

INDIGESTION BY ALKALOSIS OF THE RUMEN

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INDIGESTION BY ALKALOSIS OF THE RUMEN

Introduction :

It is an acute ammoniacal poisoning, which is due to the hydrolysis of urea from the diet by ureases in the rumen flora.

It follows a diet very rich in protein or nitrogen found in the fodder from pastures richly amended by fertilizers (nitrogen, phosphorus and potassium, or strongly amended by the manure of livestock (cattle, sheep, pigs, poultry)

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- Clinically, it is characterized by:
- a sudden start,
- a rapidly fatal evolution and by
- vascular lesions (congestion, hemorrhage).
- It is an important pathology in intensive livestock farming

It is indigestion resulting from excessive production of ammonia in the rumen. This results in digestive and then blood alkalosis causing a:

-indigestion

-enteritis.

Nervous disorders

quickly fatal.

It is due to an excess of non-protein nitrogen in the feed ration (urea, ammonium salts, uric acid)

ETIOLOGY

This pathology is due to :

a distribution by excess of urea, used as a corrector for a ration rich in energy and low in nitrogen (such as maize silage), or the ingestion of large quantities of nitrogen-rich grass following an excessive application of nitrogen fertilisers on the treated plot (Nitrogen, Phosphorus, Potassium) = NPK



Example of (advertising) information on urea

100% Food-Grade Urea 46!

25kg bag - Pallet of 50 bags

Benefits

Urea for ruminants

Dietary urea (100% dietary urea 46 guaranteed)

is a non-protein source of nitrogen for rumen microorganisms.

Dietary urea in the ration helps to improve the quality of the feed efficiency.

Characteristics

Appearance: White Pearls

Guaranteed analytical values: Urea > 98%

Total nitrogen calculated > 46.2%, Nutritional values: 1472g DINP/kg gross.

(Digestible Proteins in the Intestine corresponding to the Nitrogen of the degraded food)



Instructions for use

Cows: 30 to 80g/animal/day depending on the ration and the urea content of the other ingredients in the ration.

Sheep and goats: 5 to 10g/animal/day.

Make sure you don't exceed a daily intake of:

- 25g/100kg live weight for dairy cows
- 30g/100kg live weight for fattening cattle.

Regulations

- Is distributed in a mixture, as a food additive.
- Urea can only be given to animals with a functional rumen.
- The maximum amount of urea in the feed should be increased gradually.
- The maximum dose of urea will only be given as part of a diet rich in highly digestible carbohydrates
- Urea nitrogen can represent a maximum of 30% of the total nitrogen present in the ration.
- Use of dietary urea is subject to approval by the Directorate of Veterinary Services.

Pathogenesis

Translated into:

an increase in the concentration of ammonia in the rumen

pH rises, which facilitates

the passage of ammonia into the blood.

