تأثير تغير العلائق على صور بروتوزوا الكرش فى الاغنام

سناء م. نصار ، س. العمروسى
ع. عبد المطلب ، ط. العلاوى ، أ. عامر

أجرى العد التصنيفى لبروتوزوا الكرش فى الأغنام لدراسة تأثير الجوع ، وعليقة غنية بالمواد الكربوهيدراتية ، وعليقة غنية بالسليلوز بالاضافة الى البروتين الخام على أنواع البروتوزوا المختلفة . وجد أن الانتوديديم ، والانتوديم كوادانى كانوا يمثلون أغلب البروتوزوا ، وقد تكاثروا مع العليقة النشوية والسليلوزية . وكانت الدبلوديديم والافريوسكولكس ينمون مع السليلوز فقط. كانت الايزوتريكا بروستوما والايزوتريكا أنتستينالس والديزى تريكا الأقل فى العدد . وقد تناقص عددهم مع المجموعات الثلاقية . كانت الهولوتريكا أكثر حساسية للتجويع عن الاوليجوتريكا . وقد فسر زيادة الديزى تريكا أثناء التجويع فقط على حساب علاقتها مع بكتريا الكرش حيث كانت البكتيريا الكروية المفردة هى العالية . كذلك ارتفاع عدد البكتريا السبحية فى البطاطس أحد العوامل التى أدت الى أزدهار الانتوديديم كوداتس فى هذه المجموعة .

Dept. of Physiol., Fac. of Med.; Assiut University.
Head of Dept. Prof. Dr. Y. Hamed.

THE INFLUENCE OF THE VARIABILITY OF FOOD STUFFS ON THE PICTURE OF RUMEN MICROFOUNA IN SHEEP

(With One Figure and 3 Tables)

By

SANAA M. NASSAR; S. EL-AMROUSI; A. EL-MOTTLIB; T. ALLAWI; and A. AMER.

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SUMMARY

Differential count of rumen protozoa was done in sheep to demonestrate the influence of starvation, rich carbohydrate diet and rich cellulose containing crude protein diet on different types of protozoa. Entodinium and Entodinium caudatus constituted the majority of the protozoa and flourished with cellulose and starch diet. Diplodinium and Ophryosclex were purely cellulose digester.Isotricha prostoma , Isotricha intestinalis and Dasytricha were the least in number and decreased in the three groups. The holotricha was most senstive to starvation than the Oligotricha. The increase of Dasytricha during starvation is explained only on the bases of correlation to the bacterial content where the single cocci were predominant. Also the streptococci high number in Solanum tuberosum was a factor in flourishment of Entodinium caudatus in this group.

INTRODUCTION

There are still many aspects unknown in the role of the protozoa in the process of ruminal digestion. Defounation experiments show no influence on the process of digestion. Confl cting evaluation on the role of protozoa in cellulose digestion, was reviewed by KIROLOV and KROTKOVA (1977). The role of protozoa in carbohydrate digestion was only confined to storage of starch. The protozoal body acts as a rich source of protein of high biological value to the host.

The variability in number and types of microfauna with different types of diets, to certain extent, explains the role of protozoa in digestion. The aim of this work is to add some information about the variability of local sheep breed microfauna in cases of starvation, administration of rich starch diet Solanum tuberosum and rich cellulose contain crude protein Pisum sativus stem.

MATERIALS AND METHODS

Three groups, each of five rams of local breeds, were subjected to clinical and faecal examination before carrying the test. Rams were fed Barseem for a period of (30 days)pre-experimental. Two common feedstuffs that grow locally were offered to them. One was Solanum tuberosum which represents food rich in carbohydrates and the other was the dry stem of Pisum sativus which is rich in cellulose and contains crude protein. Before giving these food stuffs, the animals were starved for twenty four hours. Samples from ruminal contents were taken; by stomach tube connected to a suction pump; before and after starvation as well as after 24 hours post feeding.

The samples were treated for examination by the method of HARMEYE, 1963. Films were examined under microsscope for differential count.

RESULTS AND DISCUSSION

In the rumen content of the all groups of rams, the following types of protozoa were recorded (Table 1). The Oligoricha was represented by the genus Entodinium, Diplodinium and Ophryoscolex. While Holotricha was represented by Isotricha protoma, Isotricha intestinalis and Dasytricha.

