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Effects of concentrates and probiotics supplementation on colostrums and Milk composition of Boar x local cross perparturient goats

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Abstract
Present study was conducted at MRCSG Shuhama to study the effect of concentrate and probiotics supplementation on the performance of does during periparturient period. Twenty four pregnant healthy Boar x local cross does in the last month of gestation (day 120) were selected randomly and allotted to 4 treatment groups (T1, T2, T3 and T4) of 6 animals each. The does were maintained under stall feeding conditions and offered a daily ration consisting of oats hay @ 1.2 kg/head/day and commercial pelleted feed @ 577.5 g/head/day during periparturient period (one month pre-partum to one month post-partum). Does in treatment groups T1 were offered normal daily ration without supplementation. In T2 group were offered normal ration with concentrate @ 150 gram /head/day, T3 group were offered normal ratio with concentrate @ 150 gram/head/day and probiotic @ 2.5 gram/head/day and in T4 groups were offered normal ratio with concentrate 150g + probiotic @ 4 gram/head/day. Probiotic = *Saccharomyces cerevisiae* x10^{10} CFU. Colostrum fat, protein SNF and TS percent was significantly (p<0.05) higher in T2, T3 and T4 as compared to T1 (control) groups on 1st and 3rd day. More ever there was non-significant change in the milk fat, protein SNF and TS percent composition on 5th, 12th, 19th and 26th days of lactation. On the 1st day of lactation colostrum fat percent was highest in T4 group as 8.83±0.13 while as colostrum protein, SNF and TS was highest in T3 group as 9.43±0.65, 20.11±0.62 and 24.33±0.81%, respectively and lowest in T1 (control) group as 7.56±0.17, 7.01±0.65, 17.15±0.45 and 21.28±0.70 %, respectively.

Keywords: Probiotics Supplementation, Perparturient

Introduction
Economy of Jammu and Kashmir is agriculture dependent and livestock farming occupies an important component of it. Owing to the presences of abundant alpine pasture and high demand of livestock products, sheep and goat rearing is the main activity of rural and backward peoples of Jammu and Kashmir union territory. It also plays a vital role in socio-economics upliftment of weaker sections of the society *viz*; Gujjars, Bakerwals, Chopans, Gaddies and Changpas. Goats are raised principally for their meat, milk, fibre and skin. It is very well suited with other livestock production such as sheep and cattle on low-quality grazing land (Bruinsma, 2003) [8]. Goats efficiently convert low quality grazing matter that is less desirable for other livestock into quality lean meat.

During periparturient period (three weeks before and three weeks after kidding) there is a negative energy balance in does, which is considered as primary cause for the development of the ketosis/ hyperketonemia in does resulting in their decreased performance or even mortality (Van Saun, 2000) [23]. Further during late gestation, there is reduction in the rumen capacity especially in twin and triplet-bearing animals owing to the presence of foetus and the subsequent pressure of the gravid uterus on rumen resulting in decreased dry matter intake and hence, loss of performance (Andrews *et al*., 1996) [1]. Nutrient restrictions during this period also results in foetal losses. This necessitates increasing nutrition density for meeting the requirements. Feeding of high level of concentrate increases the energy status of does during gestation and the kid born form these does are having higher body weight. Increase in the nutrient density by increasing the concentrate ratio may lead to a major change in rumen microbial populations due to rapid growth of lactic acid producing bacteria. High concentrations of lactic acid accumulation cause rumen pH to drop to less than 5.0. Probiotics supplementation during periparturient periods result in stabilization of ruminal pH, increases fibre degradation and volatile fatty acids production and improve gut health

As such the present study was conceived to evaluate effects of concentrates and probiotics supplementation on performance of Boar x local cross does during perparturient period. Yeast mixed with concentrate stimulated the growth rate and muscle development inlambs. Yeast supplementation had a significant effect on blood haematological indices (WBC, RBC) and contributed to higher lymphocyte percentages in the leukogram, indicating that the preparation actively stimulated the immune system of lambs. (Milewski and Sobiech, 2009) [17] Pre-weaning kid mortality is a major factor limiting goat production in the tropics and subtropics (Bellows *et al.* 1979) [6] and has been attributed to poor maternal milk supply resulting from inadequate nutrition during lactation. Improving milk yield of dams by providing adequate nutrition can alleviate pre-weaning kid mortality and improve growth of offspring (Akinbamijo *et al.* 2000) [3]. Nutritional supply during the periparturient period is essent

