# INFLUENCE OF IMPLANT SUPPORTS ON ANIMAL PERFORMANCES AND BLOOD METABOLITES IN BULLS IMPLANTED WITH PELLETS CONTAINING TRENBOLONE ACETATE ASSOCIATED WITH OESTRADIOL.

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## INTRODUCTION.

Growth promotors have been widely used in livestock production since they increase meat production by improvements of feed conversion ratio, live weight gain and carcass quality. Trenbolone acetate (TBA) associated with 17ß-oestradiol (E2) is commonly utilized with steers, (Heitzman et al., 1977), cull cows (Lambot et al., 1984) and bulls (Gielen et al., 1982). The growth promotors are given to livestock either as injections or with a drug delivery system. The two delivery systems commonly found in practice are the silastic rubber implants impregnated with anabolic agent (Compudose system) or compressed pellets made of lactose as support. Lactose is widely used in preparing pellets because it is well absorbed by the tissues and gives hard pellets. The response in terms of gain to growth promotors given in pellets varies with time : the greatest performances being observed during the first weeks of the treatment (Lambot et al., 1983a; Keane and Sherington, 1985). Cholesterol has been proposed as another type of support since it appeared to be absorbed and metabolized more slowly than lactose allowing therefore a slower release of the anabolic agents. Two experiments were carried out with growing fattening bulls to compare lactose and cholesterol as supports for implants containing 200 mg of TBA and 40 mg of E2.

## MATERIALS AND METHODS.

### ANIMALS AND MANAGEMENT.

Twelve young bulls from the Belgian Blue breed - dual purpose type - were used. They were kept on metabolic stalls allowing for separate collection of urine and feces. The diet offered was based on maize silage supplemented with soja bean meal, dried sugar beet pulp, minerals and vitamins. The amount of soja bean meal was 1.4 kg per day and was constant during the whole experiment. The amount of sugar beet pulp was calculated to be 0.20 of the total dry matter intake. The intakes were fixed at 90 g dry matter per kg metabolic body weight and were close to ad libitum. Half of the daily amount of food was given in the morning and the other half in the late afternoon.

Two different supports for the pellets were used : lactose and cholesterol. Each implant contained 200 mg of TBA and 40 mg of E2. The 12 bulls were divided in 3 groups of 4 animals : control animals, animals implanted 3 times at 18, 12 and 6 weeks before slaughter with pellets made of lactose (L3) and animals implanted once 18 weeks before slaughter with pellets based on cholesterol (CE). The pellets were implanted on the base of the ear.

## MEASUREMENTS.

The amounts of food given were weighed out daily. The liveweight was recorded once weekly. Nitrogen balance was carried out at 7 different occasions : week -1, 1, 5, 7, 11, 13 and 17. At the slaughterhouse, the liveweight of the animals and the weight of the warm and cold carcasses were recorded. The 7 to 9 ribs were removed to be dissected in order to separate the lean meat, fat and bones; the composition of the carcass was then estimated according to the method of Martin and Torreele (1962). Blood samples were withdrawn once a week 3 hours after the morning feed. Plasma samples were analysed for urea by the diacetyl monoxime method, creatinine by the Jaffe method. Analysis of variance was used to compare the treatment differences.

**RESULTS.**

The performances of the 3 groups of animals are given in Table 1. The average initial and final live weights of the control animals were 320.8 and 494.5 kg corresponding to a total gain of 173.7 kg or a daily gain of 1.38 kg.

In the L3 and CE groups, the initial and final weights were 320.0, 521.8, 318.3 and 515.3 kg respectively. The changes in the total live weight gain over the 18 weeks of the experiment are given in Figure 1. The live weight gain of the bulls in the L3 group was significantly higher ($p < 0.05$ or 0.01 or 0.001) than that of the control animals from week 1 to week 17 while that in the CE group was significantly higher than the control from week 1 to week 16. There was a tendency for the live weight gain in the L3 group to be higher than in the CE group.

On average the dry matter intake was 8.02 kg per day and was not significantly different between treatments. There was a trend for the food convertion ratio to be lower in the treated bulls than in the control animals; the opposite was found for the killing out percentage. There were no significant differences in the composition of the carcass although the percentage of lean meat appeared to be higher and that of adipose tissue to be lower in the treated bulls. Figure 2 gives the changes in nitrogen balance. The nitrogen retention of the control animals was on average 46.8 g per day and did not vary to a great extent over the experiment. By contrast, the nitrogen retention of the bulls from the L3 group as compared with the control animals significantly increased ($p < 0.001$ at week 1; $p < 0.05$ at week 6) shortly after the implants were given. The extent of the increase was greater after the first implantation than after the second or the third. At the end of the experiment (week 18), the nitrogen retention of the control animals was significantly higher ($p < 0.05$) than that in the L3 group. The nitrogen retention in the CE treated bulls was similar to that of the L3 animals during the first 6 weeks of the experiment, tended to remain higher than the control during the second period and was then similar to the control during the third period. Plasma urea concentration decreased after the implantation both in the C and L3 groups, the decrease being greater after the first implantation in the L group (Figure 3). Plasma creatinine concentration gradually increased with time, the largest increase being observed after the implantation in the L3 groups.

