rolpa district in terms of production and reproduction traits. This result could be attributed to superior genotype along with better management practices followed by the farmers in Rolpa district.

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