# EFFECTS OF DEFAUNATION ON DEGRADABILITY AND PROTEIN SYNTHESIS IN THE RUMEN OF SHEEP

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## Introduction

The reported data on the effects of defaunation on the digestive, resorbtive and synthetic processes in the digestive tract of ruminants is very contradictory. The purpose of the present study was to be found the effect of defaunation on the degradation rate and synthesis of protein in the forestomach of sheep.

## Materials and Methods

The study was carried out with 9 male lambs (of similar breed, date of birth and liveweight), divided into two groups on the second day after birth. The first consisted of 3 animals (suckling from their dams to 3 months of age) and was used as control – faunated (F). Six lambs were separated from the dams and were kept defaunated (DF) in a different stable, without contact with other animals. During the first 3 months they were fed with cow's milk. After that age all animals received maize silage and concentrate. All were rumen-cannulated and were fitted with re-entrant cannulae at the proximal duodenum (Aliev, 1984). During the whole period the animals were controlled for the presence of protozoa. At 11-months of age 3 of the defaunated animals were refaunated (RF) by 4-day infusion of 200 ml rumen content taken from the control group. Samples were collected two weeks after the refaunation. The protein degradation was measured "in sacco" by incubation mixture of 50 % soybean meal and 50 % rape meal for 2, 4, 12 and 24 h in the rumen (Mehrez and Ørskov, 1977). The duodenal digesta flow was determined by continuous collection for 48 h. As marker for bacterial nitrogen was used Diaminopimelic acid (DAPA).

## Results and Discussion

The rumen ammonia-N ($NH_3$-N) was significantly increased 2 h after feeding for F and RF animals ($p < .001$). The $NH_3$-N concentration in the duodenal digesta 2 and 4 h after feeding was lower for F animals compared to DF and RF animals but the differences were not significant concerning the average values for 24 h (table 1).

TABLE 1. CONCENTRATION OF $NH_3$-N·mg/100 ml

| Hours after feeding | F | DF | RF |
|---|---|---|---|
| | | Rumen Content | |
| 0 | $14^a$ | $14^a$ | $14^a$ |
| 2 | $24^b$ | $16^a$ | $23^b$ |
| | | Duodenal Digesta | |
| 0 | $10^b$ | $12^b$ | $12^b$ |
| 2 | $9^a$ | $12^b$ | $11^b$ |
| 4 | $7^a$ | $11^b$ | $10^b$ |
| 7 | $10^a$ | $11^b$ | $10^b$ |
| a v. for 24 h | $9^b$ | $11^b$ | $10^b$ |

a,b Differences between groups and hours are significant at $p < .05$ if average values have different letters

TABLE 2. PROTEIN DEGRADATION RATE "IN SACCO", %

| Incubation Time, /h/ | F | DF | RF |
|---|---|---|---|
| 2 | $14^a$ | $19^b$ | $11^a$ |
| 4 | $23^a$ | $16^b$ | $15^b$ |
| 12 | $29^a$ | $20^b$ | $16^c$ |
| 24 | 50 | 57 | 48 |

a,b,c Differences between groups are significant at $p < .05$ if average values have different letters

The protein degradation rate "in sacco" during the first 2 h after feeding was higher for DF ($p < .001$) compared to F and RF animals. At 4 and 12 h degradation was higher F animals. After 24 h the differences between F, DF and RF animals were not significant (table 2).

The concentration of bacterial mass in the rumen was higher for DF animals but the total microbial mass was higher for F animals (table 3).

TABLE 3. MICROBAL MASS QUANTITY IN THE RUMEN g/100 ml

| Index | F | DF | RF |
|---|---|---|---|
| Protozoal mass | 1.7[a] | | 1.0[b] |
| Bacterial mass | 1.1[a] | 1.9[b] | 1.4[a] |
| Microbial mass | 2.8[a] | 1.9[b] | 2.4 |

[a,b]as in table 2.

The quantity of bacterial-N passing duodenum for 24 h was higher for DF animals compared to F and RF. The bacterial mass measured by differential centrifugation and by DAPA showed similar tendencies but different values (table 4).

The differences concerning bacterial synthesis were very obvious. The bacterial-N flowing into duodenum was with 75 % and 30 % higher for DF compared to F animals, by differential centrifugation for DF compared to F animals, by differential contrifugation and DAPA, respectively. In the same time the faecal-N was with 26 % higher for DF compared to F animals. The increased protein degradation rate in the rumen of F animals was due to the protozoal population which according to Kayouli et al. (1984) and Ushida et al. (1986) had increased the retention time of the rumen liquid and microorganisms in the rumen.

(**Key Words**: Defaunation, Protein Synthesis, Sheep)

TABLE 4. EFFECT OF DEFAUNATION ON ORGANIC MATTER (OM) AND NITROGEN (N) DIGESTION IN RUMEN

| Items | F | DF | RF |
|---|---|---|---|
| Intake, g/day | | | |
| OM | 1212 | 1212 | 1212 |
| N | 23.2 | 23.2 | 23.2 |
| Duodenal, g/day | | | |
| OM | 587 | 679 | 603 |
| NAN | 26.6[a] | 30.8[b] | 24.4[a] |
| BN-DC* | 12.4[a] | 21.7[b] | 13.2[a] |
| BN-DAPA* | 15.9[a] | 20.7[b] | 16.2[a] |
| Digested | | | |
| OM, g/day | 625 | 533 | 609 |
| Efficiency** | | | |
| DC | 19.8[a] | 40.7[b] | 21.7[a] |
| DAPA | 25.4[a] | 38.8[b] | 26.6[a] |

*BN-DC and BN-DAPA – bacterial nitrogen estimated by differential centrifugation and DAPA, respectively.

**microbial N g/kg OM digested in the rumen a,b as in table 2.

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