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# RUMEN PARAKERATOSIS IN INTENSIVELY FATTENED YOUNG SHEEP CLINICAL AND EXPERIMENTAL

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Parakeratosis is a keratin dystrophy caused by metabolic disturbances associated with deficiencies in vitamin A, Zn. and feed producing excess VFA (volatile fatty acids) with changing pH and ruminal acidosis. The disease is first described by Vester in 1938, with the consumption causes without roughage concentrated in large amounts, affecting 40% of the herd. In this paper, young sheep are fattened intensively with unique feed hyperglycemia (40% chopped and milled fibers with 60% concentrated powdered), feed and water ad libitum in permanent stalls for a period of 120 days.
After a period of 35–40 days, there are diseases in sheep.

*Key words:* parakeratosis, Gomorii method.

## INTRODUCTION

### Clinical signs of parakeratosis

Parakeratosis is a keratin dystrophy caused by metabolic disturbances associated with deficiencies in vitamin A, Zn. and feed producing excess VFA (volatile fatty acids) with changing pH and ruminal acidosis[1,2,3,4,5]. Some of the important clinical signs are: lack of alertness, slight irregularity, lack of appetite, reduced weight gain, staying more recumbent, consumption of more water, mild bloating, injected mucous membranes, normal temperature, frequent respiration, **low rumination**, dry nose, urinary colic, 12.5 alkaline reserve, depressed mood, decreased urine output, lap edema occurs and preputial edema, obstruction of the urethra (urolithiasis).

– On examination ruminal fluid acid-strong odor
– pH 5 after 40 days of feeding.
– Flotation late 45'–1 hour.
– Flora and fauna affected.

**Lesions** – The cavity opening rumen, feed odor of decaying sediment, dilated blood vessels lining the ventral sac thickened growths especially keratinized, and chorion edema. The urinary bladder and the urethra stones of different sizes.

**Diagnosis** – ruminal acidosis and urolithiasis.

**Prognosis** – severe.

### Etiopathogeny

Consuming high sugar forage single ground can interfere with the bowl shape (ie. rumination and salivation). The mastication plays a very important role in grinding food particles that are deposited in the cranial ventral sac.

Evacuation of ruminal contents is permitted by mastication that fills the ventral sac, allowing the network to send content and deciduous.

Alternating pH of saliva decreases the reflex movements, which stops the proper gas evacuation resulting from ruminal digestion ($CO_2$ and methane).

Saliva is an alkaline pH and hypotonic 8.2, contains large amounts of phosphate and bicarbonate-buffered system which maintains the pH at 6.2 to 6.5 in anaerobic conditions, maintain the fluidity of the fermentation broth, participating in the normal process of digestion.

Biochemical and biophysical ruminal balance is provided by salivary secretion, which varies depending on quality and quantity of the feed ration and physical condition.

In rumen flora is damaged, high cellulolytic bacteria prefer pH 6.5, they are irreplaceable, have special requirements of ammonia, phosphorus, sulfur, trace elements, isobutyric acid, isovaleric and methyl butyric acid for the synthesis of cellular protein and their multiplication.

Ruminal fauna is severely affected if large infusoria prevail (from 300 to 600 microns). Protozoa attack all feeds and are competitive with the bacteria which they consume. With the disappearance of infusoria, the high nitrogen source necessary for the cellulolytic bacteria, also disappears.

VFA (volatile fatty acids) from the rumen fluid (at pH=5) is 48% in favor of butyric acid. Also, decreases propionic acid to 8% and the acetic acids to 2%, acids which form the basis for the production of glucose in the blood. The remaining 42% is likely the lactic acid wich does not appear in the gas chromatography result.

## RESULTS

VFA-absorption was measured in vitro by the original method[6]. It is found that the absorption at pH 5 is reduced to almost zero.

Note that in the general circulation of the blood, VFA, does not circulate as they are toxic, with hemolysis properties[7].

In blood circulation the lipids are transported in the form of lipoprotein complexes, representing a major source of energy for body energy, degradation resulting in VFA CO2 and water[7].

