

Growth performance and behaviour of finishing beef cattle illegally treated with growth promoters

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ABSTRACT: The study aimed at evaluating growth performance, feeding and social behaviour of finishing beef cattle treated with Dexamethasone *per os* alone or in association with Estradiol. Twenty-four French cross-bred beef bulls were allotted to 3 balanced treatment groups: Control (C); Dexamethasone (D) and Dexamethasone + Estradiol (D+E). All the bulls received the same diet and the experimental period lasted 43 days. All the productive traits and eating behaviour were similar among treatments. Bulls provided with D+E showed a prolonged rumination during the 8 h following diet distribution but this behaviour was partially performed in standing position, since lying was significantly reduced in both treated groups as compared to Control. However, difference in behaviour were too limited to be considered a reliable indicator of these illegal treatments.

Key words: Beef cattle, Feeding behaviour, Social behaviour, Growth promoters.

INTRODUCTION – The administration of anabolic compounds to food producing animals is banned in the European Countries due to their side effects on the animals' health and for the safety of the foodstuff. However, they are still illegally administered to beef cattle to promote their growth performances (Courtheyn *et al.*, 2002). Previous studies investigated the effects of a non therapeutic use of Dexamethasone and Estradiol on beef cattle growth and slaughter performance (Renaville *et al.*, 1988), along with the effects on metabolic parameters and on nutrient partitioning hormones (Corah *et al.*, 1995). At the same time, none specific research considered the possible effect of these illicit treatments and of the sexual hormone in particular, on animal behaviour which is directly related to cattle welfare, one of the outstanding issues for the consumer (McGlone, 2001). Therefore the present study, aimed at evaluating growth performance, feeding and social behaviour of finishing beef cattle treated with Dexamethasone *per os* alone or in association with Estradiol.

MATERIAL AND METHODS – The trial lasted 43 days between end of November 2005 and January 2006 and it was carried out in a commercial farm located in Brugine (Padova-Italy). A batch of 24 French cross-bred finishing beef bulls was divided according to animals initial body weight (529 ± 56 kg) in 3 balanced groups and assigned to 3 experimental thesis: an untreated Control group (C); a Dexamethasone group (D) provided for 43 days with 38 µg/head/d of Desashock® (Fort Dodge Animal Health S.p.A) topdressed to the feed in the manger after dilution in 0.5 l/head/d of water and a Dexamethasone + Estradiol group (D+E) that received the corticosteroid as thesis D plus three subcutaneous injections of 4 ml/head of Estradiol (AMSA S.r.l.) at day 1, 15 and 30 of trial. Due to facilities limitations, each experimental group was housed in two pens of three animals each and one pen of two bulls. All the bulls were fed *ad libitum* the same total mixed ration (Crude protein = 13.0 ± 0.6 %DM; NDF = 31.1 ± 1.7 %DM; Starch = 34.6 ± 1.5 %DM) delivered at 9.00 AM. Bulls were weighted at the beginning and at the end of the trial in order to calculate their average daily gain (ADG). Dry matter intake (DMI) of each pen was calculated three times a week by weighting the feed distributed and the residue in the manger 24 hours later. Pen feed conversion ratio was calculated by dividing the pen DMI by the ADG of the pen mates. Bulls' feeding and social behaviour was observed only in the 6 pens housing 3 bulls for 8 hours right after the distribution of the diet on day 9, 25 and 39 of the trial. Lying, eating and ruminating behaviours were recorded by scan sampling technique adopting a 5 min

interval between scans (Martin and Bateson, 1993). The number of social events such as fights and mounting and the number of visits to the waterer were also recorded using the behaviour sampling technique (Martin and Bateson, 1993). Total DMI of the bulls was partitioned in two fractions: from delivery to 8 h (T0-T8) and from 8 to 24 h (T8-T24) according to the procedure proposed by Cozzi and Gottardo (2005). Data on growth performance were statistically analyzed adopting a linear model (SAS, 1990) that considered the effects of treatments and of pen within treatment. Behavioural data from scan sampling were expressed in minutes assuming that each behaviour persisted for the entire scan interval (Cozzi and Gottardo, 2005). The statistical model used for these data considered the effects of treatment, pen within treatment, observation day and treatment x observation day.

RESULTS AND CONCLUSIONS – As shown by the data in Table 1, none of the productive traits resulted significantly affected by the treatments. This result was partially due to the large variation observed within each treatment group however, considering the thesis D, it agrees with Corah *et al.* (1995) who did not show a significant effect of Dexamethasone on beef cattle growth. Regarding the use of Estradiol, a study carried out by Renaville *et al.* (1988)

Table 1. Productive performances (least square means) of the beef cattle during the experimental period.