## DISCUSSION.

### Effects of the anabolic treatment.

As compared with the control, the overall effect of the anabolic treatment was an improvement of the average daily gain of 0.20 kg/day (15,0%). Such results are similar to those found with animals of the same breed by Lambot et al. (1983a) and Fabry et al. (1984). The killing out percentage was not affected by the growth promotors but the proportion of lean meat tended to increase and the proportion of adipose tissue to decrease. The effects on the carcass composition described in the present experiment are consistent with observations in which TBA + E2 were given to bulls (Lambot et al., 1983a) but also with other animals : young growing lambs (Sulieman et al., 1986), veal calves (Verbeke et al., 1976) and cull cows (Lambot et al., 1984).

### Comparison between lactose and cholesterol based implants.

The present experiment was planned as a comparison between lactose or cholesterol as supports in short or long acting implants. It is known that a single early implantation with conventional implants of young growing animals results in improvements of the performances but these acquired improvements with regard to control progressively decrease with time and are almost lost when the animals are slaughtered. (Vanderwal et al., 1975; Van Weerden et al., 1981; Gielen et al., 1982). It seemed therefore logical to implant lactose pellet either once quite shortly before slaughtering the animals or to repeat the implantation 2 or 3 times. With cholesterol based implants, it was expected that one implant should be sufficient. From the results of the present experiment, it appeared that one implant made of cholesterol as support was nearly as efficient as repeated implantations with lactose based pellets.

One of the most interesting findings in Experiment 1 was the pattern of the nitrogen retention curve (Figure 2). With lactose based pellets, the nitrogen retention curve was characterized firstly by high values shortly after the implant was given and lower values 5 weeks after implantation and secondly by a decrease in the extent of the improvement of nitrogen retention at the second and third implantations.

Similar patterns were reported by Lambot et al., (1983b). The low nitrogen retention 5 weeks after implantation suggested that the effective lifespan of the lactose based implant appeared to be no more than 35 days, value much lower than 60 to 150 days proposed by Heitzman (1983). During the first part of the experiment, the pattern of the nitrogen retention curve of the bulls implanted with cholesterol based pellets was similar to the pattern observed when the pellets made of lactose were used. The nitrogen retention tended to remain higher than the control during the second part of the experiment and was similar to the control during the third period. Such a pattern suggested a rapid release of the hormone shortly after implantation followed by a slower and sustained liberation later on. Comparison between long acting (Compudose 365 with 45 mg of oestradiol 17ß) and short acting implants (compressed pellets with 20 mg oestradiol and 200 mg progesterone) were reported by O'Callaghan et al., (1986). The live weight gain were slightly lower with the silastic rubber implants and were associated with higher rates of loss of the implants. From a consumer's viewpoint the cholesterol based implant might be more acceptable than the lactose based one because similar animal performances are obtained by given 3 times lower hormone quantities to the animals.

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Table 1 - **Growth performances, intakes and carcass characteristics.**

| | **Total live weight gain** kg | **Average daily gain** kg/d | **Total dry matter intake** kg/d | **Food conversion ratio** kg/kg | **Killing out percentage** % | **Boneless carcass** **Lean meat** % | **Boneless carcass** **adipose tissue** % |
|---|---|---|---|---|---|---|---|
| Control | 173.7 | 1.38 | 7.77 | 5.69 | 59.0 | 73.8 | 26.2 |
| L3 | 201.8 | 1.60 | 8.10 | 5.07 | 61.3 | 75.9 | 24.1 |
| CE | 197.0 | 1.57 | 8.20 | 5.32 | 61.1 | 75.3 | 24.7 |
| SED | 13.25 | 0.100 | 0.324 | 0.474 | 1.37 | 1.53 | 1.53 |

Figure 1 - **Total live weight gain in the control bulls ( X ), bulls implanted 3 times with lactose based pellets ( O ) or implanted once with a cholesterol based implant ( □ ) (3 points moving averages). Arrows indicate the implantation times.**

