

SHORT COMMUNICATION

The Influence of Frequency of Feeding on Rumen Concentration of Volatile Fatty Acid (VFA) and Ammonia in Growing Buffalo Calves.

M. C. N. JAYASURIYA*, U. R. MEHRA AND R. S. DASS

Division of Animal Nutrition, Indian Veterinary Research Institute Izatnagar, (U.P.) 243122, India

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A major criterion for the isotope dilution techniques is that the animal remains in a relatively steady state throughout the experimental period. Unless the animal has reached the steady state, production rates of Volatile Fatty Acid (VFA) or microbial protein cannot be accurately determined. A steady state further makes it possible to extrapolate results on a daily basis.¹

The present study was conducted to determine how frequency of feeding influences steady state in the buffalo calf with regard to rumen concentration of volatile fatty acids and ammonia.

Four growing male buffalo calves, approximately 3 years of age, fitted with rumen cannulae were used in the study. Animals were randomly divided into two groups of two each. Chaffed green maize was offered *ad libitum* to all animals. After a pre-experimental period of four weeks animals in group 1 were given green maize twice daily at 08.00 and 16.00 hours. Animals in group 2 were fed their daily ration in twelve equal amounts at two hourly intervals. All animals had access to *ad libitum* water.

After a period of three weeks on this feeding regime samples of rumen liquor were drawn from four different sites in the rumen at various time intervals up to 10 to 14 hours using specially built probes covered with fine nylon gauze as described previously.¹ About 20 ml of rumen fluid received in cold Macartney bottles containing 0.2 ml of 10 N sulphuric acid were taken to the laboratory and analysed immediately for total VFA and rumen ammonia by Markham distillation.⁴ Rumen liquor samples were further fractionated by gas liquid chromatography (Shimadzu model GC-4 (B) BTF) using a column of chromosorb W-HMDS with tween 80.² Nitrogen was used as the carrier gas on the flame ionization detector.

* Present Address: Department of Animal Husbandry, University, of Peradeniya, Peradeniya, Sri Lanka.

Total VFA produced at different time intervals by animals on the two treatments are presented in Figure 1. The concentration of total VFA remained within very narrow limits at different times as a result of two hourly feeding. Similar results have been reported earlier when Know and Ward³ compared twice a day feeding with eight times feeding using brown Swiss animals on a

