

THE INFLUENCE OF THE EXPERIMENTAL NUTRITIONAL FACTORS ON THE RUMEN HISTOLOGICAL STRUCTURES

INFLUENȚA FACTORILOR NUTRIȚIONALI EXPERIMENTALI ASUPRA STRUCTURILOR HISTOLOGICE ALE RUMENULUI

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*The researches were conducted to monitor the influence of the *Saccharomyces cerevisiae* yeast, Yea-Sacc¹⁰²⁶ strain, on the morphological structure of the small intestine in young sheep, fed with forage diets comprising alfalfa hay and 40% barley, and also in the case of using 40% barley in a granulose diet with 0.5% yeast Yea-Sacc¹⁰²⁶ (EL_c). The histological studies were done after classic histological techniques. At the control lot (WL) the great papillae with multiple ramifications on their length were analyzed. Their average height was 1436.87 μ . The cornified layer of the epithelium is more reduced and the basal membrane is extremely folded, suggesting a large absorption capacity and surface. The mucous that lines the ventral ruminal bag is presenting predominantly great conic papillae, the middle and small papillae being very rare. The cornification process of the ruminal dorsal bag at the experimental lot (EL) is obvious on the lateral sides and on the tip of the papilla at the inter-papillary epithelium. The corion is represented by the lax connective tissue formed from fine and condensed collagen fibers. At the dorsal ruminal bag of the EL_c lot the great and middle papillae are predominant, the small papillae are wider, some presenting obvious ramifications.*

Key words: sheep, morphological structure, rumen, yeast, barley

Introduction

The researches were done to monitor the influence of the *Saccharomyces cerevisiae* yeast, Yea-Sacc¹⁰²⁶ strain on the morphological structure of the rumen in the young sheep fed with forage diets comprising 40% barley.

Materials and Methods

To organize the experiment the group method was used, consisting of forming experimental groups, as homogenous as possible, maintained under the same environmental conditions to diminish the altering influences on the obtained

results. For a good ongoing of the research we individualized the animals by using crotals and grouping.

In the group methods, the experimental groups are fed differentiated by the investigated factor, in this case the diet cereal proportion and by the forage preparation (*Saccharomyces cerevisiae* living yeast culture Yea-Sacc¹⁰²⁶ strain in a 1.5g/head/day proportion [4]. Tsurcana breed lambs were used as biological material.

The histological studies were done according to classic histological techniques [1, 2, 3].

Results and Discussions

Following results were obtained:

The control lot

A. The dorsal ruminal bag

Microscopic studies reveal the presence of the large, middle and small ruminal papillae, the large and the middle ones representing the majority. The large papillae present multiple ramifications on their length, larger or smaller, having the average height of approx. 1436.87 μ (Fig. 1). The middle papillae have the height of about 724.37 μ and the small papillae 395.2 μ .

The multilayered epithelium has the average thickness of about 147.5 μ (laterally), 150 μ (at the tip of the papilla) and about 75 μ towards the base of the papilla. The cornified layer is reduced and the basal membrane very folded, suggesting a large absorption surface and capacity. The corion in the ax of the papillae contains condensed and parallel collagen fibres, among which display themselves rare elastic fibres, fibroblasts and the capillary network, which is more ramified along the folds of the basal membrane. In the basal corion, the capillaries widen, and among the collagen fibres display themselves elastic fibres and numerous arterioles.

The muscular tunica is very developed.

B. The ventral ruminal bag

The mucous that lines the ventral ruminal bag presents a majority of large conical papillae, the middle and small ones being very rare (Fig. 2 and 3). The large papillae are generally narrower, some presenting lateral ramifications and having an average height of about 2745.5 μ , the middle ones 1306.25 μ and the small ones 446.5 μ . The basal membrane presents deep folds, penetrated by blood vessels. The thickness of the epithelium is approx. 665 μ (laterally), 475 μ (at the tip of the papilla) and 190 μ towards the base. The cornified layer is generally thinner, but is thicker on the lateral sides of the tip of the papilla.

The corion of the papilla presents a network of large and ramified blood vessels and many leucocytes towards the tip of the papilla.



