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Summary only

PRELIMINARY STUDIES OF DIGESTION IN THE
HINDGUT OF THE SHEEP

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ALTHOUGH the stomach is the major site for digestion of structural carbohydrates in the ruminant gut, substantial amounts of these materials may be digested in the hindgut (large intestine) (Gray, 1947; Bruce *et al.*, 1966; MacRae and Armstrong, 1969). This region is also an important site for water and electrolyte absorption (Hogan and Phillipson, 1960; Hydén, 1961; Goodall and Kay, 1965; Rogers and van't Klooster, 1969). As part of a general investigation of hindgut function, studies on techniques for caecal fistulation together with studies on caecal motility and the caecal microflora have been initiated at Applied Biochemistry Division. Wether sheep, fed dried grass or chaffed meadow hay, have been used.

The aim of surgical fistulation is to provide access to a hollow organ without disturbing its function. In the present caecal study, various combinations of sites of insertion of the cannulae in the caecum and sites of exit of these cannulae through the abdominal wall were examined for adverse effects on hindgut function. Criteria used were the digestibility of feed, caecal motility, and the rate of passage of markers (^{51}Cr EDTA and ^{103}Ru Phenanthroline) through the hindgut. The location of the fistula in the caecum itself was found not to be critical, but the site of exit was: sites of exit above the mid-lateral line were associated with abnormalities of caecal motility and an increased rate of passage of markers.

The motility of the hindgut would appear to be a major factor determining residence time of hindgut contents and thus the time available for digestion and for exchanges across the gut wall in this region. Radiological observations of caecal motility were carried out with the aid of contrast media introduced either through an ileal cannula or directly through a caecal cannula. In addition, pres-

sure changes in the caecum were sensed (using open-tipped, saline-filled catheters and differential pressure transducers) and recorded from up to three points simultaneously. Activity of three kinds was seen: localized, presumably tonic contractions; regular, co-ordinated contractions, often occurring at approximately 1 min intervals; and short trains of very strong contractions, usually occurring at long intervals. The regular contractions appeared to originate at the base of the caecum near or caudal to the ileo-caecal valve, and passed towards the free pole before returning and sometimes continuing into the colon; these movements appeared to result in efficient mixing of the caecal contents. The larger contractions started at either the pole or the base of the caecum; they appeared to be associated with massive transfer of caecal contents to the colon, and were followed by a period of reduced caecal motility.

Concentrations of bacteria capable of fermenting hemicellulose, starch and soluble sugars appeared to be similar in the caecum and the rumen. A smaller proportion of obligate anaerobes occur in the caecum, as compared with the rumen, but aerobes occur in similar numbers in both organs. The numbers of bacteria in the caecum were 10^2 to 10^3 times the numbers found in the terminal ileum.

ACKNOWLEDGEMENTS

This work was carried out using X-ray equipment and physiological recording equipment purchased with the aid of grants made by the Lottery Distribution Committee for Scientific Research.

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