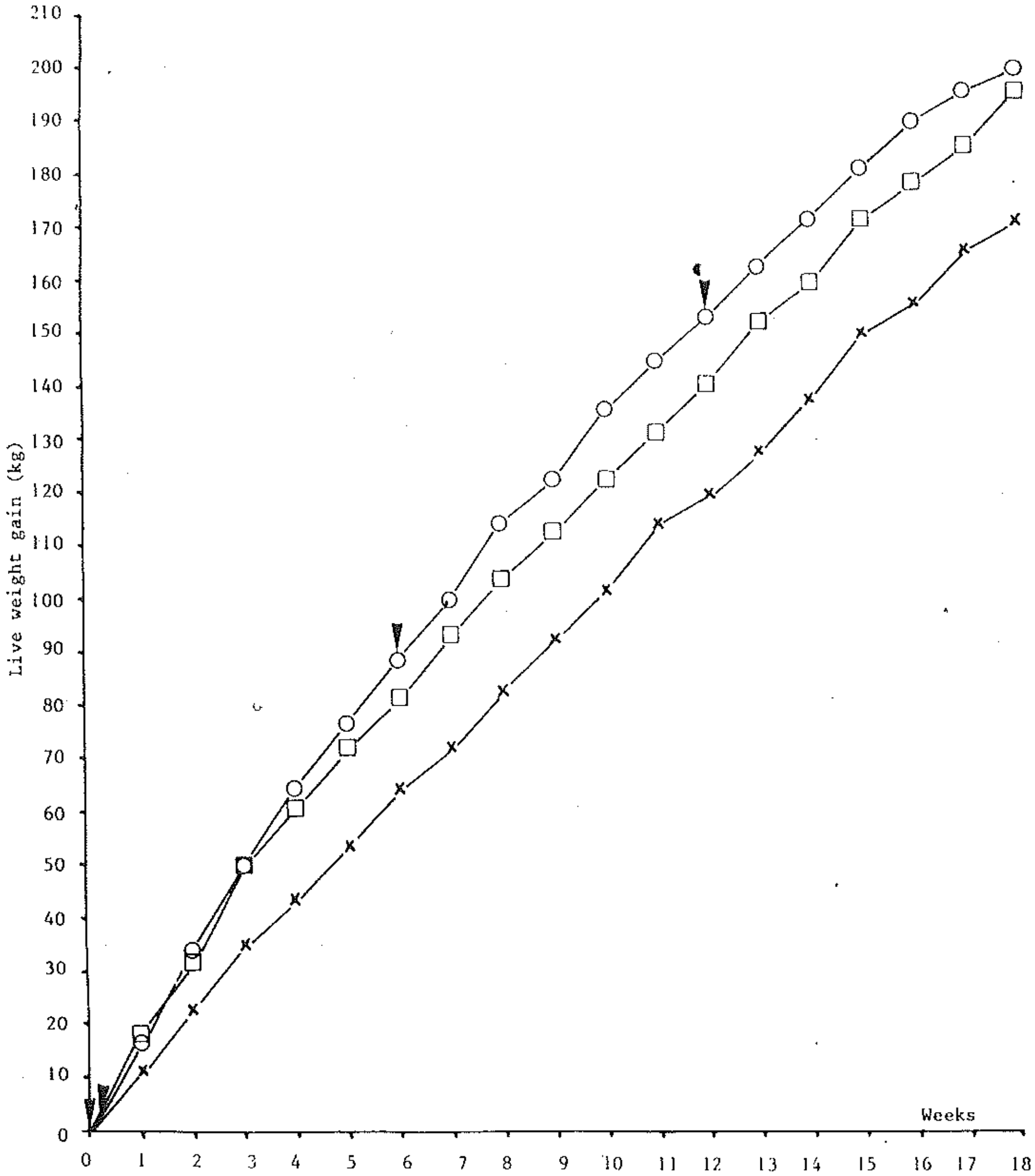


Figure 2 - **Nitrogen retention in the control bulls ( X ), in bulls implanted 3 times with lactose based pellets ( O ) or implanted once with a cholesterol based implant ( □). Arrows indicate the implantation times.**

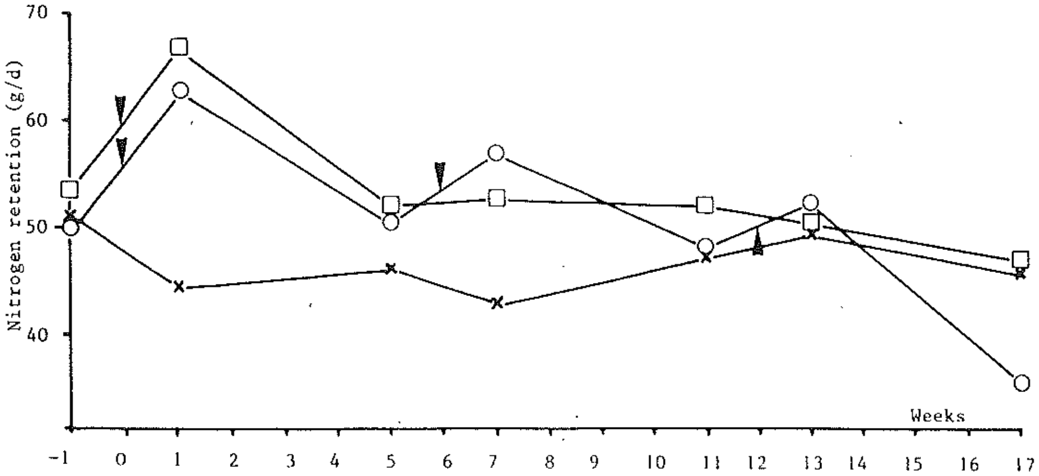

Figure 3 - Plasma urea and creatinine concentrations in control bulls (×), bulls implanted 3 times with lactose based pellets (○) or implanted once with a cholesterol based implant (□). Arrows indicate the implantation times.