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## Effect of rbST on weight gain and fat cover of heifers in semiconfinement

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**Abstract.** The objective of this study was to evaluate the effect of recombinant bovine somatotropin (rbST) on average total weight gain, average daily gain, muscularity and finishing. 24 Nellore heifers were used, up to two years of age and weighing 307.4 kg. The animals were semi-confined in *Brachiaria ruziziensis* and were supplemented per day, with 1.5% kg live weight per animal feed. Heifers were divided into 2 groups, T1: with the use of rbST and T2: unused rbST (control). The rbST was applied every 14 days at a dose of 500 mg per animal. For the statistical analysis, the results were submitted to analysis of variance (ANOVA) at 5% significance level. There was no significant difference ( $p > 0.05$ ) for average initial body weight, average final body weight, total average gain and average daily gain, and ribeye area (REA) adipose tissue thickness. Therefore the use of rbST did not promote change in performance characteristics in Nellore heifers 2 years old.

**Keywords:** somatotropin, heifers' performance.

### Introduction

The beef cattle confinement is an alternative for meat production during the period of shortage of fodder. However, we need to explore the various techniques available, such as crossbreeding, production and preservation of high quality forage, use of additives and adequacy of diets to combine the best performance with the lowest cost of production (EZEKIEL et al. 1999).

There is increased productivity in better conditions offered to the flock as a convenience, absence of stress, feeding, breeding or use of technologies such as bovine somatotropin (CAMPOS, 2008). Currently, research has shown the positive effect of bST in the regulation of growth and changes in the fat reserves in the animal body (Valente et al., 2011).

According to Vieira et al. (2010), studies with bST began in the 1980s with the large scale synthesis of the recombinant form of this hormone (rbST) obtained by the technique of recombinant DNA; those are used for treating growth disorders in humans or for stimulating production of milk and meat in farm animals.

In the absence of available nutrients, no response in production with the use of bST, and the handling property as the most important factor. Typically, the use of bST is associated with high production livestock, however, there are studies indicating good productive response in crossbred animals (*Bos taurus* X *Bos indicus*) proving there is good management (Campos, 2008).

The aim of this study was to evaluate the effect of recombinant bovine somatotropin on average total weight gain, average daily gain, muscularity and finishing.

### Methods

The study was conducted in Araguaia farm, Santa Carmen, Mato Grosso, Brazil. Twenty-four Nellore heifers, with up to two incisors teeth and average weight of 307.4 kg were evaluated. The animals were semi-confined in *Brachiaria ruziziensis* and were supplemented with 1.5% kg weight of feed per day. This diet contained 60% corn, 30% soybean, 10% millet, for each 1000 kg of feed and provide mineralization (Table 1). The trial period was 90 days.

This diet was used for both treatments, which differed by injection of rbST. The control group was not rbST injected, and in Group 1 were injected subcutaneously 500 mg of rbSt (1.6 mg / kg / BW) every 14 days.

**Table 1.** Guarantee levels of mineral salt (Núcleo Mineral Corte Novanis) + monensin.

NNP –Protein (min.)	850 g/kg
Calcium (max.)	200 g/kg
Calcium (min.)	170 g/kg
Phosphor (min.)	10 g/kg
Sodium (min.)	57 g/kg
Magnesium (min.)	10 g/kg
Sulfur (min.)	15 g/kg
Fluor (max.)	100 mg/kg
Cobalt (min.)	20 mg/kg
Copper (min.)	340 mg/kg
Iodine (min.)	35 mg/kg
Manganese (min.)	660 mg/kg
Selenium (min.)	7 mg/kg
Zinc (min.)	1200 mg/kg
Vitamin A (min.)	80000 mg/kg
Monensin sodium (min.)	740 mg/kg

The animals were weighed at the beginning of the experiment, and thereafter every 28 days to measure the average initial body weight results, average final body weight, total average gain and average daily gain.

To evaluate the development of muscle and fat tissue, ultrasound examinations (n = 60) were performed on the carcass at the end of each experimental phase (growing and finishing). The ultrasonographic images of the ribeye area indicated muscularity, carcass yield and weight gain. The fat thickness was indicative of casting finishing precocity.

The image was measured between the 12th and 13th ribs, cross *Longissimus thoracis*, the thickness of subcutaneous fat measured in the middle third of the lateral rib eye area, which is the last fat deposition site. For these evaluations ultrasound equipment Pie Medical Scanner 200 with a Curved Array Scanner Sector probe 51B04UM02 model were used.

For statistical analysis, weight data, weight gain, average daily gain, ribeye area and fat thickness were analyzed by variance (ANOVA) at 5% significance level, using the software R (R Development Core Team, 2010).

The statistical model used was:

$$y_{ij} = \mu + C_i + e_{ij}$$

being:

$y_{ij}$  = Observation of animal;

$\mu$  = General average;

$C_i$  = use or not of rbST ( $i=0;1$ );

$e_{ij}$  = error associated to observation  $ij$ .

## Results and Discussion

The data shows that the initial body weight and final body weight were similar ( $p = 0.5897$ ) between the groups, with 366.3 kg and 358.3 kg for heifers with rbST and control, respectively (Table 2).