Materials and methods

The present study was conducted to explore the possibility of improvement in performance of periparturient does through concentrate and probiotics supplementation. The experiment was conducted at Mountain Research Centre for Sheep and Goat (MRCSG), Shuhama, SKUAST-K. Twenty four pregnant healthy Boar x local cross does in the last month of gestation (120 day) were selected randomly and allotted to 4 groups (T1, T2, T3 and T4) of 6 animals each. The does were maintained under stall feeding conditions and offered a daily normal ration consisting of oats hay @ 1.2 kg/head/day and commercial pelleted feed @ 577.5 g/head/day during periparturient period (one month pre-partum to one month post-partum). Does in treatment groups T1 were offered daily normal ration without supplementation. In T2 group were offered normal ration with extra concentrate @ 150 gram /head/day, T3 group were offered normal ratio with extra concentrate @ 150 gram/head/day + probiotic @ 2.5 gram/head/day and in T4 groups were offered normal ratio with extra concentrate 150g + probiotic @ 4 gram/head/day. Probiotic used in the experiment was *Saccharomyces cerevisiae* x10^{10} CFU.

Table 1: Feeding schedule of experimental animals during the study period

Different treatment	Normal ration		Extra conc (g)	Probiotics (g)	DCP (g/head/day)	TDN (g/head/day)
	Roughage oats hay(kg)	Conc(g)				
T1	1.2	577.5	-	-	105	918.6
T2	1.2	577.5	150	-	126	1015.8
T3	1.2	577.5	150	2.5	126	1015.8
T4	1.2	577.5	150	4	126	1015.8

Colostrum and milk analysis

Colostrum and milk samples were collected in the morning, once daily from postpartum does of different treatment groups on 1st, 3rd, 5th day and weekly. Samples were taken in sterilized glass container (200 ml capacity) after cleaning teat orifice. Samples were subjected to various physico-chemical analysis *viz* fat, protein, solid-not-fat, total solids percent and within a week time.

Fat percent

Fat percentage was determined by Gerber method (IS: 1224, 1958). In this method 10 ml of Gerber sulphuric acid was taken into butyrometer. 10.75 ml of well mixed sample of milk was taken with the help of pipette and transferred into the butyrometer carefully. With the help of tilt pipette 1 ml of amyl alcohol was added to the butyrometer. Lock stopper was put and the contents were mixed by shaking the butyrometer at angle of 45° until all curd has been dissolved. The butyrometer was placed in centrifuge and the machine was balanced. Centrifugation was done for 5 minutes at 1000 to 1200 rpm. The butyrometer was removed from centrifuge and fat column within the scale on butyrometer was adjusted and read.

Protein percent

Determination of protein in the sample of milk and colostrum was performed by formal titration method (Pyne, 1932). For this 10 ml of the well mixed milk was taken with the help of pipette into a 100 ml flask. Five drops of phenolphthalein indicator was added to it. Then milk was titrated against standard alkali to its end point. 2 ml of neutral formalin was added to it and again titrated against standard alkali to same end point as before. The volume of alkali used was recorded in the second titration.

Protein percent = v x 1.7

Where,

v = Volume of N/10 Sodium hydroxide required by 10 ml of milk treated with formaldehyde and 1.7 is Pynes constant.

Solids not fat and total solids percent

Solids not fat (SNF) and total solids (TS) percent were determined as per the standard procedure (IS: 1183, 1957). Temperature of milk and colostrum sample was adjusted near to 70 °F (not below 65 °F or above 75 °F). It was then gently mixed by pouring several times from one vessel to another, avoiding incorporation of air or foam formation. Sufficient amount of colostrum or milk was poured into lactometer jar to allow lactometer to float freely. Lactometer was placed in the milk/colostrum and allowed to come at constant level. Lactometer reading and temperature of milk/colostrum was taken as soon as it assumed constant level.

$$\text{Solids not fat (SNF)} = \frac{\text{CLR}}{4} + 0.21\,F + 0.36$$

$$\text{Total solids (TS)} = \frac{\text{CLR}}{4} + 1.21F + 0.36$$

Where,

CLR is corrected lactometer reading = Observed reading to correction factor (for every °F rise of temperature in milk to above 70°F, 0.2 lactometer reading was added to the observed lactometer reading, likewise for every °F lowering of temperature of milk, 0.2 was deducted from observed lactometer reading).