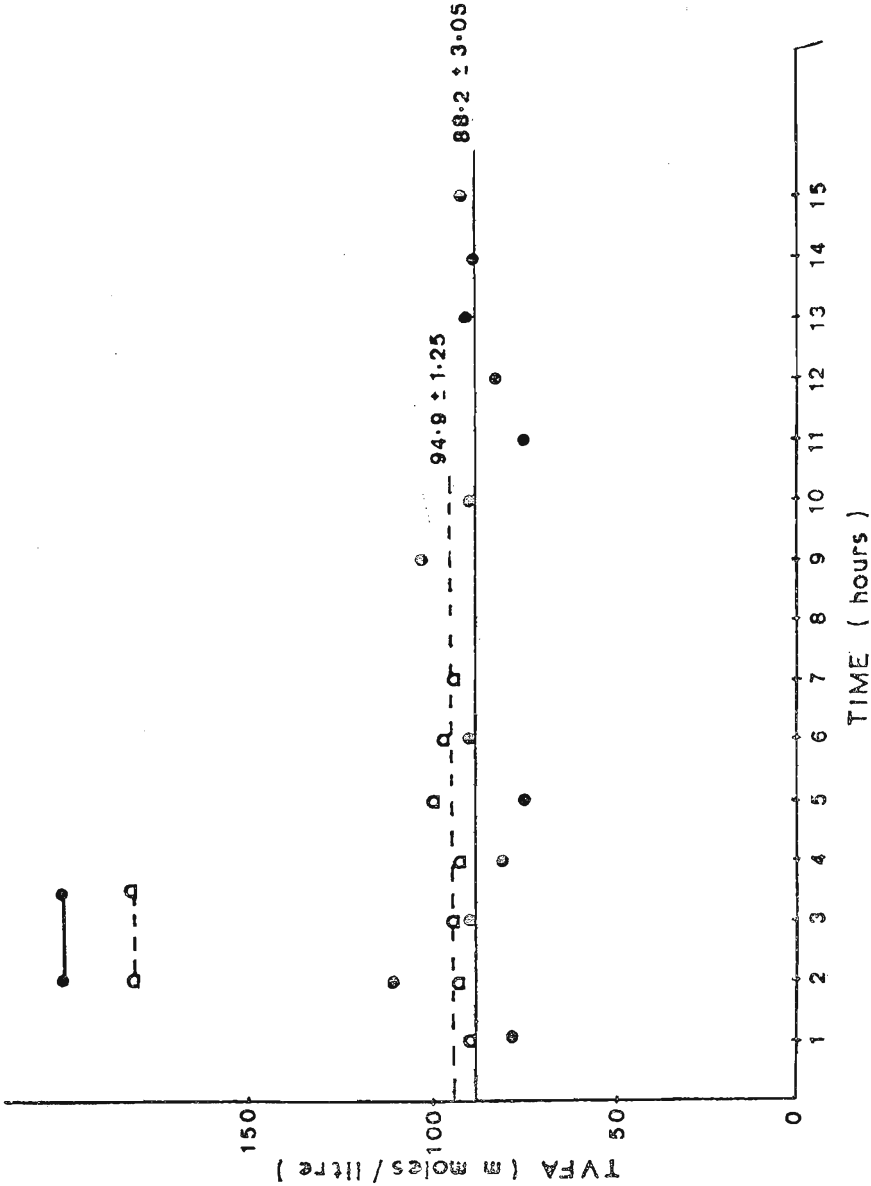


Figure 1 Total Volatile Fatty Acid (TVFA) concentration as affected by frequency of feeding in buffalo calves.

alfalfa hay diet. Twelve times feeding at two hourly intervals in the present experiment appears to provide a more constant (94.95 ± 1.25 vs 114.8 ± 4) rumen VFA concentration compared to eight times feeding at three hourly intervals, reported earlier.³

The concentration and molar percentage of VFA and the concentration of rumen ammonia for the two treatments are shown in Table 1. The frequency of feeding had no influence on the concentration of total VFA although the tendency was for the animals in the twelve times feeding group to show constantly higher values. There was no significant correlation ($P < 0.05$) between rumen ammonia concentration and total VFA for both feeding regimes.

Table 1. The concentration and molar percentage of Volatile Fatty Acid (VFA) and rumen ammonia.

Treatment	Rumen ammonia (mg/100ml rumen fluid)	Total VFA concentration (m moles/ litre rumen fluid)	Molar % of total VFA			Concentration of VFA		
			Acetic acid	Propi- onic acid	Buty- ric acid	Acetic acid	Propi- onic acid	Buty- ric acid
Two times feeding at 08.00 and 16.00 hours (group 1)	13.46 ± 0.58	88.3 ± 3.05	62.6	23.6	13.6	55.2	20.8	12.0
Twelve times feeding at two hourly intervals (group 2)	14.14 ± 1.17	94.95 ± 1.25	62.8	21.6	15.1	59.6	20.5	14.3

The frequency of feeding had no influence on the molar percentage of volatile fatty acids in agreement with the findings of Putnam *et al*⁵ although Know and Ward³ reported a constantly higher acetic acid percentage on the two times feeding compared to eight times feeding.

As two hourly feeding helps to maintain a constant concentration of VFA throughout the period such a feeding regime appears to be satisfactory when measuring production rates of microbial synthesis by isotope dilution techniques

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References

1. CHATURVEDI, M. L., SINGH, U. B. & RANJHAN, S. K. (1973). *Indian J. Anim. Prod.*, 4 (4) 194.
2. ERWIN, E. S., CARCO, G. J. & EMERY, E. M. (1961). *J. Dairy Sci.* 44 : 1768.
3. KNOW, K. L. & WARD, G. M. (1961). *J. Dairy Sci.* 44 : 1550.
4. MARKHAM, (1942). *Biochem. J.* 36 : 790
5. PUTNAM, P. A., GUTIERREZ, J. & DAVIS, R. E. (1961). *J. Dairy Sci.* 44 : 1364.