VFA arrives through the spaces between cells corneum (Fig. 1) and the layer enzymes are activated by CoA using ATP and enzyme activators in the presence of Mg ++ ions and transported by "carrier transport" to the basal membrane and then from venous blood to the fenestrated capillaries of the papilla under basal membrane of ruminal epithelium.

Lactic acid in the rumen fluid is absorbed by the ruminal epithelium in lower quantities compared to the rate of production by gram-positive bacteria.

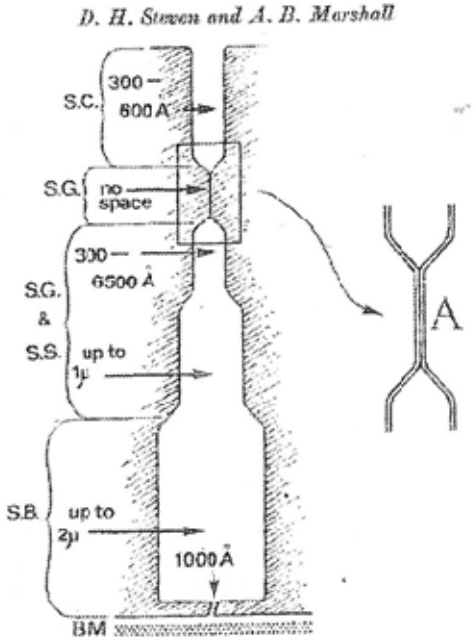


Figure 1. Represents the organization of ruminal epithelium seen in the electron microscope by Steven D.H. and Marshal A.B. in 1969, shows that between the stratum corneum and granular layer is a small space that belongs to the granular layer does not distinguish any structure is a junction between granulosa cell mem. In reality this junction (A) corresponds to the intermediate area of the lucid layer[6] that has been highlighted by histochemical methods[8].

Lactic acid absorbed from the rumen mucosa by oxidative phosphorylation in the mitochondria of granulosa cells is catalyzed by lactate dehydrogenase and pyruvic acid [1].

Histological preparations of the ruminal mucosa samples from ventral sac ware stained with hematoxylin eosin. Bubble edema and diffuse parakeratosis growths ware revealed (Figures 1–4).

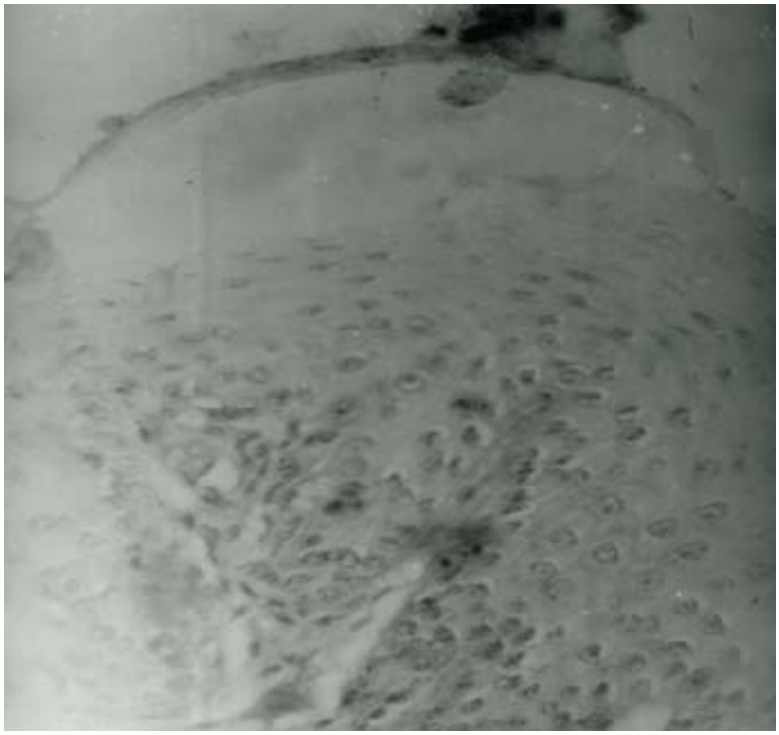

Figure 2. Bubble swelling in the lining of the rumen of young sheep. Hematoxylin eosin Coloration. Ob 20×.

