A new solution for the prevention of ketosis in dairy cows

More than 60% of dairy cows in the world suffer from sub-clinical ketosis and clinical ketosis at the beginning of lactation. Ketosis is due to a negative energy balance between feed intake and the nutrients needed for maintenance and production. A massive adipose mobilisation, due to lack of nutrients, leads to an increase of non-esterified fatty acids (NEFA) in the blood.

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The NEFA are converted to more available energy substrates once the liver transforms them into ketone bodies.

Beta hydroxybutyrate (BHB) is the most important ketone body in dairy cows. It will be used by muscle and nerve tissue as an energy substrate.

The overflow of ketones provoke ketosis. It is an early-lactation disease characterised by clinical symptoms such as anorexia and milk production loss, sometimes accompanied by nervous symptoms. Dairy cows with more than three lactations are the most sensitive.

Prevention consists of ensuring energy balance (for example with propylene glycol) and supporting liver function. The BHB level in the blood is a good indicator of a cow's ketosis status. If the BHB level is between 1.2-1.4mmol/L of blood, this means that cows suffer from sub-clinical ketosis.

When this parameter reaches levels higher than 1.4mmol/L of blood, this means that cows suffer from clinical ketosis.

In order to prevent the occurrence of ketosis, Olmix Animal Care has developed DigestSea, a nutraceutical product based on an algae extract cocktail rich in Marine Sulphated Polysaccharides (MSP) with $MSP_{antihyperlipidemic}$ activity.

DigestSea protects the liver through hepato-billiary drainage and anti-oxidant stress management. In addition to the MSP, it is formulated with sorbitol, choline, plant extracts (selected for their choleretic and cholagogues activities) and vitamin B to optimise its efficacy.

Marine Sulphated Polysaccharides

MSP are widespread in macroalgae. They have been shown to possess diverse unique biological properties based on their structure. This is linked to their sulphate content in particular.

Terrestrial plant polysaccharides do not contain these sulphate groups. They can be compared to sulphated polysaccharides found in animals (sulphated chondroitin, heparin). Among others, they exert anti-hyperlipidemic, antioxidant and anti-thrombotic activities, as well as immune-modulating activities that might find relevance in stimulating the immune response.

The specific $MSP_{antihyperlipidemic}$ used in DigestSea exerts its effects via the stimulation of digestive enzymes (lipoprotein lipase, hepatic lipase).

Consequently, it reduces the level of fatty acids in the blood and also in the liver, and helps in preventing ketosis.

Trial result

A recent trial in Brittany, France, was carried out with 64 Holstein dairy cows in order to measure the efficacy of DigestSea, in reducing the risk of ketosis after calving. The average milk production on this farm was around 9,900kg per cow per year.

Both the control group (31 cows) and the test group (33 cows) had an average rank of lactation of 2.8. The farm selected for this trial had a history of subclinical ketosis and administered, to all dairy cows, propylene glycol at the rate of 400ml/day/cow five days after calving. One cow in two received 80ml/day of DigestSea, added with the propylene glycol, for five days.

The body condition score was evaluated by the same veterinarian 10 days and 25 days after calving in order to determine the

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Fig. 1. BHB level 10 days after calving.

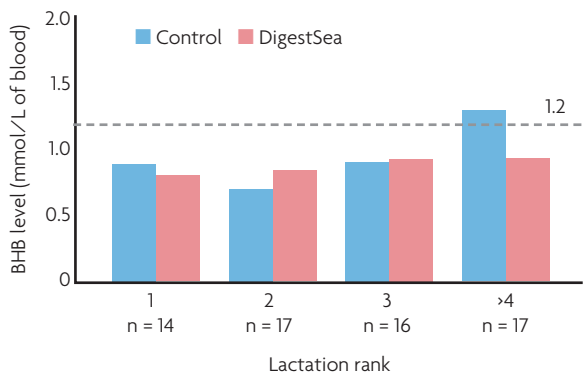
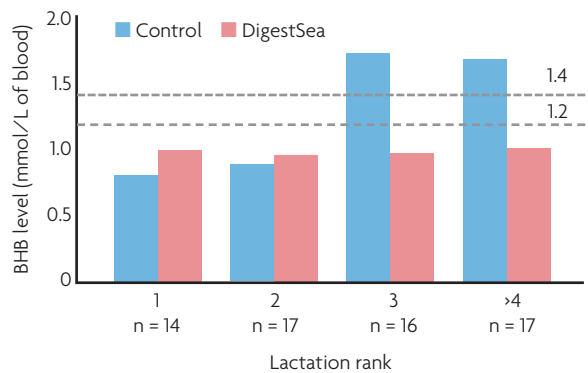


Fig. 2. BHB level 25 days after calving



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cow's reserve mobilisation between these two dates, (Score: [0-2]: skinny/[3-3.5]: normal/[4-5]: fat). Two blood samples of each dairy cow were collected at the same date. BHB was measured via the blood sample.

The results of this trial showed that the BHB level was lower in the DigestSea group compared to the control group. Third lactation cows in the control group had a BHB level higher than 1.2mmol/L, meaning that the cows suffered from ketosis, whereas no cows in the DigestSea group were affected 10 and 25 days after calving (Figs. 1 and 2).

The same results were observed for the fourth lactation cows 25 days after calving in the control group.

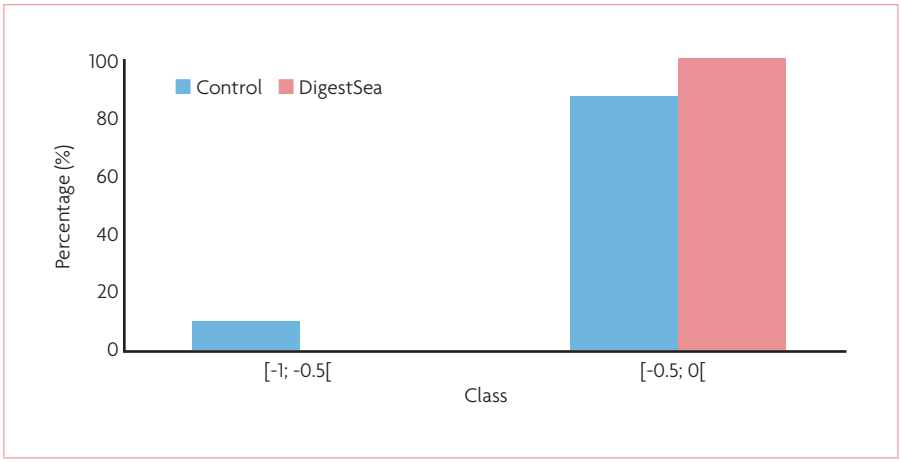

Fig. 3. Evolution of body condition score between 10 and 25 days after calving.

The DigestSea group had a lower variation of the body condition score between the first observation (10 days after calving) and the second (25 days after calving).

Therefore DigestSea prevents excess mobilisation of body reserves. No cow from the DigestSea group was in the class [-1; -0.5[while 13% of the control cows were in this group.

Conclusion

The results show that the administration of propylene glycol is not sufficient to prevent ketosis. However, in association with DigestSea the risk of ketosis proved to decrease significantly.

Indeed cows in the DigestSea group did not show any ketosis trouble contrary to the control, especially the cows in their third or higher lactation (known to be more sensitive to ketosis). It was concluded that DigestSea helps to reduce the risk of ketosis in the first month after calving. ■

References are available from the author on request