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Health aspects of alfalfa (*Medicago sativa*) grazing management

Aspectos sanitarios del manejo del pastoreo de alfalfa (*Medicago sativa*)

Aspectos de saúde do manejo de pastejo de alfafa (*Medicago sativa*)

Lara, Stephanie; Albornoz, Luis

 Stephanie Lara

stephanielara1983@gmail.com

Universidad de la República, Uruguay

 Luis Albornoz

albornoz@vera.com.uy

Universidad de la República, Uruguay

Agrocienza Uruguay

Universidad de la República, Uruguay

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agrocienza@fagro.edu.uy

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Corresponding author: stephanielara1983@gmail.com



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1. INTRODUCTION

Alfalfa (*Medicago sativa*) is a perennial legume with high productive potential of excellent nutritional quality, persistent with good management, and with the ability to tolerate dry periods due to the characteristics of its root. The high soluble protein content and the low level of effective fiber produce a fast digestive transit, with high digestibility that finally translates into better levels of food intake and productive performance of

AUTHOR NOTES

stephanielara1983@gmail.com

the animal. The costs of establishing the crop, the high crude protein content, which leads to an energy cost in the cow due to urinary nitrogen excretion, and the higher incidence of frothy bloat are linked to alfalfa management difficulties⁽¹⁾.

Frothy bloat is one of the biggest problems in livestock farming worldwide due to the economic losses which occur because of this disease⁽²⁾. Uruguay is no exception⁽³⁾. Although it is a problem known by producers, it is essential to generate opportunities for discussion and mutual learning related to the subject. Its collective occurrence in cattle herds has increased as agricultural production has tried to improve production systems, the nutritional value of forage, and the production of milk and meat. Alfalfa is a forage species which importance has recently increased in intensive production systems, mainly in fattening cattle and dairy production⁽³⁾.

2. WHAT IS FROTHY BLOAT?

Frothy bloat is a digestive disorder in ruminants caused by excessive retention of gases from microbial fermentation that produce abnormal rumen distension. The production of gas (CO₂ and methane) is usual in the food fermentation procedure. In this case, very stable and slight bubbles are forming, which trap the gas and prevent its regular elimination by eructation⁽⁴⁾. Frothy bloat causes substantial economic losses due to significant production decreases associated with reduced dry matter intake, high mortality in severely affected ruminants, secondary complications (cardio-respiratory and recovery problems due to peritonitis), treatment costs, and control measures, and the impossibility of established forage use⁽⁵⁾.

3. WHAT IS THE AETIOLOGY OF FROTHY BLOAT?

It is fundamental to consider that frothy bloat is a disease in which several risk factors are involved in its aetiology⁽⁴⁾. Concerning the animal factor, it was described as greater susceptibility to fattening in young animals than in adults, and in British breeds than in Zebu breeds. Jersey is the most affected breed⁽²⁾. Differences in saliva production, motility, pH and ruminal microbiota among animals are associated with a frothy bloat genetic predisposition. Animals that enter grazing for the first time and are hungry or poorly fed are more affected. Regarding pasture composition, greater susceptibility in young, tender, and juicy pastures rich in bloating substances (pectins, saponins, soluble proteins, 18s fraction, chlorophyll, chloroplasts, and methylesterases) was demonstrated⁽⁵⁾. Among the different forages that can produce frothy bloat, alfalfa is the most dangerous bloated legume, followed by clovers (*Trifolium repens* and *T. pratense*). Their hazard varies according to the proportion found in the forage base and mixed with grasses, as well as with other legumes such as *Lotus* sp., which are anti-bloating due to their medium to high levels of condensed tannins. It is essential to consider that frothy bloat problems have also been observed in annual winter crops (wheat, barley and oats) when they have soluble protein levels above 23% and low fiber content. Additionally, a type of frothy bloat associated with grain ingestion has been reported in housed systems⁽⁴⁾.

The environmental conditions predisposing to frothy bloat are the presence of dew, then a dry period followed by rain, and seasonal changes from winter to spring and summer to autumn. Clinical frothy bloat presentation is observed mainly in spring-autumn. Discontinuous grazing or interruptions due to nocturnal enclosed work in a cattle chute, transport, stress, and abrupt changes in feeding with lack of control and monitoring are animal's risk factors for frothy bloat associated with management⁽⁶⁾.

4. WHAT CLINICAL SIGNS CAN WE OBSERVE IN THE ANIMALS?

An international scale⁽⁷⁾ that describes six degrees of clinical presentation of frothy bloat is used:

1- *Normal*. 2- *Slight tympany*: with mild distension of the left flank. 3- *Moderate tympany*: with recent distension of the left flank and mild distension of the right flank. 4- *Severe tympany*: consisting of generalized swelling, visible on both sides of the animal, which defecates and urinates with abnormal frequency. 5- *Dangerous tympany*: during the process, the compression of the diaphragm decreases the lung capacity; the animal already has significant breathing problems, showing with open mouth and tongue out, eyes wide open with an expression of distress, congestive mucous membranes, wide-open thoracic limbs, extended head and neck, kicking the flank, violent tail movements and attempts to defecate. 6- *Death*: the condition worsens, increasing the concentration of toxins in the body, and the heart and respiratory rates increase, leading the individual to lie down and move its legs until death occurs.

