SOMATOTROPIN TREATMENT OF DAIRY COWS AND ITS EFFECTS ON GASTROINTESTINAL MOTILITY

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Introduction

In spite of the great abundance of research work on the effects of somatotropin administered to dairy cows, many aspects of the mechanisms of such a hormone are still unclarified. Thus Peel and Bauman (1987) as well as Chilliard (1988), did a review of the more recent studies, and concluded that the improvement of the feed efficiency is mainly due to the "dilution" of maintenance cost being contradictory to the results on digestibility and/or metabolizable energy utilization.

Nevertheless there is proof of a relationship between GH and digestion activity, i.e. the distension of the cranial rumen in goats can inhibit the release of G.H. (Tindal et al., 1985). Furthermore, somatostatin seems to control the initiation and propagation of intestinal migrating motor complexes (Fioramonti and Bueno, 1988).

In a previous trial with daily injections of BSTH we had a quick and great increase of body weight (an average of 12 kg), followed by a similar drop after the GH injection (unpublished results). We supposed that responsibility for such a reaction could be a greater fullness in the gastrointestinal apparatus. Nevertheless the dry matter intake was almost unchanged. Thus with this study we have tried to explore a new hypothesis, i.e. the somatotropin is capable of slowing down the digesta flow.

Materials and Methods

To confirm the effect of somatotropin on body weight, 3 dairy cows (Italian Friesian) in late lactation, were treated with a sustained-release formulation of 640 mg of BSTH (Somidobove, Ely-Lilly) two times every 28 days, while 3 other similar cows received a placebo. The feed intake was strictly controlled and body weight was measured always in the morning and 16 hours after the previous meal before treatment as well as 2, 5, 12, 19 and 26 days afterwards.

To study the digesta flow, 3 more dairy cows all in late lactation (two open and one pregnant), was submitted to the Somidobove administration; therefore, a week before and 3 days after the administration, each cow was given 50 g of Cr_2O_3 (before the morning meal with an esophagal tube as a paper bolus). Faeces samples were collected from the rectum after 4, 8, 12, 16, 24, 30, 36, 40, 48, 60, 72, 84, 96 and 120 hours for Cr_2O_3 determination by an atomic absorption technique. The statistical approach has been the "t" of student.

Results and Discussion

The mean values of body weight along the period between the treatments are shown in figure 1 from which can be seen:

- a very quick and significant increase in body weight in a maximum of 12 days after the treatment. The differences with the control are significant ($P < 0.01$) only for the controls of days 5, 12 and 19;
- the fact that the weight did not reduce afterwards, when the treatment effects would be finished (as milk production confirmed),it may be due to the increase of foetal weight since the cows were in the second half of pregnancy (the control group also shows some increase).

Now, if we pay attention to the behaviour of Cr_2O_3 in the gastrointestinal tract, even though our results can only be considered preliminary, they show that the excretion pattern is extremely different before and after treatment with BSTH. Namely the following remarks can be made:

untreated animals show a sharp increase of

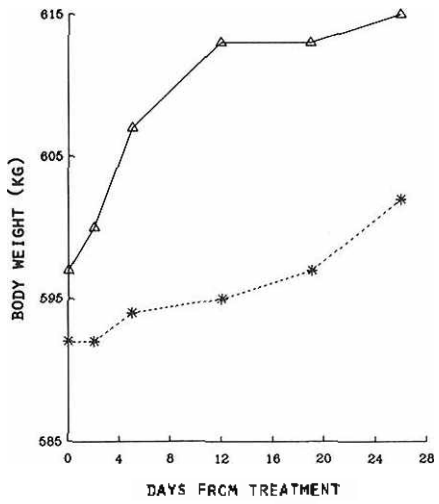

Figure 1. Body weight changes of dairy cows treated with BSTH (—△—) or untreated (-- ✳ --).

Cr_2O_3 content in the faeces in a maximum of 16 hours after each dose (in a situation slightly different, Bartiaux-Thill et al., 1988, got the highest values 17 hours afterwards) and a quite low content already 30-36 hours after;

– the treated animals showed slower excretion, the maximum (lower than before) being reached 24 hours after each dose and being quite high in the concentration of Cr_2O_3 also after 30 and 36 hours.

Such results seem to confirm quite clearly that GH acts also on the gastrointestinal motility and thus can explain – especially the quick change of body weight – some increase of digestibility, but not the reduction obtained in some other cases (Chilliard, 1988). However it must be kept in mind that, for such a kind of experiment, small differences of digestibility are difficult to measure properly (Chilliard, 1988).

Looking now to a possible mechanism, we can only remember that the distension of stomachs is a cause of higher gastrointestinal motility and also of an inhibition of GH release (Tindal et al., 1984). So higher values of GH after treatment could result in the opposite effect (motility reduction) maybe thoroughout the induction of somatostatin which is an intestinal motility inhibitor at the local or at central (brain) level as reviewed recently by Fioramonti and Bueno (1988).

If so, it can be difficult to understand why digestibility does not positively change in any case, unless it is considered that:

– the relating effect is not so great (in fact the feed intake is almost unchanged);
  somatostatin is also involved in a reduction of blood flow to the intestine (Fioramonti and Bueno, 1988), thus absorption is maybe slightly reduced.

If our results will be confirmed, the studies on the mechanisms of the GH activity will be completed with more attention to:

– the real meaning of body weight changes;
– the effects of the BSTH treatment on the digesta flow speed and consequently on feed digestibility.

The Ely-Lilly grant is acknowledged.

(Key Words: Dairy Cows, Somatotropin, Gastro-Intestinal Motility)

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