F is the fat content of milk which has to be ascertained by Gerber method.

Results and discussion

Colostrum and milk fat and protein

Colostrum and milk fat (%) are presented in the Table 2 and 3.There was decrease in fat (%) of colostrum form Ist to fifth day of periparturient does. Colostrum fat was significantly higher in T2, T3 and T4 as compared to control T1.Treatment groups on ist and 3rd day. On the ist day postpartum colustrum fat percent in different treatment groups was 7.56±0.17, 8.75±0.99, 8.68±0.21, 8.83±0.13for T1, T2, T3 and T4 respectively. On third day postpartum colustrum fat percent was highest in T4 as 7.68±0.23 and lowest in T1 as 6.08±0.59. However no significant difference between T2, T3 and T4.Moreever there was no significant change in the milk fat composition on 5th, 12, 19 and 26 days postpartum. Milk fat (%) was 3.61±0.21, 3.75±0.11, 4.11±0.15 and 4.18±0.21 (%) for T1, T2, T3 and T4 respectively 26 day postpartum. Colostrum protein was significantly higher in T2, T3 and T4 as compared to control T1. Treatment groups on ist and 3rd day. On the ist day postpartum colustrum protein percent in different treatment groups was 7.01±0.65, 9.40±0. 7199. 43±0.65 9.35±0.63for T1, T2, T3 and T4 respectively. On third day postpartum colustrum protein percent was highest in T4 as7.41±0.29and lowest in T1 as 5.73±0.51.However no significant difference between T2, T3 and T4. Moreever there was no significant change in the milk protein composition on 5th, 12, 19 and 26 days postpartum Milk protein (%) was 3.55±0.16, 3.81±0.09, 3.93±0.16 3.85±0 for T1, T2, T3 and T4 respectively 26 day postpartum. Values of milk fat, protein, SNF and TS percent in the present study was within the range as reported by Bhosale *et al.* (2009) [7]; Ghada (2005) [11] and Mahmut (2004) [16] in goat milk. In contrast to present study Marques *et al.* reported that milk fat, SNF, TS and lactose concentrations were higher in concentrate supplemented group. The decrease in TS, fat and protein contents associated with advancing lactation is in line with the reports of Agrawal and Bhattacharyya (1980) [4]. The findings of present investigation are in agreement with Charnobai *et al.* reported that the lactation period influenced the fat content of goat milk.

Table 2: Mean (±SE) Forthnightly Colostrum and milk fat percent of periparturient does supplemented extra concentrate with or without probiotics.

Days	Different treatment groups			
	T1(control)	T2	T3	T4
Ist	7.56±0.17^{a}	8.75±0.99 ^{b}	8.68±0.21^{b}	8.83±0.13^{b}
3rd	6.08±0.59^{a}	7.50±0.32^{b}	7.38±0.27^{b}	7.68±0.23^{b}
5th	4.30±0.19	4.91±0.39	5.08±0.30	5.11±0.23
12th	4.06±0.14	4.18±0.28	4.36±0.27	4.48±0.27
19th	4.05±0.22	4.30±0.23	4.16±0.30	4.20±0.17
26th	3.61±0.21	3.75±0.11	4.11±0.15	4.18±0.21

Mean with different superscript in a row differ significantly.

Table 3: Mean (±SE) Colostrum and milk protein percent of periparturient does supplemented extra concentrate with or without probiotics

	Different treatment groups			
Days	T1(control)	T2	T3	T4
Ist	7.01±0.65 ^{aa}	9.40±0.71^{b}±0.71^{b}	99.43±0.65 ^{b}	9.35±0.63^{b}
3rd	5.73±0.51^{a}	7.00±0.22^{b}	7.46±0.21^{b}	7.41±0.29^{b}
5th	4.40±0.39	4.90±0.29	5.21±0.45	5.48±0.37
12th	3.81±0.22	3.71±0.20	4.06±0.19	4.00±0.30
19th	3.81±0.23	3.60±0.15	3.81±0.27	3.70±0.15
26th	3.55±0.16	3.81±0.09	3.93±0.16	3.85±0.20

Mean with different superscript in a row differ significantly.

