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Effect of complete feed containing *moringa oleifera* and *sorghum sudanense* on milk yield of lactating malabari goats*

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Abstract

A study was conducted to compare the lactation performance of Malabari goats fed on two different complete feeds containing Moringa (T2) and fodder sorghum (T3) with those fed on conventional ration (T1). The animals in group T1 were fed on conventional ration consisting of compounded feed mixture (CFM) having 17.89 per cent crude protein (CP) and 68.90 per cent total digestible nutrient (TDN) along with green grass. Complete feed containing moringa leaves fed to goats in T2 group had 15.85 per cent CP and 66.85 per cent TDN while T3 group was fed on complete feed containing sorghum having 15.90 per cent CP and 65.86 per cent TDN, respectively. The roughage:concentrate ratio was maintained at 30:70. The average daily dry matter intake of goats in the three groups, T1, T2 and T3 were 1.46, 1.67 and 1.58 kg, respectively. The average daily milk yield of goats in groups T1, T2 and T3 were found to be similar to each other i.e., 0.81, 0.96 and 0.83 litre respectively (P>0.05). Hence it was concluded that the feeding of complete feed did affect neither the dry matter intake nor the milk yield of lactating Malabari goats.

Keywords: *Complete feed, Moringa oleifera, Sorghum sudanense, milk yield, lactating Malabari goats*

Complete feed is a promising feeding strategy adopted during the scarcity of conventional feed or fodder to improve the livestock productivity. Incorporation of nonconventional feedstuffs in complete ration will reduce the cost of feeding and improve the productivity of animals (Beigh *et al.*, 2017). Utilization of fodder trees could be a potential strategy for increasing the quality and availability of feed for livestock at times of scarcity. *Moringa oleifera* (Moringa), popularly known as 'miracle tree' possesses proven nutritional, therapeutic, prophylactic and immunomodulating properties which are beneficial to both human and animal population. The high nutritional quality

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and better biomass production of *M. oleifera*, especially in dry periods further adds to its significance as a livestock fodder (Nouman *et al*., 2014). Moringa has been considered as a natural galactagogue which has lactation enhancing effect on milk production in dairy animals (Vinodkumar, 2013). *Sorghum sudanense* (Sorghum fodder) is another drought resistant crop. Fodder sorghum is gaining importance in animal feeding because of its low inputs and production cost. Its high starch content (73.8 per cent) is beneficial to ruminant feeding (Popescu and Condei, 2014). Sorghum fodder can be efficiently utilised by animals and is having similar nutrient content as that of maize fodder (Iqbal and Iqbal, 2015). Hence, the present study was planned to evaluate the effects of two different complete feeds containing moringa leaves and sorghum fodder on the productivity of lactating goats.

Materials and Methods

The study was conducted in University Goat and Sheep Farm, Mannuthy for a period of 120 days. Eighteen lactating goats in their early lactation period (within ten days after kidding) were selected and randomly divided into three groups as uniformly as possible with respect to their age, parity and body weight. The animals in control group (T1) were fed on conventional feed (compounded feed mixture pellets and *ad libitum* hybrid Napier grass) and the animals in experimental group (T2) were fed on complete feed pellets containing 15 per cent moringa leaves and those in group T3 were fed on complete feed containing 15 per cent fodder sorghum. Compounded feed mixture contained 18 per cent CP and 70 per cent TDN while both the complete feeds, which were isocaloric and isonitrogenous, were formulated to contain 16 per cent CP and 65 per cent TDN. The ingredient composition is given in Table 1. Proximate analysis and fibre fraction analysis of feeds and green grass were done (AOAC, 2016; Van Soest *et al*., 1991). All the experimental animals were fed according to ICAR feeding standards (ICAR, 2013). The animals were fed *ad libitum* twice daily. Daily dry matter intake and daily milk yield of all the individual animals was recorded throughout the experimental period. The body weight of goats

Table 1: Ingredient composition of compounded feed mixture and complete rations

Sl No.	Ingredients	CFM (T1)	T2	T3
1	Maize	15	15	18
2	Corn gluten fibre	10	08	09
3	Tapioca starch waste	05	05	04
4	Coconut cake	24	09	09
5	Alfalfa pellet	03	05	09
6	Rice polish	06	10	10
7	Black gram husk	09	08	04
8	De-oiled rice bran	25	07	04
9	Calcite	1.5	1.5	1.5
10	Salt	1.0	1.0	1.0
11	Mineral mixture	0.5	0.5	0.5
12	Hybrid Napier	-	15	15
13	Moringa leaves	-	15	-
14	Fodder sorghum	-	-	15
	Total	100	100	100

Chemical composition of experimental feeds, green grass, moringa leaves and sorghum fodder are given in Table 2.

