

Reducing metabolic and infectious disease

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The ever increasing milk production in dairy cows has long been recognised as a risk factor for cattle health and fertility. This has, of course, a high impact on farming economy. Despite tremendous efforts to meet the nutritional requirements of the periparturient cow, the problem could not be eradicated and is even assumed to further increase in the future.

A vicious cycle

The exact reasons for the apparent link between high production and the prevalence of post-parturient metabolic and infectious disorders in cattle are not fully elucidated.

However, multiple lines of evidence indicate that there is a vicious cycle (Fig. 1) starting from the negative energy balance resulting from the high energy requirements of the fresh cow at a time when dry matter intake is physiologically depressed. This may render the cow vulnerable to metabolic disorders. In a considerable number of cases, these metabolic imbalances become clinically evident as ketosis and fatty liver syndrome, but the majority of animals still remain clinically inconspicuous. Thus, the incidence of subclinical ketosis can achieve



Fig. 1. The postulated vicious cycle of high performance.

levels of up to 40% in the early postparturient period.

Metabolic disorders, in turn, are associated with a further decrease in feed intake and thereby do exacerbate the problem. In addition, the immune system is compromised. If not treated early on, all this may culminate in the clinical manifestation of periparturient disorders such as mastitis, endometritis and abomasal dislocation. Especially in concert with other predisposing

factors such as retained placenta or cystic ovary, ovulation is suppressed in metabolic disorders and fertility is finally impaired.

Interrupt the cycle

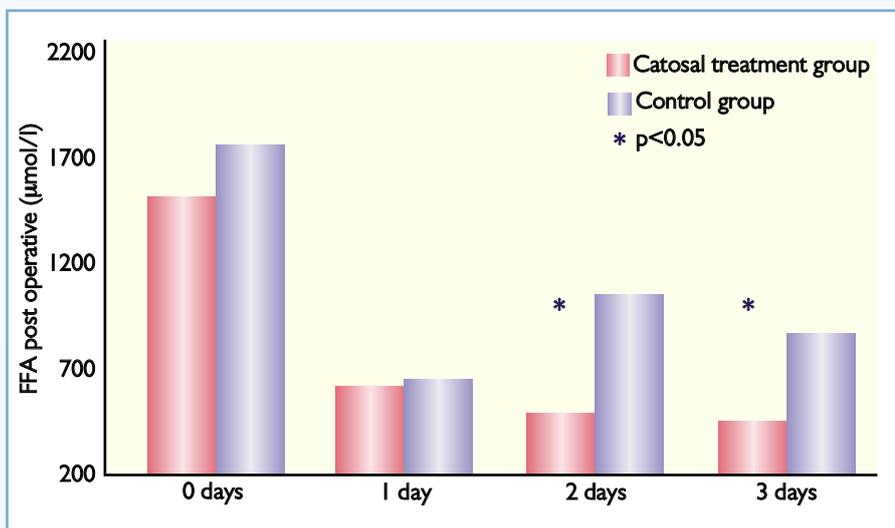
Due to the importance of early intervention in the apparent vicious cycle of the high performing cow, a number of metabolic stimulants and tonics have been made available to the market in order to support nutritional and maintenance management strategies for the correction of imbalances in energy metabolism and electrolyte homeostasis.

Among these, Catosal (also known as Coforta and Phosphorum B12) from Bayer Healthcare AG, is prominent in terms of scientific documentation of safety and efficacy. The injectable solution contains two active ingredients, butafosfan 10% and cyanocobalamin 0.005%, and is currently registered in about 60 nations worldwide.

Catosal stimulates both energy metabolism and the humoral and cellular immunity. Besides these beneficial effects or possibly as a result of them, an increase in feed intake, milk yield and a certain resistance to the development of periparturient disorders as well as an improvement of reproductive and liver functions has been reported in dairy cows.

Recently it has also been shown under lab-

Fig. 2. Stabilisation by Catosal of serum levels of free fatty acids (FFA) in cows with abomasal displacement (Fürl et al, 2006).



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 oratory conditions that treatment of mice with butafosfan increases the ATP and ADP energy contents in the liver and muscle tissues which generates a basic understanding of Catosal's mode of action.

Metabolic stimulation

The clinical benefits associated with the well established use of Catosal were recently confirmed in prospective, negatively controlled, and randomised clinical studies. Two such studies focused on the cow with metabolic disorders (ketosis) in association with abomasal dislocation to the left. The condi-

tion of abomasal dislocation was selected for two reasons.

First, ketosis can have various aetiologies in the lactating cow. Therefore, it was important to select a representative disorder associated with ketosis in order to minimise the level of confounding factors.

Secondly, the primary treatment of abomasal dislocation is by mechanical intervention such as surgical repositioning of the abomasum. Hence the metabolic stimulant effects of Catosal under investigation are not biased by concomitant therapy.

The animals were randomly assigned to one of the following treatment groups:

- Negative control group (no treatment or physiological saline).