Colustrum and milk SNF and TS

Colostrum and milk SNF (%) are presented in the Table 4 and 5. There was decrease in protein (%) of colostrum form Ist to fifth day of periparturient does. Colostrum SNF was significantly higher in T2, T3 and T4 as compared to control T1. Treatment groups on ist and 3rd day. On the ist day postpartum colustrum snf percent in different treatment groups was 17.15±0.4520.08±0.25, 20.11±0.62, 20.00±0. 79for T1, T2, T3 and T4 respectively. On third day postpartum colostrums SNF percent was highest in T4 as18.03±0.75and lowest in T1 as15.31±0.66. However no significant difference between T2, T3 and T4.Moreever there was no significant change in the milk SNF composition on 5th, 12, 19 and 26 days postpartum Milk SNF (%) was 8.20±0.19, 8.80±0.46, 9.20±0.30, 9.30±0.33for T1, T2, T3 and T4 respectively 26 day postpartum There was decrease in TS (%) of colostrum form Ist to fifth day of periparturient does. Colostrum TS was significantly higher in T2, T3 and T4 as compared to control T1. Treatment groups on ist and 3rd day. On the ist day postpartum colustrum protein percent in different treatment groups was. 21.28±0.70, 24.91±0.56, 24.33±0.81, 24.00±0.44for T1, T2, T3 and T4 respectively. On third day postpartum colustrum TS percent was highest in T4 as20.50±0.69and lowest in T1 as16.50±0.89.However no significant difference between T2, T3 and T4.Moreever there was no significant change in the milk TS composition on 5th, 12, 19 and 26 days postpartum Milk TS (%) was12.11±0.57 12.41±0.80 12.46±0.32 and 12.61±0.for T1, T2, T3 and T4 respectively 26 day postpartum. Values of milk fat, protein, SNF and TS percent in the present study was within the range as reported by Bhosale *et al.* (2009) [7]; Ghada (2005) [11] and Mahmut (2004) [16] in goat milk. In contrast to present study Marques *et al.* reported that milk fat, SNF, TS and lactose concentrations were higher in concentrate supplemented group. The higher fat and lower level of lactose in colostrum relative to milk has been previously reported (Treacher 1970) [22]. Milk TS, SNF, fat and protein contents are influenced by stage of lactation (Mba *et al.* 1975) [15]. Findings of present investigation are in agreement with Antunae *et al.* (2001) [2] and Chanobai *et al.*

Table 4: Mean (±SE) Forthnightly Colostrum and milk SNF of periparturient does supplemented extra concentrate with or without probiotics

Days	T1 (control)	T2	T3	T4
Ist	17.15±0.45^{a}	20.08±0.25^{b}	20.11±0.62^{b}	20.00±0.79^{b}
3rd	15.31±0.66 ^{a}	18.18±0.65^{b}	18.38±0.42^{b}	18.03±0.75^{b}
5th	11.86±0.45	12.08±0.25	12.63±0.62	12.75±0.79
12th	9.10±0.30	10.61±0.77	9.80±0.48	10.41±0.77
19th	9.33±0.61	10.01±0.45	9.83±0.30	9.60±0.33
26th	8.20±0.19	8.80±0.46	9.20±0.30	9.30±0.33

Mean with different superscript in a row differ significantly.

Table 5: Mean (±SE) Forthnightly Colostrum and milk TS percent of periparturient does supplemented extra concentrate with or without probiotics

Days	T1(control)	T2	T3	T4
Ist	21.28±0.70^{a}70^{a}	24.91±0.56^{b}±0.56^{b}	24.33±0.81^{b}0.81^{b}	24.00±0.44^{b}0±0.44^{b}
3rd	16.50±0.89 ^{a}	19.78±0.92^{b}	20.85±0.55^{b}	20.50±0.69^{b}
5th	12.85±0.32	13.68±0.41	14.16±0.63	14.28±0.57
12th	12.30±0.50	12.78±0.78	12.58±0.31	12.98±0.74
19th	12.00±0.43	12.15±0.90	12.88±0.80	12.53±0.45
26th	12.11±0.57	12.41±0.80	12.46±0.32	12.61±0.43

Mean with different superscript in a row differ significantly.

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