5. WHY DO ANIMALS DIE OF FROTHY BLOAT?

Given the structural characteristics, chemical pasture composition and predisposing factors, rapid fermentation occurs with the large gas formation, and a rumen contents viscosity increases, favoring the foam formation. Gas enclosed in stable bubbles cannot be eliminated by eructation. The rumen dilates and compresses lungs, leading to death by asphyxia. In addition, compression of the large blood vessel causes cardiac-circulatory disturbances, evidenced at necropsy by cranial congestion in the head and neck region, and ischemia in the abdominal organs⁽⁵⁾.

6. WHAT TO DO WHEN WE OBSERVE ANIMALS WITH FROTHY BLOAT?

When we observe clinical signs at the beginning of grazing pasture, we must remove the animals immediately and encourage gas elimination by slowly walking them. Supplementation with hay for the less affected animals is recommended to stimulate rumination and salivation. It is also important not to introduce the animals into the problem forage without implementing prophylactic measures. The application of treatments with natural (liquid petroleum jelly or oil) or artificial (silicone, polysiloxane, poloxalene) antifoaming agents and/or anti-fermentative (monensin) orally or intraruminally will depend on the number of affected animals and the degree of frothy bloat they present. The recommended alternative for the most severely affected animals is to make an incision in the left flank iliac fossa with subsequent emptying of the rumen contents. Significantly, trained personnel carry out these measures, and veterinary assistance is urgent⁽²⁾.

7. WHAT STEPS CAN WE TAKE TO PREVENT FROTHY BLOAT?

Several measures⁽³⁾⁽⁴⁾⁽⁶⁾⁽⁸⁾⁽⁹⁾ were proposed to prevent or reduce the risk of frothy bloat, including the following:

7.1 Before pasture planting

1- *Mixing seeds with grasses*: The principal advantage of using grasses and legumes grassland associated is the biological fixation of N. For example, alfalfa with positive effects in that grasses provide organic matter to the soil through the root system, reducing the risk of frothy bloat; and if the selection of forage is correct, it can be used strategically at times when the seasonal production of alfalfa is deficient (for example, pastures

associated with alfalfa with *Festuca arudinacea*). It is essential to consider that the proportion of legumes does not exceed 25-30%, as well as the selection by the animals of the pastures that are part of the forage base during the entire grazing period.

2- *Employment of non-bloating legumes*: Medium to high tannin levels have a low rumen degradation rate.

3- *Fertilizer selection*: Nitrogen fertilization generally increases the proportion of grasses in the pasture and reduces the concentration of soluble N in legumes. Then, this type of fertilization is used for frothy bloat prevention. However, this practice is questionable when implemented in consociated pastures, due to a predominance of this legume or monocultures because it reduces the symbiotic capacity of atmospheric N by nitrifying bacteria installed in the root nodules, as it would not be cost-effective or environmentally friendly.

4- *Paddock's choice*: Not only from the vegetation cover but also from the proximity to the facilities to allow good surveillance during grazing.

7.2 After pasture establishment

1- *Improving pasture with grass seeds*.

2- *Withering*: Mowing of the pasture with a rotary mower/weeder with airing for 36-48 hours in autumn-winter and 12-24 hours in spring-summer before the next grazing. A lower rate of rumen degradation is produced by reducing the proportion of soluble protein.

3- *Pre-wilting*: Drying with herbicides, such as Paraquat, 36-48 hours before grazing in problem pastures. It is significant to consider the reduction of the legume's nutritional value.

4- *Rotational grazing*: Use electrically fenced strips to prevent animals from selecting only the tender parts of the pasture by forcing them to eat the whole plant.

5- *Grazing time*: The familiarization of the animals with the pasture must be gradual. Then, the risk of frothy bloat decreases the more hours the animals are grazing each plot. Avoid early in the morning grazing when dew or frost is most prevalent. It is more appropriate grazing around midday.

6- *No entry of starving animals*.

7- *Pre-supplementation* with fiber-rich forages such as hay or maize silage before the animals enter the pasture.

8- *Clipping*: Get animals to access to graze on the strip, which will use the following day. Therefore, that way, they will be able to consume a considerable proportion of leaves, thus reducing the risk. In extensive livestock farming, this method can be used with sheep.

9- *Surveillance*: Personnel trained in the early detection of clinical signs of frothy bloat and control measures implementation must perform surveillance. Surveillance must be within the first 15 to 20 minutes after the animals enter the pasture, monitoring every 2 to 3 hours.

10- *Eliminate susceptible animals*.

11- *Antifoams/anti-fermentative*: The use of antifoams or anti-fermentative agents in the drinking water, in the ration, by sprinkling in the pasture, or by prolonged-release intraruminal bolus has to be considered in times of increased risk, but they alone will not prevent the occurrence of acute cases.

8. FINAL CONSIDERATIONS

No single strategy is appropriate for controlling frothy bloat, so the combined use of tools is recommended. However, it is crucial to contemplate that the performance of these strategies does not ensure 100% success due to the multifactorial characteristics of this disease. It is essential to discuss as a team the management strategies possible to be implemented for the prevention of frothy bloat, evaluating the cost-benefit ratio and the feasibility of their implementation in each farm.

SUPPLEMENTARY MATERIALS

Presentation (pdf)

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