Fig.1. Dorsal ruminal bag WL (Ob. 10)



Fig.2. Ventral ruminal bag WL (Ob. 4)

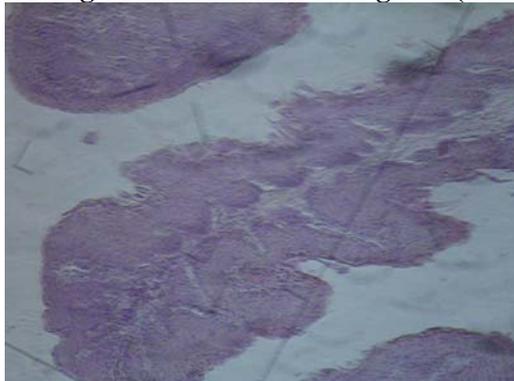


Fig.3. Ventral ruminal bag WL (Ob. 10)

Experimental groups

In the histological preparations taken from the experimental lots, in comparison with the control, following modifications were noted:

A. The dorsal ruminal bag

1. EL lot (EL-experimental SDE)

The wall of the rumen is organized upon four over placed layers: mucous, muscular and serous. Through folding, the mucous generates large and narrow

conical papillae (Fig. 4), with an average height of approx. 1140 μ , middle papillae 712.5 μ and small papillae 408.5 μ . The mucous, free from glands, is lined with a cornified multilayered epithelium, with the thickness of approx. 150 μ (laterally), 112.5 μ (towards the base of the papilla) and 100 μ (at the tip of the papilla). The epithelium stands on a slight curled basal membrane. The cornification process of the epithelium is obvious on the lateral sides and at the tip of the papillae. The corion is represented by connective lax tissue formed from fine and condensed collagen fibres, among which display themselves numerous fibroblasts and cellular elements with defensive mechanisms. In the corion from the ax of the papilla, blood vessels can be observed, which penetrate the folds generated by the basal membrane. The basal corion, well represented, contains collagen fibres, elastic fibres, numerous fibroblasts and blood vessels with a large lumen.

The muscular tunica is organised on two layers of smooth muscular cells: the internal layer is oriented longitudinally (more developed) and the external layer is oriented circularly.

2. The EL_c lot (experimental lot from Giulvaz)

At the dorsal ruminal bag following aspects were noted:

Predominant are the large and middle papillae (Fig. 5.), the large ones being generally wider, some presenting obvious ramifications and having an average height of about 1251.15 μ . The middle papillae have the height of about 712.5 μ and the small ones 427.5 μ .

The thickness of the epithelium is approx. 195.85 μ (laterally), 143.75 μ (at the base) and 118.75 μ (at the tip of the papilla), the cornification process being more pronounced in comparison with the control lot WL, but the basal membrane is extremely folded, the folds being deep. The capillary network is extended.

B. The ventral ruminal bag

1. The EL lot (experimental lot SDE)

In the structure of the mucous predominant are the large papillae, whose average height is approx. 2156.5 μ (Fig. 6). The middle papillae have an average height of about 807.5 μ and the small ones 418 μ .

The epithelium: 125 μ (laterally), 100 μ (at the base) and 100 μ (towards the tip). The process of keratinisation is intensely manifested on the lateral parts of the papillae and at the base.

2. The EL_c lot (experimental lot at Giulvaz)

In the structure of the mucous predominant are the large (2109 μ) and small (437 μ) papillae (Fig. 7). The thickness of the epithelium is 100 μ , 75 μ , 150 μ , the basal membrane presenting few folds, deeper towards the tip of the epithelium. The process of keratinisation is manifested intensely on the whole surface of the epithelium. The corion in the ax of the papillae contains many condensed collagen fibres, fibroblasts, leucocytes and blood vessels with a small lumen.

