

Is mastitis occurrence related to feeding management in dairy herds?

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Introduction

Mastitis, defined as the inflammation of the udder whatever the origin or the severity, is a multifactorial disease. In a study subsidized by the Walloon Region (Belgium) in which 349 farms were audited (Hanzen *et al.*, 2008), it was shown that techniques and hygiene of milking, accommodation and some management factors, such as the presence of a calving box, had a great influence on mastitis occurrence. The economical consequences of this disease were reviewed by several publications synthesized by Hasala and Hogeveen (2007). According to these authors, the mastitis cost is estimated between 21.3 and 31.2 € per cow present and per year, and between 19.9 and 286.2 € per case. According to Huijps and Hogeveen (2007), the average cost of mastitis per cow present in Dutch farms reached 140 €. Researches on the effect of nutrition on mastitis occurrence are often limited to vitamins and mineral supplies. The aim of our study was to correlate the feeding characteristics and the fulfilment of the animal requirements to the risk of mastitis.

Material and methods

The analysis concerned 33 farms audited by Hanzen *et al.* (2008). These farms were the only ones using a feed mixer wagon feedstuffs, allowing the weighting of the feed supplied, and having maintained the same feeding scheme the last 3 months before auditing. All the forages and concentrates were sampled for an infra-red spectrometry analysis. The VEM (net energy), DVE (true digestible protein in the intestine) and OEB (balance between rumen fermentable protein and energy) contents were calculated according to their composition. The nutritional value of the diets was accurately determined on the basis of these data and the amounts of production concentrate supplied for high producing cows. A theoretical milk production was then calculated and compared to the observed milk production, identifying the diets being deficient or excessive in nutrients in relation to the animal requirements. The N efficiency of the diets was evaluated by the part of ingested proteins that were secreted in the milk.

The mastitis occurrence, quantified in each farm by the estimated somatic cell count (SCC) in the milk of the tank mentioned in the 3 last herd reports, was related to the feeding characteristics.

Results and discussion

In 48% of the farms, the feed was provided under a total mixed diet form, while in the others, the breeders distributed concentrate in addition in amounts depending on the individual production level. The average OEB content of the diets reached +12.3 g/kg DM, but varied from -13.3 to +31.7 g/kg

DM. The N efficiency of the diets ranged between 20.4 and 31.4%. The milk production estimated on the basis of VEM and DVE intake (allowed milk production, corresponding to the lower level of milk produced from VEM or DVE intake) was sometimes lower (until -6.6 L/d/cow), and sometimes higher (until +6.9 L/d/cow) than the observed milk production (Figure 1); suggesting respectively a body reserve mobilization or an excessive nutrient supply. Two significant relations appeared when diet characteristics were related to the estimated SCC data :

- when the feed supplied an excess of nutrient equivalent to more than 4 L/d of milk, the estimated SCC was higher by 158000 cells/mL compared to other farms ($P < 0.05$, Figure 1).
- the cows from the herds receiving a total mixed diet had a higher SCC compared to those receiving concentrate in function of their production (331000 vs 248000 cells/mL, $P < 0.05$).

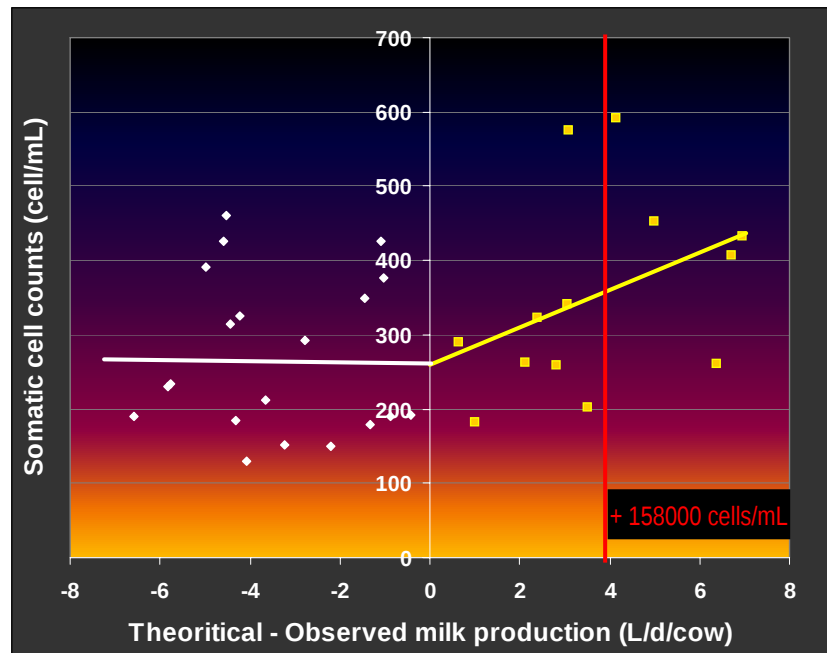


Figure 1. Relation between bulk milk SCC and the fulfilment of the animal's requirements

These results suggest that an important excess of nutrients make the animal more subject to mastitis development. A misbalanced nutrition is a source of stress that could weaken the immune system and induce mastitis. The animals receiving a total mixed diet also have to face more discrepancies between their requirements and what they eat. Such a system accentuates the nutrient deficit at the beginning of the lactation, the weight gain in the second phase of the lactation and represents, by this way, a source of stress susceptible to induce mastitis.

These results are in accordance with Heinrichs (2008), showing that feeding high amounts of concentrates was positively associated with an increased incidence of clinical mastitis in a multi-variable model. This author also mentioned the importance of an adequate intake of vitamin A or beta carotene, selenium, vitamin E, copper and zinc for maintaining proper immune function and mammary gland health. Mineral supplementation was realized in all the farms but the balance among minerals was not measured. No effect of the VEM/DVE ratio or the OEB content of the diet was observed.

Conclusion

Despite the predominant effect of the mineral supply often mentioned in the literature, an adapted diet calculated to comply closely with the animal requirements seems important to limit the mastitis occurrence.

References

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