In the control Barseem group, the richest protozoa, constituting the majority of rumen flora, was Entodinium (69.8%). Others constituted the following percentages Entodinium caudatus 11.2%, Dasytricha 6.8%, Diplodinium 6%, Isotricha intestinalis 3.2%, Isotricha prostoma 2.2% and the least was Ophryoscolex 1.3%.

BECKER and TALBOTT (1927) reported the presence of the holotricha with it's genus Isotricha prostoma, Isotricha intestinalis and Dasytricha in sheep. FERBER (1928) stated that the genus Entodinium and Diplodinium represent the majority and constitute nearly 80 - 90% of rumen protozoa in sheep. SMAIL and ROBENSON (1958) observed that the first appearance of the protozoa in the rumen of youngs have a determined sequance. At first appears the protozoa of genus Entodinium after that Diplodinium then the separate types of hologtricha.

In the starved group, the sensitivity of the different types of protozoa varied. Some types twicely increased above the normal level as Diplodinium, Ophryoscolex and Dasytricha which constituted (10.9%, 2.3% and 15.8%).With control Barseem group the respective percentages were 7, 1.3 and 6.5. Other types decreased than normal as Entodinium caudatus, Entodinium and Isotricha intestinalis and prostoma and constituted percentages of (2.9, 62.4, 2.9 and 1.9). In normal Barseem group they were (11.2%, 69.2%, 3.5% and 2.2%).

BELEN KII, (1923) found that the quantity and the type content of the protozoa depended, on a large extent, on the contition of animal feeding. On the third day starvation in sheep only few individuals of protozoa were found,the majority of which were of low vitality,. On the fourth day starvation only few individuals were observed. The author also observed that the sensetivity of separate types of protozoa to starvation is variable. At first died the Isotricha, followed by

Ophryosolex and Diplodinium. Entodinium was the last one to disappear from the rumen.

In the present work the increase in number of Diplodinium, Ophryoscolex and Dasytricha can be explained by the fact that these protozoa are the cellulose and starch digester. During starvation for 24 hours, the main constituents of the rumen are cellulose fibres. This fact is also proved in the group fed on Pisum sativus stem which represents a roughage containing 39.8% cellulose. The type of protozoa which increased in this group were genus Diplodinium 13.2%, Ophryoscolex 3.6% and Entodinium 74.2%. It forms in Barseem 6%, 1.3% and 69.3%.

The fact that Diplodinium and Entodinium are cellulose digester was firstly suspected by the observation that these types of protozoa swallow large quantity of cellulose which undergo considerable changes in their body (SOHULEZ, 1924). DOGEL and VINOGRADOVOL did not confirm this opinion and stated that the cellulose fragments leave the body of protozoa without any morphological changes. In their opinion, the significant role of these protozoa in the digestion of cellulose is confined to mechanical grinding of the plant fibers. USUELLI (1930) stated that lyses of the cellulose in the body of protozoa occured through the help of swallowed bacteria attached to cellulose particles. Later on HUNGATE (1943) discovered the enzyme cellulase by studing the extract of different types of Diplodinium and Entodinium. The same result was proved in recent research by ABBO AKKADA, EADLE and HOWARD (1963) who concluded that although cellulose digestion by the protozoa is not an essential role nevertheless separte types shared in its dissolution.

The main role of Ophryosclex appears also to be mainly cellulose digester as the other members of Oligotricha. It increases above normal in starvation (3.2%) and Pisum sativus (3.6%). While it nearly disappear in Solanum tuberosum.

In starvation group, Pisum sativus and Solanum tuberosum groups, the Isotricha intestinalis, Isotricha prostoma were decreased than normal. The isotricha prostoma was 1.9% in starved group, 1% in Solanum tuberosum, 0.6% Pisum sativus and 2.2% in Barseem. The same was true for Isotricha intestinalis in Starved group 2.9%,1.0% in Solanum tubersum, 0.6% Pisum sativus and 3.5 in Barseem. Dasytricha was within the range in Solanum tuberosum, Pisum sativus (7.2%, 5.8% in Barseem 6.6%). While it twicly increased in starvation (15.8% Barseem 6.6%). This decrease can be explained by the fact that Isotricha intestinalis and prostoma and Dasytricha utlise only soluble carbohydrates. OXFORD(1951),SUGDEN (1953), SUGDEN and OXFORD (1952), GUTIERREZ (1955) and LEVINE (1961) stated that the Isotricha prostoma, intestinalis and Dasytricha ferment soluble carbohydrate glucose, fructose, sucrose, rafenose and insignificant amount of cellobiose. The product of fermentation was volatile fatty acids,lactic acid, Co_2 and water.