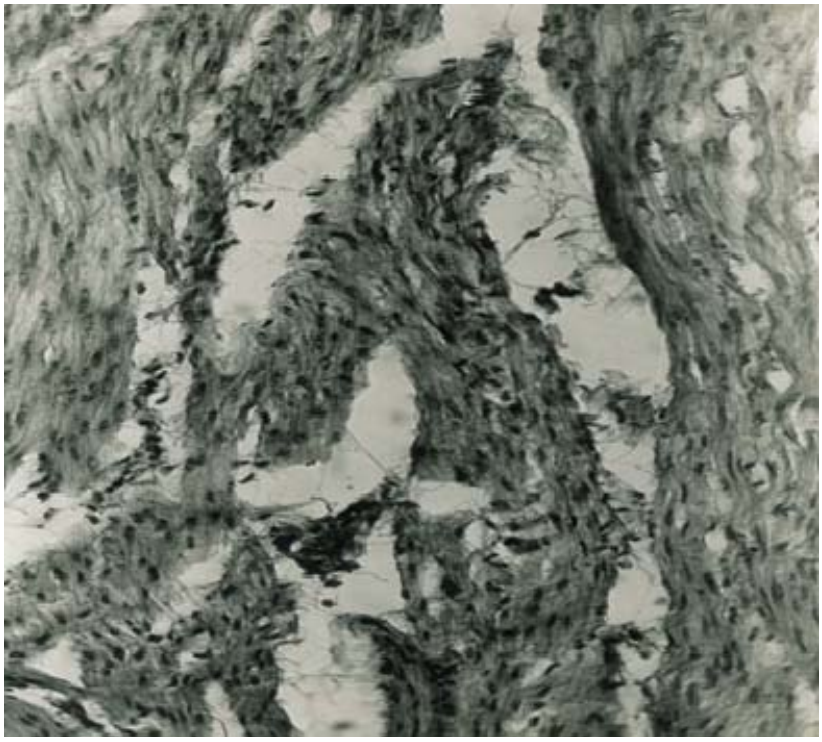

Figure 3. Diffuse edema in young sheep rumen mucosa. Hematoxylin eosin Coloration. Ob 20×.

Histoenzymatic preparations were carried, highlighting the much thickened stratum corneum with excess keratin immature nucleus keeping tabs horn - parakeratosis (Figures 5, 6).

Rumen mucosa after 60 days of feeding with single grinding is affected entirely by hyperkeratosis and parakeratosis especially ventral sac (Figure 6).

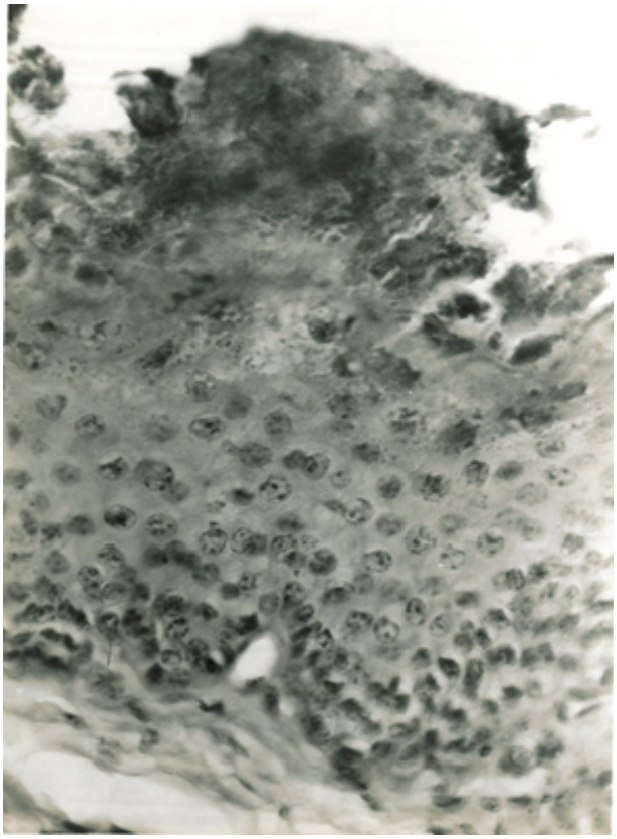

Figure 4. Tumor in the lining of the rumen parakeratosis in young sheep.
Hematoxylin eosin Coloration. Ob 40×.