Table 2: Chemical composition of compounded feed mixture, experimental complete rations, green grass, moringa leaves and fodder Sorghum, %

Parameters	CFM	T2	T3	Grass	Moringa	Sorghum
Dry matter	93.63	93.64	93.55	23.36	91.56	89.36
Crude protein*	17.89	15.85	15.90	8.31	18.08	7.04
Crude fibre*	12.46	14.80	14.04	35.39	7.44	27.88
Ether extract*	3.36	3.48	3.39	2.60	6.04	2.51
Total ash*	9.76	8.84	8.61	10.78	9.09	5.52
Nitrogen free extract*	56.52	57.01	58.05	42.93	50.90	46.41
Acid insoluble ash*	1.77	1.81	1.45	3.16	2.64	2.83
Neutral detergent fibre*	39.04	41.75	45.63	63.02	22.66	72.8
Acid detergent fibre*	20.72	28.82	24.20	34.11	11.72	43.4
Calcium*	1.40	1.48	1.44	0.73	2.13	0.6
Phosphorus*	0.92	0.92	0.85	0.44	0.28	0.2

*On dry matter basis

The data on average daily dry matter intake of goats recorded at weekly intervals are given in Table 3.

Table 3. Average daily dry matter intake of goats maintained on three experimental rations, kg

Week[1]	T1	T2	T3	p-value
1	1.42±0.07	1.45±0.08	1.43±0.11	0.958 ns
2	1.45±0.08	1.54±0.08	1.50±0.15	0.837 ns
3	1.44±0.07	1.58±0.09	1.55±0.16	0.683 ns
4	1.44±0.07	1.59±0.09	1.53±0.15	0.646 ns
5	1.41±0.07	1.59±0.09	1.57±0.15	0.481 ns
6	1.43±0.11	1.70±0.12	1.70±0.15	0.247 ns
7	1.45±0.09	1.71±0.14	1.63±0.15	0.387 ns
8	1.47±0.09	1.69±0.15	1.58±0.17	0.548 ns
9	1.46±0.09	1.72±0.14	1.58±0.17	0.425 ns
10	1.49±0.09	1.73±0.15	1.60±0.14	0.458 ns
11	1.48±0.10	1.72±0.14	1.56±0.11	0.364 ns
12	1.48±0.09	1.73±0.15	1.58±0.11	0.355 ns
13	1.47±0.09	1.72±0.14	1.58±0.12	0.351 ns
14	1.48±0.10	1.73±0.13	1.58±0.13	0.387 ns
15	1.50±0.10	1.72±0.14	1.62±0.10	0.408 ns
16	1.50±0.10	1.70±0.12	1.60±0.12	0.484 ns
17	1.52±0.09	1.72±0.13	1.61±0.11	0.479 ns
Cumulative DM intake	1.46±0.08	1.67±0.12	1.58±0.13	0.458 ns

[1]Average of six values with SE

ns- non significant (P>0.05)

The average daily dry matter intake (DMI) of animals maintained on the three dietary treatments T1, T2 and T3 was 1.46, 1.67 and 1.58 kg, respectively. The DMI was similar (P>0.05) among the groups, though it was numerically higher in T2 and T3 than T1. The present result was in agreement with that of Madhavi *et al.* (2010) who observed that the DMI of goats fed on a conventional ration and complete ration, were similar.

The milk yield of goats recorded daily and documented at fortnightly intervals are given in Table 4.

Table 4: Average daily milk yield of goats maintained on three experimental rations, litres

Fortnight[1]	T1	T2	T3	p-value
1	0.57±0.07	0.67±0.06	0.60±0.06	0.575 ns
2	0.97±0.12	1.15±0.10	1.02±0.15	0.575 ns
3	0.94±0.12	1.13±0.09	0.94±0.10	0.357 ns
4	1.01±0.14	1.21±0.16	1.10±0.17	0.689 ns
5	0.96±0.12	1.02±0.19	0.91±0.06	0.821 ns
6	1.00±0.18	1.03±0.17	0.84±0.07	0.645 ns
7	0.52±0.08	0.77±0.06	0.62±0.06	0.056 ns
8	0.50±0.07	0.69±0.07	0.58±0.03	0.098 ns

[1]Average of six values with SE, ns- Non significant at P>0.05

was recorded at weekly intervals. The data were analysed statistically using analysis of variance (ANOVA) (Snedecor and Cochran, 1994) using statistical software IBM Statistical Package for Social Sciences (SPSS), version 24.0.

Results and Discussion

The average milk yield was similar (P>0.05) but numerically higher in T2. The milk yield of the animals started increasing from the first fortnight and reached the peak milk yield at the fourth fortnight which followed the normal lactation curve. The animals of T1, T2 and T3 attained average peak milk yield of 1.01, 1.21 and 1.10 litres, respectively. Similar result was reported by Kushwaha and Rai (2011) who found that there was no variation in milk yield of cross bred (Alpine x Beetal) lactating does fed on mixed ration containing babul pods and the milk yield was in the range of 0.97 to 0.99 kg per day. Kholif *et al.* (2015) reported that there was an increase in milk yield of goats fed on rations containing 15 per cent moringa leaves, as against those fed on rations containing 0, 10 and 20 per cent moringa leaf meal. The milk yield obtained in the present study are comparable to those of Venkatachalapathy *et al*. (2016) who observed that the average milk yield of the Malabari does were 0.82, 0.67 and 0.56 litres in early, mid and late lactation, respectively.

Conclusion

Based on the results obtained in this study, it can be concluded that feeding of complete feed has no effect on the dry matter intake and milk yield of animals. Further studies are needed to evaluate the use of complete feed in lactating goats incorporating cheaper roughage sources.

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