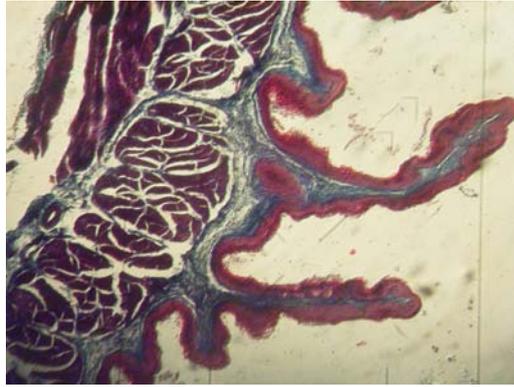


Fig.4. Dorsal ruminal bag EL (Trichromic Mallory –Ob. 4)



Fig.5. Dorsal ruminal bag EL_c (Trichromic Mallory-Ob. 4)

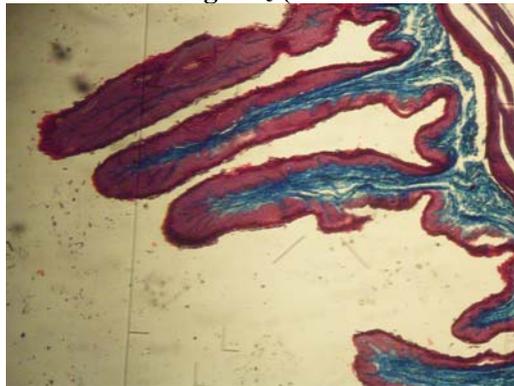


Fig. 6. Ventral ruminal bag EL (Trichromic Mallory-Ob. 4)

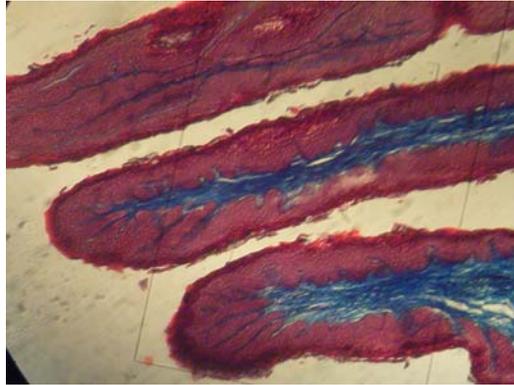


Fig. 7. Ventral ruminal bag EL_c (Trichromic Mallory-Ob. 4)

Conclusions

1. In comparison with the control lot, in case of the experimental lot, the mucous that lines the ventral ruminal bag presents predominantly large conical papillae, middle and small ones being very rare.
2. The mucous of the dorsal ruminal bag at the experimental lot presents predominantly large and middle papillae, the large ones being wider, with ramifications.
3. The process of cornification of the epithelium of the dorsal ruminal bag at the experimental lot (EL) is obvious on the lateral sides and at the tip of the papillae, as well as at the interpapillary epithelium.

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*În cercetările întreprinse s-a urmărit influența drojdiei *Saccharomyces cerevisiae*, tulpina *Yea-Sacc*¹⁰²⁶ asupra structurii morfologice a rumenului la tineretul ovin furajat cu rații pe bază de fân de lucernă și orz în proporție de 40% precum și în cazul utilizării variantei cu orz în proporție de 40% într-o structură de rație granulară și cu un adaos de 0,5% drojdie furajeră (*Yea-Sacc*¹⁰²⁶) (*LE_c*). Studiile histologice au fost efectuate după tehnici histologice clasice. La lotul martor (*LM*) s-au sesizat papile mari care prezintă ramificații multiple pe lungimea lor, mai mici sau mai mari și au înălțimea medie de cca. 1436,87 μ. Stratul cornos al epiteliului este mai redus iar membrana bazală subepitelială este foarte cutată, ceea ce sugerează o suprafață și o capacitate mare de absorbție. Mucoasa care căptușește sacul rumenal ventral prezintă predominant papile conice mari, cele mijlocii și mici fiind foarte rare. Procesul de cornificare a epiteliului sacului ruminal dorsal la lotul experimental (*LE*) este evident pe părțile laterale și ale vârfului papilelor și la nivelul epiteliului interpapilar. Corionul este reprezentat de țesut conjunctiv lax format din fibre de colagen fine și condensate. La sacul ruminal dorsal al lotului *LE_c* sunt predominante papilele mari și mijlocii, papilele mari fiind în general mai late, unele prezintă ramificații evidente.*

Cuvinte cheie: oaie, modificări histologice, rumen, drojdie, orz.