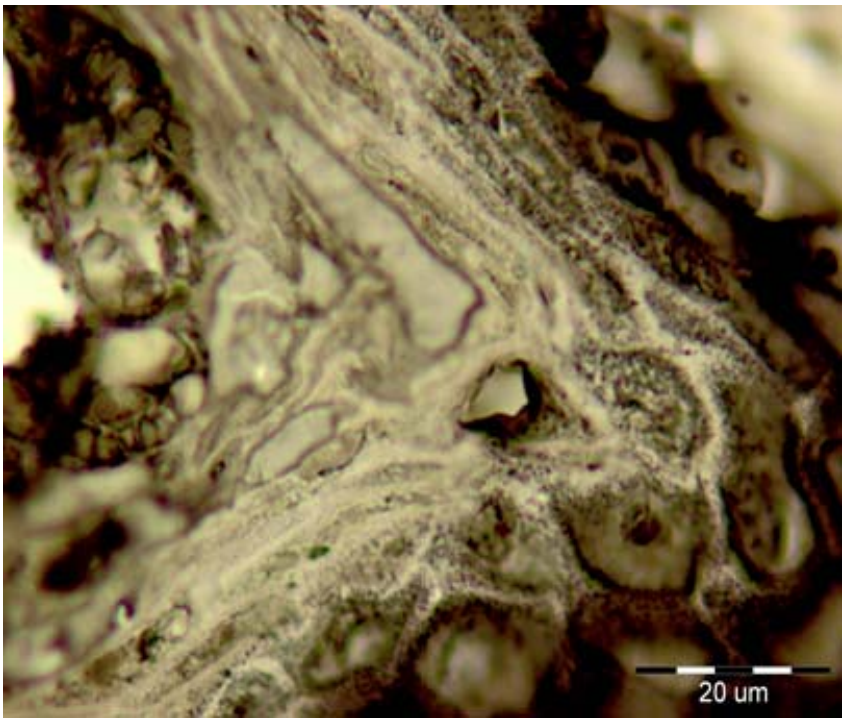


Figure 5. Parakeratosis young sheep rumen mucosa.
Colouring histoenzimatic met. Gomorii. Ob 100×.

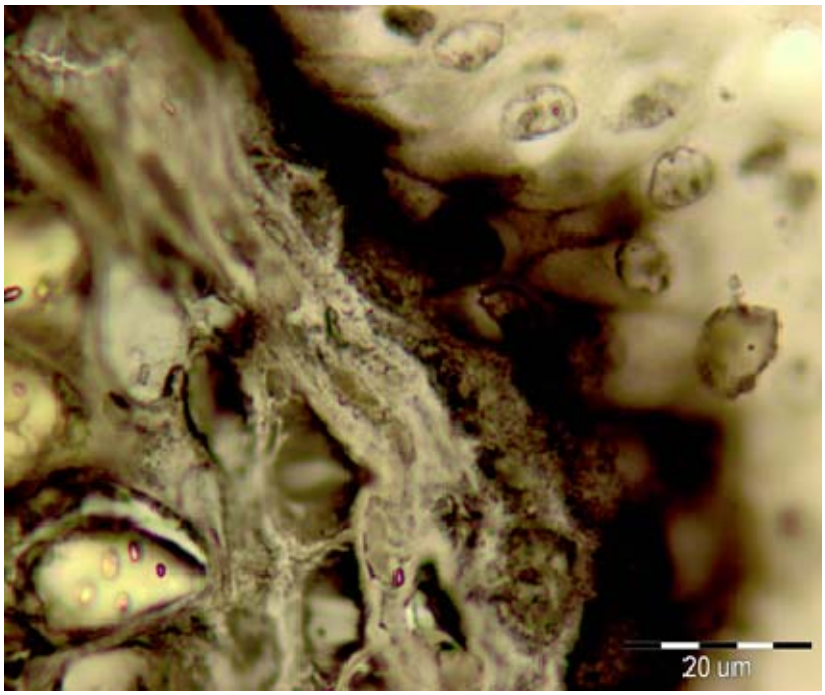


Figure 6. Parakeratosis young sheep rumen mucosa. Colouring histoenzimatică Gomorii method. Ob 100× Detail, the presence keratoses mass nucleus.

