Table 1. *Observed and estimated flow of duodenal digesta, and the intake and duodenal flow of long-chain fatty acids in two sheep*

| | Intake of fatty acids (g/24 h) | Digesta flow measured directly | | Digesta flow measured by marker technique | | Concentration of saturated acid in total fatty acid (g/100 g) | |
|---|---|---|---|---|---|---|---|
| | | Volume (ml/24 h) | Fatty acids (g/24 h) | Volume (ml/24 h) | Fatty acids (g/24 h) | Intake | Digesta flow |
| | | Grass only | | | | | |
| Sheep A | 18·8 | 10115 | 29·1 | 10847 | 21·0 | 18 | 73 |
| Sheep M | 18·8 | 8205 | 14·0 | 11895 | 15·1 | — | — |
| | | Grass plus linseed oil fatty acids | | | | | |
| Sheep A | 70·1 | 9271 | 73·2 | 11202 | 74·3 | 10 | 65 |
| Sheep M | 70·1 | 7803 | 67·7 | 10065 | 62·6 | — | — |

Table 1 shows the directly observed and the estimated flows of duodenal digesta and of fatty acids; 94% of the acids was associated with the solids. The unsaturated acids were largely hydrogenated by the time they reached the duodenum. The flow of fatty acids into the duodenum estimated by the two-marker technique was similar to the intake, as previously found by Ulyatt *et al.* (1966), indicating that gains and losses during passage through the forestomach and abomasum are small or balanced under these conditions.

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**Fermentation of various soluble carbohydrates by rumen micro-organisms.** By J. W. CZERKAWSKI and GRACE BRECKENRIDGE, *Hannah Dairy Research Institute, Ayr*

The modes of fermentation of twenty-six different carbohydrates by mixed rumen micro-organisms were studied in an artificial rumen. The apparatus and the experimental procedure have already been described by Czerkawski & Breckenridge (1969). The carbohydrates investigated could be divided into four groups, largely according to the rate of their fermentation, which was usually accompanied by the production of methane:

(a) Glucose, fructose and sucrose were fermented rapidly.

(b) L(+)-arabinose, xylose, galactose, mannose, cellobiose, maltose, lactose, raffinose, inulin, xylan and pectin were fermented at appreciable rates, but these rates were significantly lower than those in the first group.

(c) D(−)-arabinose, ribose, sorbose, mannitol, sorbitol, glucuronic and galacturonic acids, trehalose, starch and fucose were fermented slowly or not at all.

(d) Rhamnose and glucosamine were fermented but no methane was produced.

The fermentation of sucrose and its constituent hexoses was accompanied by a transient accumulation of lactate. On the other hand, fermentation of rhamnose and glucosamine resulted in a permanent accumulation of lactate. No increases in the amounts of lactate were observed when other sugars were fermented.

Although the overall rates of fermentation varied widely, the amount of methane produced was related to the amount of carbohydrate fermented, irrespective of the type of carbohydrate used as substrate, except for rhamnose and glucosamine. The mean amount of methane produced was equivalent to 6 cal/100 cal substrate fermented. The amount of steam-volatile acids formed was also directly related to the amount of carbohydrate fermented. The results are consistent with a hypothesis that methanogenesis involves a pathway that utilizes precursors which may result from the dissimilation of carbohydrates and other substrates by non-methanogenic micro-organisms.

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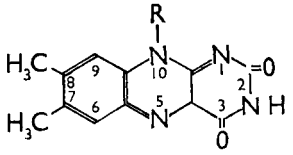
**A study of cultures of rumen anaerobic bacteria in the presence of excess riboflavine (vitamin $B_2$).** By P. N. Hobson and R. Summers, *Microbiology Department, Rowett Research Institute, Aberdeen*, and E. C. Owen, Jane C. Spencer and D. W. West, *Biochemistry Department, Hannah Dairy Research Institute, Ayr*



For riboflavine ($B_2$) (7, 8-dimethyl-10[D-ribityl]-isoalloxazine)
R is $-CH_2$ $(CHOH)_3$ $CH_2OH$
For hydroxyethylflavine (HEF) R is $-CH_2$, $CH_2OH$
For formylmethylflavine (FMF) R is $-CH_2$ CHO

Riboflavine ($B_2$) in the ruminant especially if fed in amounts in excess of requirement gives rise to metabolites in milk and urine the chief of which is HEF (Owen, 1962). Accompanying HEF is FMF the corresponding aldehyde (Owen & West, 1968). $B_2$ metabolites including FMF and HEF arise when rumen contents are incubated in vitro with $B_2$ but are not produced by the animal when $B_2$ is subcutaneously injected. This and other evidence now being prepared for publication indicate that rumen micro-organisms are responsible for HEF and FMF production. Pure cultures of rumen anaerobic bacteria were grown for 24 h in the presence of excess $B_2$. The bacteria were then separated by centrifugation from the supernatant medium and ground in a mortar with glass wool in the presence of 10% (w/v) trichloroacetic acid. The extract was neutralized and, using phenol, an aqueous concentrate was prepared (Owen, 1962). The supernatants and the extracts were chromatographed on thin filter paper in the upper phase of a mixture of n-butanol, acetic acid and water (4:1:5, v/v). On chromatograms isoalloxazines fluoresce