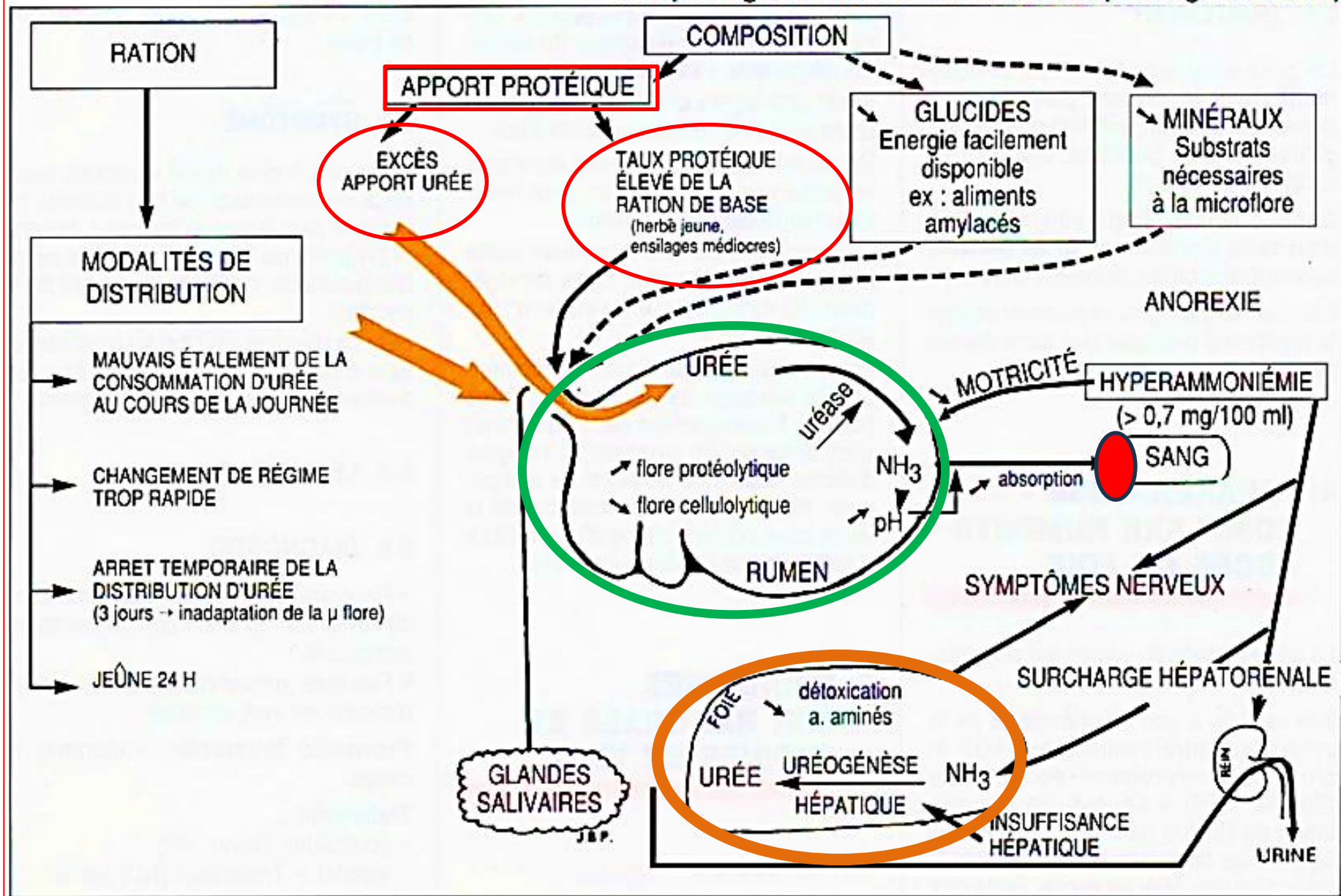
- This hyper-amunienemia leads to blood electrolyte disorders:
 - hypomagnesemia causing nerve excitability
 - cellular damage to the central nervous system
 - Death will be preceded by a hyper syndrome.

the passage of ammonia into the milk promotes the appearance of mastitis (by irritation of the smooth muscles and reduction of the teat defenses),

This leads to digestive disorders in the lamb at the udder.

- The primary cause of these disorders is the ingestion of excessive amounts of substrates that can rapidly give rise to ammonia in the rumen.
- the ammonia absorbed in the rumen is taken up by the portal circulation,
- its appearance in the systemic circulation is a sign of an overshoot of the hepatic possibilities of detoxification.

Etiopathogénie de l'alcalose du rumen (J. Brugère-Picoux)



SYMPTOMS

- Alkalosis evolves in a superacute mode:
- Right after ingestion, the animal becomes:
 - -anxious
 - -teeth grinding and
 - - saliva profusely.
 - -The gait becomes shaky.
 - -Tremors more and more violent and close together agitate his body.