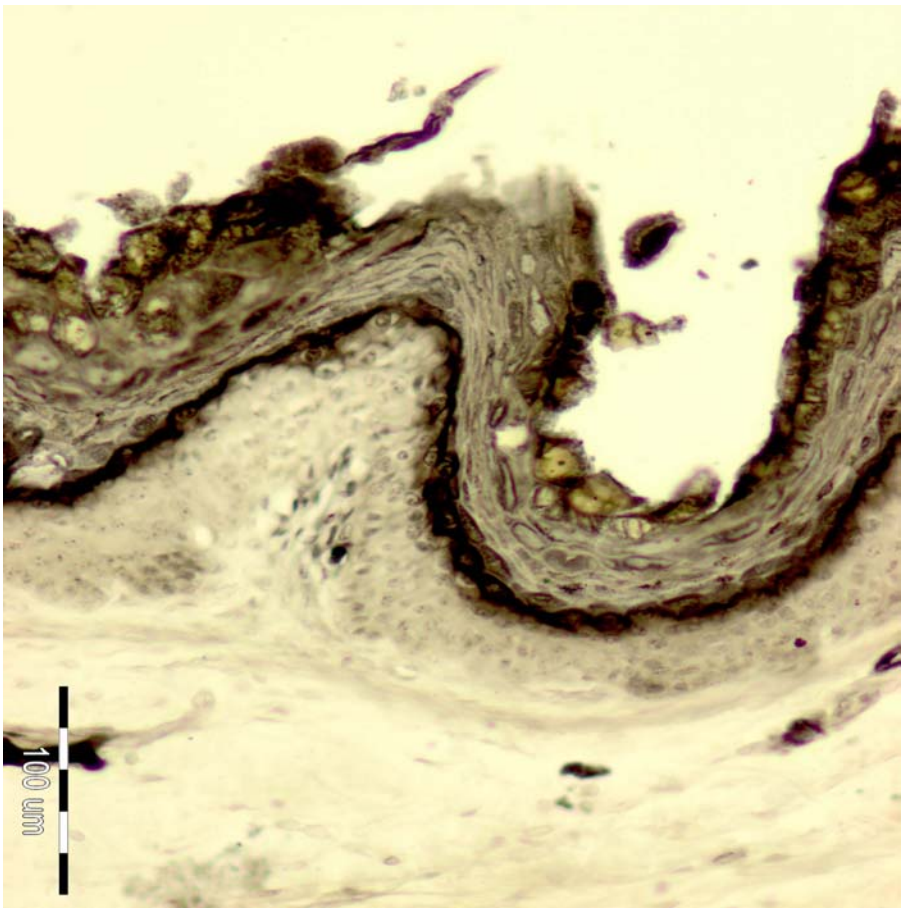


Figure 7. Hyperkeratosis and parakeratosis ventral sac of the rumen mucosa in young sheep. Colouring histoenzimatic. Gomorii method. Ob 100 um.

Because of the parakeratosis of the stratum corneum (Figures 5,6), the spaces between corneous cells disappears and VFA does not reach the enzyme layer and VFA not reach enzyme layer (Epiplasmal barrier – Figure 8).

**Epiplasmal barrier** is an extracellular enzymatic layer secreted by granulosa cells of the ruminal epithelium.

Determination of this enzyme layer was performed using histoenzymatic methods[8].

– Gomori method for highlighting acid phosphatase and alkaline phosphatase.

– Vachstein and Meisel method for ATPase.

– G-Nady method for cytochrome oxidase, the enzyme strictly intra cytoplasmic linked to cellular respiratory chain.

– Chevremont and Frederic reaction for thiol group-SH.

– Feulgen reaction which reveals the presence of appreciable amounts of DNA in the top of the last row of granulosa cell cytoplasm without exceeding the cell membrane.

Enzyme layer occupies the intermediate zone of Ranvier lucidum layer and serves to protect the rumen epithelium to substances that enter from the outside through the horn cells, to loosen them into their component parts, to sort and carry through "carrier transport" as the plasma membrane to the internal environment through a biological process active even against osmotic gradient.