Cervieri (2003) evaluated 35 crossed male calves Angus/Nellore (aged  $63 \pm 17$  days and weight of  $76.8 \pm 14.7$  kg), and 18 calves given 1.4 mg / kg

of rbST (Boostin®) every 14 days and other 18 treated with saline (control), and it was found that the animals that received rbST had an average daily gain, total weight gain and final body weight greater than the control animals. The daily weight gain was 7.9% higher in calves treated with rbST.

Chardulo et al. (1997) used 59 bulls, 30 crossbred Simmental/Nellore and 29 Nellore. The animals were weaned at 7-8 months of age and had 166Kg (Nellore) and 236 Kg (crossbred) of average weight. 15 animals of each group were subjected to 250mg/animal/14 days. The experimental period endured 188 days, 20 days for adaptation and 168 day for sample collection, split in two phases: the first one denominated growing (70 days), and the second, phase of finishing (98 days). The crossbred animals presented daily weight gain and final weight superior to the ones of the Nellore breed ( $P<0,01$ ), independently of the experimental phase, and this evidences the beneficent effects of heterosis and breed complementary in these varieties. Such performance permitted the crossbred animals to achieve commercial slaughter weight of 223 Kg at 13 months of age. However, referring to the use of rbST, the results showed that the weight gain and final weight didn't alter.

There was no difference ( $p>0,05$ ) in the total weight gain between the groups, being 56,7Kg and 51,5 Kg for sbST and control group, respectively.

These data disagree with the results obtained by Early, MecBride & Ball, 1990; they reported 15,0% of weight gain in the experiment on steers 9 months of age, treated with rbST 20,6 mg/animal a day. There were also no difference in daily average weight gain between heifers ( $p=0,2467$ ); however, heifers treated with rbST had a greater average of daily weight gain compared to the control heifers, although it wasn't significant. These results agree with the data Ezequiel et al. (1999) obtained; in their experiment 40 steers crossbred and castrated, being 30 months of age and weighing 360,2Kg were used, in which they

used 320mg of rbST every 28 days and weighing every 14 days, wherein the effect of the use of rbST on weight gain didn't promote difference between the treated and non-treated animals. Nascimento

(2003), working with beef heifers, detected that the use of subcutaneous rbST in two doses (320 and 640mg/animal), at 14 days intervals didn't influence the average of daily weight gain.

**Table 2.** Comparative between the averages of initial body weight (AIBW), final body weight (AFBW), total weight gain (ATWG) and daily weight gain (ADWG) in Nellore heifers subjected to the use of recombinant bovine somatotropin, rbST.

	rbST	Control	p-value
AIBW (kg)	306,9 ± 13,6	307,9 ± 11,9	0,6987
AFBW (kg)	366,3 ± 12,5	358,3 ± 10,6	0,5897
ATWG (kg)	56,7 ± 12,1	51,5 ± 8,9	0,2528
ADWG (kg)	0,72 ± 0,1	0,65 ± 0,1	0,2467

p<0,05

In relation to muscularity (p=0,1927) and finishing (p=0,0624) in Table 3, there was no difference (p>0,05) between the experimental groups in the analysis of muscularity through the ribeye area (REA) in heifers treated with rbST. For finishing there was no difference between the groups; however, the thickness of the subcutaneous

adipose tissue deposition at the end of the experiment was 1,13 mm in heifers treated with rbST and 0,61 mm in control heifers. These data disagree with the ones presented by Vieira *et al.*, (2010), in which working with bovine, the use of rbST promoted greater muscle score and decreased adipose tissue deposition.

**Table 3.** Results of ultrasounds measuring the size of ribeye area (REA) - in cm<sup>2</sup> - and thickness of subcutaneous adipose tissue (SCAT) - in mm - of Nellore heifers subjected to the use of Boostin<sup>®</sup> - a formulation for recombinant bovine somatotropin

	rbST	Control	p-value
Initial REA (cm <sup>2</sup> )	37,69 ± 5,5	36,99±5,0	0,7271
Final REA (cm <sup>2</sup> )	45,4 ± 5,3	42,1 ± 5,5	0,1927
Initial SCAT (mm)	3,55 ± 0,4	3,28 ± 1,0	0,4358
Final SCAT (mm)	4,68 ± 0,9	3,89 ± 0,8	0,0624

p<0,05

Moreira *et al.* (2002) used 64 calves, males and females, crossbred with Simental and Nellore, with an average weight of 114,3 Kg for males, and 105,3 Kg for females, at 60 days of age, supplemented with rbST (*Boostin* - 250mg®, *Coopers do Brasil, Ltda*), using a dose of 0,15 mg kg/LW/day, every 14 days and didn't observe differences (p>0,05) in the measurements of REA in relation to supplementation with or without use of bST as much for females as for males.

Moreira *et al.* (2002) also observed that the animals that received supplementation with rbST presented less fat tissue deposition in carcass (p<0,05) in relation to the control animals.

## Conclusion

The use of rbST didn't promote alterations for yield and carcass characteristics in Nellore heifers at 2 years of age.

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