The twice increase in the number of Dasytricha in the starved group was correlated in our openion to the bacterial content of the rumen flora where in starvation it was mainly single cocci, diplococci and streptococci. The single cocci constituted 75% of microflora (Table 2) as given by SANAA. M. NASSAR et al. (1977). GUTIERRES and HUNGATE (1957) found that Dasytricha ruminantium ingested small cocci and occasionally small rod - shaped bacteria. They were able to cultivate this species in a medium containing these types of bacteria but on growth could be reached without it.

In Solanum tuberosum group, there was increase in the ratio of Diplodinium (10.8% - Barseem 6%) and the Entodinium caudatus (15%, Barseem 11.2%). There were decrease in Ophroscolex and Isotricha intestinalis and prostoma.

The Endtodinium coudatus was mainly starch ingester. SUDGEN (1953), LEVINE (1961), ABBO ADDADA and HOWARD(1960) stated that Entodinium which are starch ingester, although it cannot metablolised this ingested starch and nothing is known about product of starch digestion by this genus. In the openion of GUTIERREZ and DAVIS (1959) this ingested starch act as a store to the animal host and in this manner smooth the fermentation processes through preventing streptococcus bovis from gaining excess easily to this stored starch. GUTIERREZ and DAVIS (1959) found that Entodinium species could be cultivaled in the presence of Streptococcus bovis but not without it, and that Entodinium caudatus ingest not only streptococcus bovis but also other bacteria. HUNGATE (1959) stated that Entodinium smooth out the fermentation process by converting starch into reserve food and by feeding on streptococci thus keeps it in check. This is proved in our results as the percent of streptococci was the richest in potato (7%) on which Entodinium caudatus flourished.

In conclusion; the microfouna of rumen of sheep was largely influenced by variation in the type of ration. Holotrichus was the most sensitive to starvation and ration variation. This is because it depends on soluble carbohydrates in its nutrition. The Oligotricha which are cellulose and starch ingester are the least to be affected in starvation and other groups. The Diplodinium and Entodinium flourished with high cellulose content of Pisum sativus. The Entodinium also flourished with high percent of carbohydrate in Solanum tuberosum.

Not only the food but also the bacterial floura is an important factor for the growth of microfouna. On this bases, one could explain and correlate the twice increase in number of Dasytricha in starvation with the predominance of cocci and also the significant increase in number of Entodinium coudatus in Solanum tuberosum with the increased number of streptococci.

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Table (1)

Differential count of rumen micro floral in percent during digestion of different food stuffs

Groups of feeding	Single cocci		Diplo cocci		Strepto cocci		Cocco-bacilli and Bacilli		Filaments				Vibrio	
									Spiral form		Straight form			
	Gr+	Gr-	Gr+	Gr-	Gr+	Gr-	Gr+	Gr-	Gr+	Gr-	Gr+	Gr-	Gr+	Gr-
Starved.	60	15	8	15	-	-	-	-	-	-	-	-	-	-
Barseem	23	10	13	2	-	-	33	7	-	6	-	-	-	7
Vicia Foba	24	7	14	2	-	-	11	32	-	3	-	6	-	5
Pisum sativus	44	6	10	3	4	-	25	2	-	3	-	-	-	4
Saccharum officinarum	7	71	1	5	3	-	5	4	-	-	-	-	-	2
Solanum tuberosum	17	31	9	15	7	-	11	6	-	-	-	2	-	2
Hilianthus annus	12	25	26	9	-	-	9	7	-	-	-	1	-	1

Table (2)