This enzyme hydrolysates group and thiol group-SH on the layer show that this chemical reaction takes place by dissolution of the molecules in their components, carrying the active transport of substances in both ways. From a functional perspective, The Epiplasmal Barrier fulfills the role of mediator between the organism and the surrounding world, free molecules making up promptly with great mobility and biochemical drive, connecting or rejecting substances that enter from outside through intercellular spaces of the stratum corneum, or leave the epithelial structures.

This enzyme layer was named in 1978 as "The Epiplasmal Barrier" which is the basis of biological selective processes, information linkages and exchanges that occur without interruption between the organism and the environment under the control of nucleic acids[8].

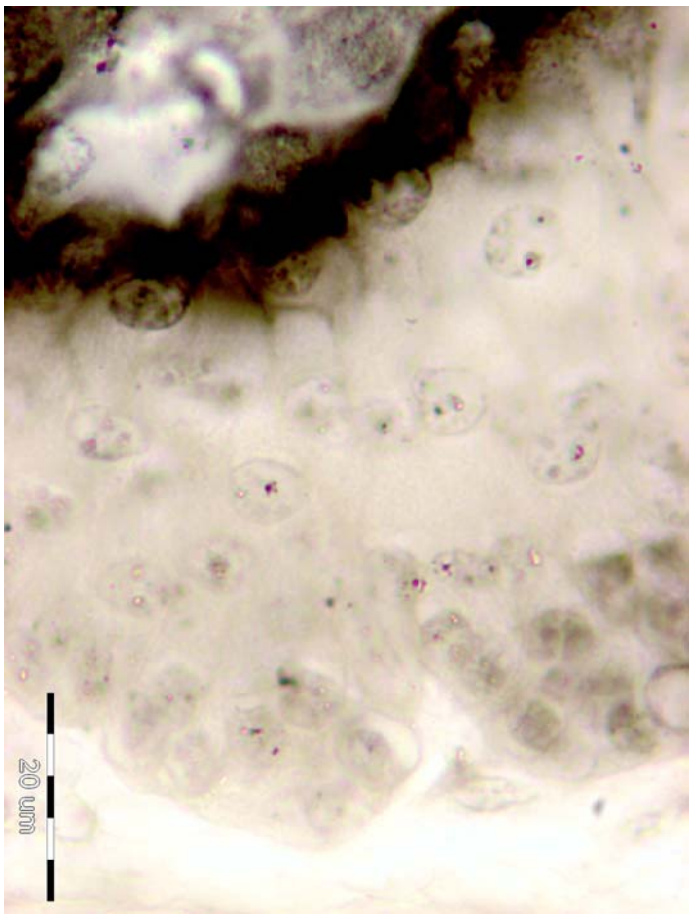


Figure 8. Colouring histoenzimatic. Gomorii method. Ob 20 um. Epiplasmal barrier in young sheep rumen mucosa.

## CONCLUSIONS

Exacerbated enzymatic activity of ruminal bacteria, inactivates vitamin A, which is involved in the etiology of parakeratosis.

At pH 5, VFA will not be absorbed through the rumen lining, being affected the enzyme layer (Epiplasmal Barrier – Figure 8), the lack of nutrition and cellular hypoxia, epithelial basal membrane by breaking off from hemidesmozomi, increased transepithelial influx, hydrodynamic and brutal for buffering acidity in the ruminal content, producing bubbles, diffuse edema and submucosal edema, resulting enzymopathies. Due to an increased pH the enzymes no longer recognize the substrate and have no affinity for the substrate[8,9].

Because of the parakeratosis of the stratum corneum, the spaces between corneous cells disappears and VFA does not reach the enzyme layer.

Parakeratosis in young sheep rumen mucosa dystrophy is a severe chronic evolution, the shape of the adjustment to the pH increased risk-factor-generated unique feed milling, characterized clinically by disrupting VFA absorption, increased acidity which generates toxic factor ruminal epithelium oncogenesis[10], the appearance of the pillar carcinoma rumen, the cardia, and the pylorus causing chronic flatulence[11].

Single feed grinding food is inappropriate for young sheep fattening fed intensively nor for ruminants in general.

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