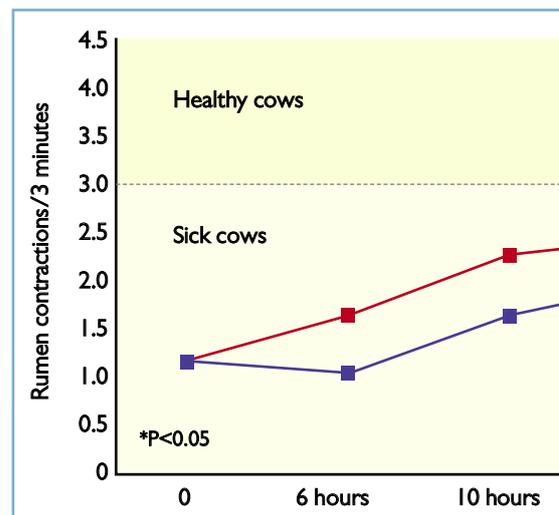


Fig. 3. Improvement of rumen activities of cows with abomasal dislocation (Lohr et al, 2006).

- Catosal 5ml per 100kg body weight intravenously.

Even one single treatment administered before start of surgical repositioning significantly accelerated the return of feed intake, rumen motility and rumination as compared to an untreated control group. The biochemical markers of a disturbed energy balance associated with the condition of abomasal dislocation, such as elevated blood concentrations of bilirubin, β -hydroxybutyrate, non-esterified fatty acids, as well as on aspartate aminotransferase and creatine kinase activities, showed a fast recovery from increased pre-surgical levels to physiological levels within 24 hours, presumably supported by concomitant glucose infusion.

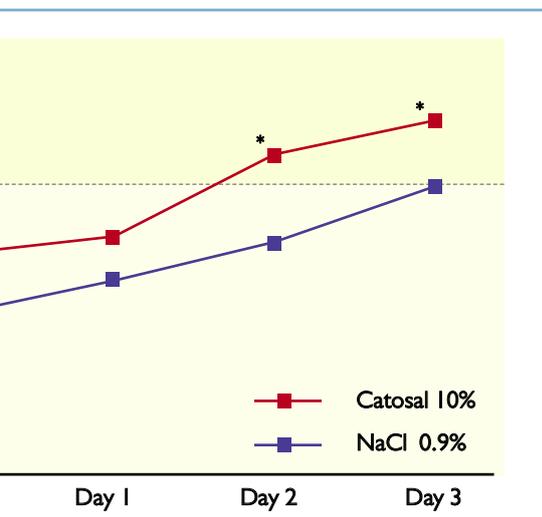
Upon discontinuation of glucose infusion, however, their values returned to pathophysiologically elevated levels in control animals, while Catosal treated animals were stabilised in the physiological range and even continued to improve. An example is given for the parameter of free fatty acids (synonym 'non-esterified fatty acids' in Fig. 2).

The efficient and safe use of Catosal as metabolic stimulant was further confirmed in a field trial performed in Germany. This study involved 140 cows with ketosis (70 animals in the control and the Catosal group, respectively), again associated with abomasal dislocation. The Catosal dose was again 5ml/100kg bodyweight. The product was administered three times as follows:

- Before start of surgical repositioning of the abomasum.
- 24 hours after surgery.
- 48 hours after surgery.

The control group received physiological saline in the same dose volume and corresponding administration time points.

The primary efficacy criterion of this study was the return to physiological rumen activity (for example, three or more rumen contractions per three minute auscultation time) over time. The animals were examined at various predefined time points up to 72 hours post surgery. As a result, cows treated with Catosal showed a significantly



h ketosis associated with abomasal displacement

accelerated recovery of rumen activity as compared to controls (Fig. 3).

Bottom line, the Catosal group on average achieved the break even point of physiological rumination about twice as fast as the control group. This finding was paralleled by evidence of a Catosal mediated facilitation of the recovery of plasma β -hydroxybutyrate levels.

Calcium homeostasis

Another recent field study investigated the efficacy of Catosal as an adjunct treatment to calcium and magnesium therapy of milk fever (parturient hypocalcaemic paresis).

This study was performed in the Republic of South Africa and involved the following treatment groups.

- Physiological saline 5ml/100kg body-weight (14 animals evaluable for efficacy).
- Catosal 5ml/100kg bodyweight (15 animals evaluable for efficacy).

Treatments were administered intravenously about 15-30 minutes after response to primary treatment. Efficacy was assessed by measuring serum calcium levels 24 hours after treatment. These turned out to be better stabilised in the Catosal group than in controls. In addition, the development of sub-clinical ketosis was partially prevented by Catosal.

Confirming previous experience with Catosal, no treatment-related adverse events were reported in the three confirmatory field studies summarised above.

Beware of generic copies

Due to its broad recognition in the field as an effective and safe metabolic stimulant, a number of copies of Catosal have emerged in various countries. It should be clear that both features are strictly dependent on product quality which can only be guaranteed for the original product manufactured by Bayer HealthCare AG.

Interestingly, an analysis of two such generic copies in Asia showed tremendous weakness in product quality. One product had only about one tenth of the declared content of butafosfan. The other one was highly contaminated by micro-organisms, precluding any safe parenteral use.

Conclusion

Experience from about five decades of well established use of Catosal indicates that this product is safe and effective in the control of metabolic and infectious disease in cattle and other species. This could be confirmed in recent clinical studies, further elaborating

the prominent status of scientific documentation of clinical efficacy of this product in the class of metabolic stimulants and tonics.

The demonstrated recovery of energy metabolism, stabilisation of mineral homeostasis, protection from liver disease and ketosis, stimulation of feed intake and rumination, prophylaxis of post-parturient disorders, and – last but not least – improved fertility under the influence of Catosal do not only give strong argument for the continued use of the product in dairy cattle farming, but also contribute to our current understanding of the importance of an efficient control of metabolic and infectious disease for improving cattle health and dairy farming economy. ■