Parameter	Treatment			P	SE	
	C	D	D+E			
Live weight:						
- initial	kg	535	552	533	0.88	7.2
- final	"	592	619	612	0.85	9.9
Average daily gain	kg/d	1.33	1.54	1.84	0.27	1.1
Dry matter intake	kg/d	8.78	8.91	10.21	0.44	0.3
Feed conversion ratio		6.93	5.88	5.54	0.33	0.3

Table 2. Time spent eating and ruminating, number of visits to the waterer and number of mounting and fighting events (least square means) of Control (C) and treated bulls (D) and (D+E).

Activity	Treatment			P	SE	
	C	D	D+E			
Eating	min	76.7	81.7	83.3	0.84	1.9
Ruminating	"	75.8 ^b	81.3 ^b	101.1 ^a	0.02	1.9
Drinking	number of events	4.7	5.3	3.9	0.55	0.4
Mounting	"	1.8	3.2	0.8	0.55	0.6
Fighting	"	8.8	5.5	6.5	0.13	1.2

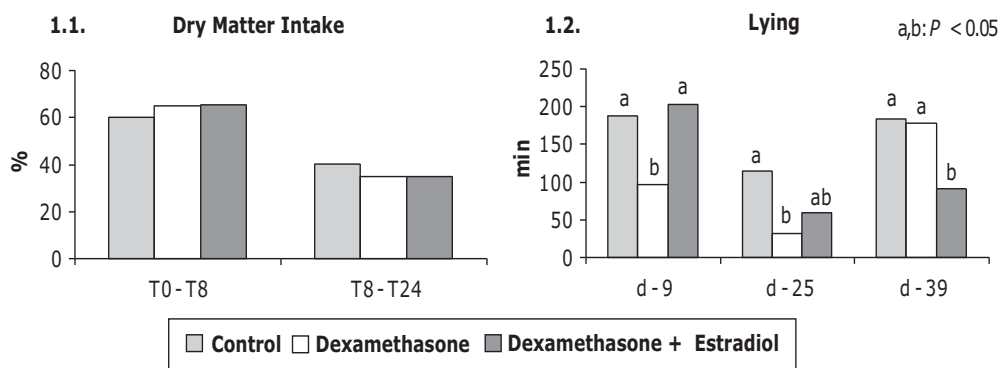
a,b: P<0.05.

showed that the cocktail of the estrogen and trenbolone acetate had an anabolic effect in the first month of administration while Estradiol alone did not affect bulls ADG and feed efficiency. None scientific reference is available on the effect of the provision of Estradiol combined with Dexamethasone.

Consistent with previous results of Cozzi and Gottardo (2005), the partition of intake during the 24 h showed that the main feed consumption occurred in the first 8 hours after diet delivery when bulls consumed more than 60% of the total DMI (Figure 1.1). This behavioural pattern was not affected by the different treatments as well as the results recorded for eating in the observations carried out during the 8 h following diet distribution (Table 2). A significant treatment x observation day interaction was observed for the lying behaviour (Figure 1.2). In comparison to the Control group, the administration of the corticosteroid alone (D) showed a significant reduction of lying time at days 9 and 25, while in the

last observation session the bulls seemed to cope with the treatment and their lying time was similar to the Control ones. The D+E group, instead, showed a delayed response resulting different from the Control only in the last observation session. From an animal welfare point of view, the prolonged standing recorded in both groups of treated bulls could have reduced their opportunity to rest (Rotger *et al.*, 2006) and, according to Mogensen *et al.* (1997), it should have negatively affected their potential daily gain. Moreover, D+E bulls showed a prolonged rumination (Table 2) that was likely performed in standing position considering the decreased lying at the second and third observations (Figure 1.2). This does not correspond to normal behaviour of ruminating animals. During the period of observation, all the bulls visited the waterers with the same frequency and the number of conflicts and mounts did not change significantly even in the D+E group provided with the sexual hormone (Table 2). Feeding and social behaviour of beef cattle treated with Dexamethasone alone or combined with Estradiol have shown to be slightly different than the ones of Control bulls. Therefore beef cattle behaviour has shown not to be a clear indicator of these type of illegal treatments. Anyway, the reduction of lying observed in both treated groups, even if at different times, can be related to a lower animal welfare.

Figure 1. **1.** Partition of dry matter intake (least square means) in the first 8 hours after diet delivery and in the following 16 hours of the day ($P=0.92$; $SE=1.0$).
2. Time spent lying (least square means) in the three observation sessions ($P=0.04$; $SE=7.6$).



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