Chemical Analyses of used food stuffs in percent *

Constituents / Food stuffs	Meisture %	Crude protein %	Ether extract %	Ash %	Eaibodydrates d %	Crude fibers %
Barseem **	86.31	2.54	0.46	1.92	6.39	3.80
Vicia Foba	84.40	3.35	0.73	2.11	5.92	3.49
Pisum Sativus	7.96	7.70	0.85	7.70	39.20	36.51
Sacchrum officinorum	65.76	1.01	0.46	0.99	20.89	10.89
Solanum tuberosum	79.10	1.66	0.05	1.10	17.74	0.35
Hilianthus annus	70.26	0.44	0.21	1.67	12.90	12.54

* Technical boluten of minestry of agriculture (1968)

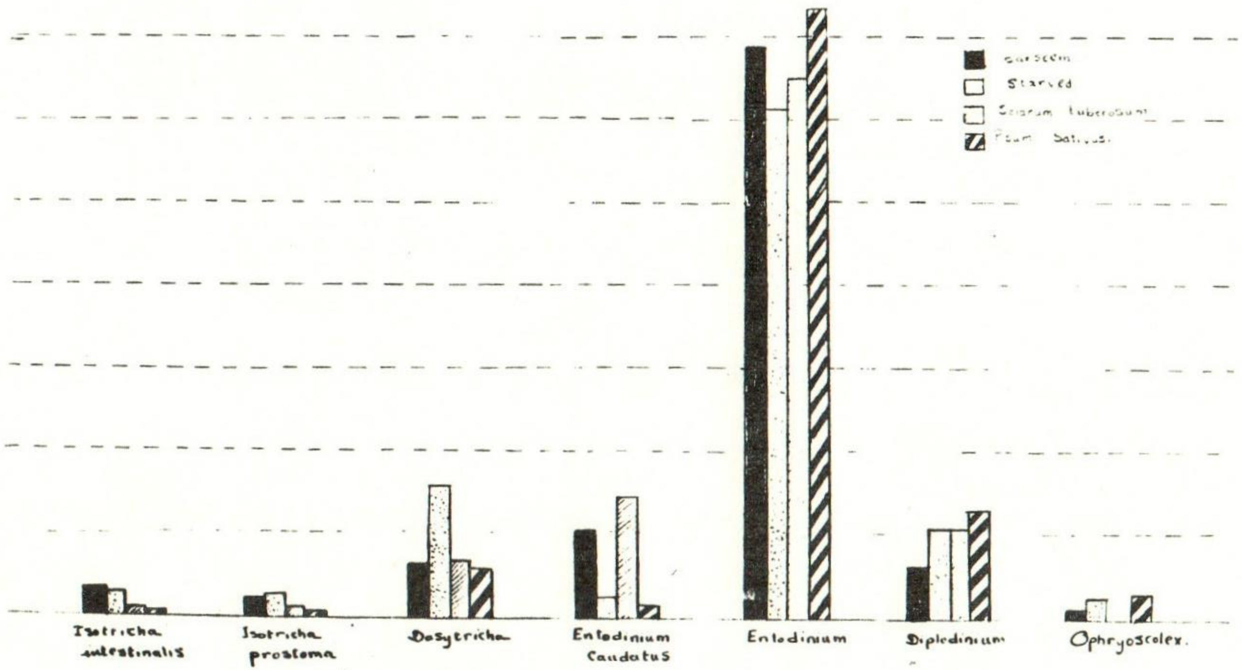
** Abou Akkada et al. (1958).

*** The second fiqures are colculated according to dry matter.

Table 3

The percentage of differential count of rumen protozoa in sheep in starved, normal regim of feeding (barseem) , tuberosum and pisum sativus.

Species of protozoa	Percentage of the differential count of protozoa			
	Normal	Starved	Potato	Pea stem
Isotricha intestinalis	3.5	2.9	1.0	0.6
Isotricha proctoma	2.2	1.9	1.0	0.6
Dasytricha.	6.5	15.8	7.2	5.8
Entodinium caudatus	11.2	2.9	15.0	2.0
Entodinium.	69.3	62.4	64.8	74.2
Diplodinium	6.0	10.9	10.8	13.2
Ophryoscolex	1.3	3.2	0.2	3.6


Starved
Sativus.
Isotricha intestinalis
Isotricha prostoma
Dasytricha
Entodinium Caudatus
Entodinium
Diplodinium
Ophryoscolex.

Figur (1)