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EFFECT OF FEEDING BYPASS FAT ON RUMEN FERMENTATION, DM DIGESTIBILITY AND N BALANCE IN SHEEP

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Incorporation of fat or grains in the diet of ruminants at high levels adversely affect rumen fermentation (Palmquist and Jenkins, 1980), thereby, affecting fibre digestibility. It is reported that bypass fat, inert in rumen, could be used for increasing energy density of ration and improving production and reproduction (Palmquist, 1988).

Acid oil, a by-product of oil refining process, is available at about one third the price of edible oil and contains approx. 95 per cent total fatty matter. Bypass fat was produced using acid oil as source of fat and effect of its feeding on rumen fermentation and DM digestibility was studied in sheep to assess whether or not it could be used in the ration of ruminant animals for increasing energy density.

Materials and Methods

Bypass fat was produced using mixed vegetable acid oil with the precipitation method (Garg, 1997). 50 g acid oil was added in 500 ml water and mixed. To this, 100ml of 10 per cent sodium hydroxide solution was added. The contents were heated to boiling. While hot, 100 ml of 30 per cent calcium chloride solution was added which resulted in the precipitation of calcium soaps (by-pass fat), which was washed with water, dried and crushed.

For rumen fermentation studies, nine rumen fistulated Merino sheep were divided into three groups of three each with average body weight of about 38 kg. Animals in all the groups were offered 700 g oat (CP 8%, ME 11 MJ/kg) and lucerne (CP 16%, ME 11 MJ/Kg) chaff in the ratio of 70:30, alongwith 15g mineral mixture. Animals in the treatment T1 were on basal diet alone which served as control while animals in treatments T2 and T3 were fed bypass fat daily @ 50 g and 100 g, respectively. After 4 weeks of preliminary feeding, rumen liquor samples were collected at '0', '2', '4','6', '8', '10' and '12', hours of feeding. Ammonia-N in strained rumen liquor (SRL) was analysed by Kjeldahl method, total volatile fatty acid (TVFA) concentration was estimated by Markham's distillation apparatus and pH in SRL was measured using pH meter.

After collection of SRL samples, 5 days metabolism trial was conducted to determine the digestibility coefficient of various nutrients and N balance studies. Nitrogen in feed, dung and urine was estimated by

Kjeldahl method, based on which N balance was determined. Data was analysed statistically by Snedecor and Cocharan (1980).

Results and Discussion

Effect of feeding bypass fat on various rumen metabolites has been shown in Table-1. Ammonia-N, TVFA conc. and pH of rumen liquor in three dietary treatments were non-significantly different. Other scientists have also reported that bypass fat feeding to ruminants did not affect rumen fermentation pattern (Jenkins and Palmquist, 1984 and Klusmeyer *et al*., 1991). However, addition of fat as such to ruminants' diet above 3 per cent depressed fibre digestibility by way of affecting rumen fermentation (Ward *et al*., 1957; Brooks *et al*., 1954).

Effect of feeding bypass fat on DM digestibility and N balance at two levels of feeding is also shown in Table 1. As rumen fermentation was not affected, similarly hay DM digestibility was also not affected on feeding bypass fat, at levels of 7 and 14% incorporation in the ration of ruminants did not affect DM and other nutrients digestibility (Brumby *et al*., 1978) and Evendra and Lewis (1974). Bypass fat incorporation in the ration @ 7 and 14 per cent significantly ($P<0.05$) improved N balance in treatments T2 and T3. Since animals were fed only maintenance ration, by pass fat incorporated at these levels alongwith higher dietary nitrogen/ protein intake could have improved the N balance further.

These studies indicate that feeding of bypass fat produced from vegetable acid oils at two levels (7 and 14 per cent) did not affect rumen fermentation and DM digestibility and helped in improving N balance significantly ($P<0.05$) in sheep. This suggests that acid oil based bypass fat can be used for increasing energy density of ruminants ration.

Summary

Bypass fat was produced from vegetable acid oils using precipitation method. It was fed to fistulated sheep at 7 and 14 per cent of dietary DM. Its feeding at both the levels

Table 1:Effect of feeding by pass fat on various rumen m tabolites, DM intake and N balance

Treatment	Bypass fat offered (g) %	Ammonia-N (mg/1 SRL)	TVFAcocn (mg/1 SRL)	pH	Hays DM digestibility	N balance (g/day)
T1	Nil	68.80 ± 25.05	93.25 ±10.28	6.35 ±0.16	64.05 ±1.76	-0.60 a ±0.03
T2	50	64.80 ±24.48	89.71 ±10.85	6.49 ±0.15	62.93 ±1.46	+0.01[b] ±0.01
T3	100	64.40 ±21.29	88.88 ±11.28	6.43 ±0.15	65.58 ±1.54	+1.27[c] ±0.02

Note : All the three treatment were offered 700 g hay
Figures bearing different superscripts in a column significantly $P<0.05$

did not affect rumen fermentation pattern, as well as DM digestibility. Its feeding significantly ($P<0.05$) improved N balance at both the levels of feeding. These studies indicated that bypass fat thus produced can be safely incorporated in the ration of small ruminants for increasing energy density and meeting energy demands.

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