- The fall to the ground is accompanied by tetanic seizures.
- Bloating is rapid, due to the atony of the forestomachs (by local action of ammonia on the centres of motor skills:
- Paralysis begins at 0.4 mg ammonia per 100 ml of blood, it is total at 0.8 mg per 100 ml.
- Without treatment, death occurs quickly by asphyxiation

LESIONS

- At autopsy, the opening of the rumen reveals a marked ammoniacal odour,
- the pH is high.
- Congestion of the carcass is generalized, with haemorrhagic foci particularly in the endocardium, trachea and lungs.
- DIAGNOSIS
- Anamneses, lightning evolution
- These symptoms easily guide the diagnosis.
- DIFFERENTIAL DIAGNOSIS:
- enterotoxemia, organophosphate and organochlorine poisoning.

TREATMENT

- The prognosis of alkalosis remains poor if the intervention is not early; This should make it possible to:
- Stopping ammonia absorption
- either by an emergency ruminotomy followed by emptying and washing,
- or by administering vinegar per os (1 litre per ewe, to be repeated 2 hours later at half a dose).
- administration of activated charcoal;
- – the administration of 3 l of acetic acid 5% (spirit vinegar) followed by 30 l of cold water, to be renewed if necessary;

Acetic acid reacts with ammonia to form ammonium acetate, which is neutral.



(CH₃COO⁻ NH₄⁺) Ammonium acetate
CH₃COOH (citric acid, vinegar)

L'acide acétique réagit avec
l'**ammoniac** pour former l'**acétate**
d'ammonium qui est neutre.



($\text{CH}_3\text{COO}^- \text{NH}_4^+$) Acétate
d'ammonium

CH_3COOH (acide citrique, vinaigre)

- stopping the production of ammonia by oral administration of cold water, to dilute the contents of the rumen, and antibiotics to stop the operation of ammonia production
- Neutralization of ammonia by intravenous administration of magnesium solutions:
- aspartate and Mg glutamate, which act as cellular protectors

- normalize the contents of the rumen: block fermentation and acidify the environment, by having a cold solution of vinegar or acetic acid at 5% swallowed through a probe (5 to 6 litres in 20 to 40 litres of water).
- The probe also makes it possible to evacuate the gases in the event of bloat.
- The rumen should then be reseeded with freeze-dried flora or 4 to 5 L of rumen juice from a healthy animal.
- - Fight blood alkalosis and ammonia poisoning.
- Formalin can be injected (30 to 60 ml slowly intravenously) because in the body it is transformed into uroformin after trapping the NH_4^+ ion.

- Calcium and magnesium glutamate or aspartate are administered intravenously, the Ca^{++} and Mg^{++} ions also having a regulatory action on neuromuscular excitability.
- Amino acid solutions (arginine, ornithine, ketoglutaric acid) can be used as an infusion to boost energy metabolism.
- - Prevent liver and kidney complications with the help of diuretics and lipotropic factors.

PROPHYLAXIE

- Prevention is based on the administration of rations that are adapted, both from the point of view of their balance (energy, nitrogenous matter) and their distribution rate (administration of moderate urea, 15 g/day/animal, gradual, dispersed and associated with the energy used by the animal)

- Liver diseases must be prevented (exp parasitosis), to increase the possibilities of detoxification of the liver for its recycling of blood ammonia.
- Distribute magnesium-enriched minerals to the animals when grazing, for example in the form of licking blocks

- Rational use of non-protein nitrogen: always ensure that the energy supply is sufficient (PDIE > PDIN)
- Distribute soluble nitrogen over the whole day: this is how the incorporation of ammonia into silage is less dangerous than the addition of urea to concentrates.
- each ration has two PDI nitrogen values: PDINs are the proteins digestible in the intestine made possible by the nitrogen in the ration and PDIEs are the proteins digestible in the intestine made possible by the energy of the ration

- Provide soluble nitrogen at the same time as energy to facilitate its use by the microflora.
- Slow degradation or delay mixtures are preferred to highly soluble forms.
- Ensure the supply of the minerals and trace elements necessary for fermentation.
- Monitoring of liver function, as it is the liver that detoxifies ammonia: intake of lipotropic factors (acetylmethionine, choline, vitamin B12), prevention of parasitic diseases

Thank you