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A SUMMARY OF PRELIMINARY FINDINGS IN A RUMEN MICROBIOLOGICAL INVESTIGATION ON WILD RUMINANTS

by

N. O. VAN GYLSWYK* and D. GIESECKE**

Abstract – A study was made of numbers of total culturable and cellulolytic bacteria and microbial activity in rumen ingesta from different species of wild ruminants. These and several other criteria were examined to detect possible differences in the digestive physiology between strict grazers and species which fed largely on plant material other than grass.

Introduction

From the end of July to the end of September 1971, a survey on wild ruminants was made to study differences between species which fed mainly on grass and species which included a considerable proportion of plant material other than grass in their diets. The project was directed principally towards gaining an insight into the activity and composition of the microbial flora in the rumens of animals with different feeding habits. Other criteria were applied in order to study possible concomitant differences in the physiology of the animals.

Results and Discussion

Mean values for data relevant in showing up differences in species of different feeding habits are given in Table 1.

It appeared that grazing species had a higher ratio of rumen-reticulum contents to body weight than was the case with animals which fed largely on plant material other than grass. *Aepyceros melampus* (impala) were exceptions but they are known to feed largely on grass during the summer months.

Ammonia nitrogen content of rumen fluid was higher for essentially non-grazing than for grazing animals. In the case of impala and *Antidorcas marsupialis* (springbok), *Acacia* seeds were found in the rumen. These were

* *National Chemical Research Laboratory, Council for Scientific and Industrial Research, P.O. Box* 395, *Pretoria.*

** *Institute for Animal Physiology, University of München,* 8 *München* 22, *Veterinärstrasse* 13, *W. Germany.*

nearly all damaged which indicated that the protein from such seeds could be metabolized by the microflora with subsequent release of ammonia. In addition, the ingesta from the rumens of springbok contained a considerable proportion of the inflorescences of *Acacia mellifera* (swarthaak). *Tragelaphus strepsiceros* (kudu) from the Kruger National Park had eaten large numbers of the fruits of *Cucumis anguria* (wildekomkommer) and the rumens of kudu from the Eastern Cape contained a large proportion of the leaves and young stems of *Portulacaria afra* (spekboom).

Differences between values for total culturable counts of bacteria for the various animal species were relatively slight. Values for fermentation rates, which should be related to total bacterial counts, were also fairly uniform. In the case of both these parameters the values for *Oryx gazella* (gemsbok) and springbok were somewhat high when compared with those for the other animal species. These two species were obtained in the Kalahari where the roughage may have been of a better quality than that from other regions covered in the survey.

Except in the case of kudu, the mean values for counts of cellulolytic bacteria were very similar for all the ruminant species examined, irrespective of feeding habit. The obviously low fibre content of *P. afra* leaves, which formed a significant proportion of the kudu's diet, could have made these animals less dependent on the activities of cellulolytic bacteria. However, the results of analyses for fibre content (*cf* "holocellulose" in Table 1) of rumen ingesta showed that there was very little difference between animal species. Hence, in the case of kudu, the digestibility of fibre must have been low, probably attributable to low levels of cellulolytic bacteria. Alternatively, it may be argued that the fibre of *P. afra* (and other constitutents of the diet) may be relatively difficult to digest or that these plants contain factors that are inhibitory for the growth of cellulolytic bacteria. It is regrettable that, owing to technical difficulties, no figures for bacterial counts could be obtained for rumen ingesta from kudu in the Kruger National Park. Such data could perhaps have contributed towards establishing whether low cellulolytic counts are typical of kudu.

A significant finding in this survey was that the mean counts for total culturable bacteria (13 to 51 x 10^8 colony forming units per one gram rumen ingesta) were very similar to counts obtained with sheep adapted to low-protein teff hay diets which were fed either with or without urea supplementation (10 to 40 x 10^8; Van Gylswyk, 1970). Also, except for the kudu, the cellulolytic counts obtained in this survey (5 to 11 x 10^7) were very similar to counts done on rumen ingesta from the abovementioned sheep (2 to 14 x 10^7; Van Gylswyk, 1970). Hence the wild ruminants are, like sheep fed on teff hay diets, probably adapted to digest large quantities of material rich in fibre and generally low in protein.

Furthermore, with the exception of kudu, the microbiological picture, considered quantitatively, did not differ much with animal species or feeding habit. Work is being done to determine whether the types of bacteria are also similar.

Table 1

Mean values for various parameters relating to rumen-reticulum contents from different species of wild ruminants

Animal species	Number of animals used and where obtained	Body weight (kg)	CONTENTS OF RUMEN-RETICULUM						
			Per cent of body weight	Grass as per cent of identifiable plant material (dry weight basis)	Ammonia nitrogen (mg/100 ml fluid)	Holocellulose as per cent of dry matter	Colony counts of bacteria per 1 g rumen ingesta		Fermentation rates (gas produced at N.T.P. in ml/g dry matter/hour)
							Total culturable x 10^{-8}	Cellulolytic x 10^{-7}	
Buffalo	3 K.N.P. * 1 Addo * *	808 not done	16 not done	100 15	5,3 12,6	65,7 65,5	14 12	7 5	3,41 4,66
Blue Wildebeest	6 K.N.P.	235	15	100	2,8	not done	17	5	4,05
Gemsbok	3 K.G.N.P.*** 2 S.W.A.	219	13	96	6,1	63,4	34	9	4,95
Impala	10 K.N.P.	44	14	4	10,4	57,1	23	9	4,16
Springbok	3 K.G.N.P.	42	10	10	21,6	66,2	51	11	4,75
Kudu	2 K.N.P. 5 E.Cape	195 149	11 10	7 2	17,1 9,2	not done 68,5	not done 14	not done 0,6	4,17 3,83

* Kruger National Park
** Addo Elephant National Park
*** Kalahari Gemsbok National Park

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