

# Effects of immunocastration and beta-agonists on the meat sensory profile of *Bos indicus* cattle

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**Abstract – Beta-agonists ( $\beta$ AA) have been used to improve feedlot performance and carcass yielding, but some negative effects on meat quality have been reported. Immunocastration could be an alternative to surgical castration, to improve fat deposition and sensory attributes of beef meat. The aim of this study was to evaluate the effect of  $\beta$ AA and immunocastration on sensory profile of the meat of *Bos indicus* cattle. Forty-eight Nelore males received two doses of immunocastration vaccine (IC) and other 48 animals were kept non-castrated (NC). They were fed for 70 days to a common diet and then divided in three groups and fed for 30 more days one of the following treatments: control diet without BAA (CON); 80mg/day zilpaterol hydrochloride (ZIL); 300mg/day of ractopamine hydrochloride (RAC). At slaughter one sample of *Longissimus dorsi* muscle, between 12/13<sup>th</sup> ribs, was collected for sensory profile analysis. There was no interaction between sexual condition and BAA. There was a trend of NC males have higher tenderness ( $P=0.0949$ ) and overall quality ( $P=0.0556$ ) scores than IC. The meat of  $\beta$ AA treated animals had lower tenderness ( $P=0.0175$ ) and overall quality ( $P=0.0401$ ) scores than CON. Aroma, juiciness and flavour were not affected either by sex condition or  $\beta$ AA.**

**Key Word – Succulence, flavour, juiciness.**

## 1- INTRODUCTION

The beta-adrenergic agonists ( $\beta$ AA) are a class of pharmacological compounds that have similar chemical structure to a group of natural compounds called catecholamines, which show potent anabolic effects on skeletal muscle. The  $\beta$ AA have been used in some countries, for

feedlot cattle aiming to increase rate of weight gain and improved feed efficiency by increasing synthesis and decreasing protein degradation. Additionally, these compounds exhibit a lipolytic action, causing a reduction in the amount of fat in the carcass, which can have negative effects on meat quality. This is especially important in Brazil, where most of the animals are non-castrated males that are confined for short periods, resulting in carcasses with low fatness degree, insufficient to maintain the quality of the meat.

Another practice than has been largely used is the castration of animals in order to improve fat deposition and meat quality. However, surgical castration causes animal hurt and normally affects negatively animal performance. One option to surgical castration is the use of immunocastration vaccines, that are capable of temporarily inhibit the release of male and female sex hormones, by stimulating the production of antibodies that neutralize factor GnRH (gonadotrophin-releasing factor). This product could be an alternative to improve fat deposition and also meat quality, with a smaller impact on animal performance because it does not cause hurt and can be used few days after slaughter for feedlot animals.

For these reasons, the objective of this study was to evaluate the effect of immunocastration and  $\beta$ AA on meat sensory traits of feedlot finished *Bos indicus* cattle.

## 2- MATERIALS AND METHODS

Ninety-six males ( $409 \pm 50$  kg LW; 20 mo old) were divided in two groups and half of them received two doses of immunocastration vaccine (IC; Bopriva<sup>®</sup> - Zoetis Veterinary Products Industry LTDA, São Paulo, SP, Brazil) within 30 days interval and the other half of animals were kept non-castrated (NC). Animals were fed for 70 days a common diet containing 76% concentrate and 24% roughage (corn silage). Following they were split in three groups (n=32) and fed 30 more days one of the following treatments: control diet without BAA (CON); diet containing 80mg/d zilpaterol hydrochloride (ZIL; Zilmax<sup>®</sup> - MSD Animal Health, São Paulo, SP, Brazil); diet containing 300mg/d of ractopamine hydrochloride (RAC; Optaflexx<sup>®</sup> - Elanco Animal Health, São Paulo, SP, Brazil). After this period, the animals were slaughtered according to humanitarian slaughter procedures as required by Brazilian laws.

Thereafter, carcasses were chilled for 48h (0-2 °C) and then ribbed between 12th and 13th ribs and a sample (2.5 cm thick) of the *Longissimus dorsi* muscle (LM) was taken and vacuum packaged and refrigerated for more two days, at 5°C, for further sensory analysis. The LM samples placed in 10% brine for 15 minutes. The steaks were roasted until they reached an internal temperature of 35°C, flipped over, roasted until they reached 70°C, and then removed from the oven. The roasted meat samples were cut parallel to the muscle fibers to form 1.5cm cubes. The samples were then placed in an oven (60°C) until the completion of tests, which were performed within 30 minutes of preparation. Samples were evaluated for five attributes (aroma, flavor, succulence, texture and overall quality) in a nine-points (1- extremely dislike, 9- extremely like) unstructured scale according to Meilgard et al. [1].

The data was analyzed by ANOVA as a randomized complete block (initial LW) design in 2 x 3 factorial arrangement (sexual condition

x treatments) and means compared by Student T test..

## 3- RESULTS AND DISCUSSION

There was no sex condition x  $\beta$ AA interaction. Sex condition did not affected meat aroma, juiciness and flavor (Table 1) but there was a trend of NC animals have more tender meat (higher values on sensory panel) than IC (P=0.0949). In the same way, those NC tended to have higher overall quality scores (P=0.0556) than IC animals.

Table 1 – Means, standard errors of means (SEM) and probabilities of meat sensory traits of immunocastrated (IC) and non-castrated (NC) cattle.

Attributes	Sex condition		SEM	Pr>F
	IC	NC		
Aroma	6.0	6.0	0.11	0.6434
Tenderness	5.6	5.8	0.11	0.0949
Juiciness	6.0	6.1	0.10	0.3248
Flavour	6.3	6.3	0.10	0.9726
Overall quality	6.1	6.3	0.10	0.0556

The trend of better scores for tenderness and overall quality of meat from NC males was unexpected because many reports in literature describe better quality attributes for castrated (surgically) males than NC (DIKEMAN et al.) [2]. Amatayakul-Chantler et al., [3], observed an improvement in objective meat tenderness (Warner-Bratzler shear force) of IC animals when compared to NC. According to Luchiari Filho, 2000 [4], the most pronounced differences between sexes are related to fat and muscle deposition and when animals are slaughtered at young ages and at adequate fatness degree, differences in meat quality tend to be small.

Treatments did not affected aroma, juiciness and flavour of meat (Table 2). On the other hand, use of  $\beta$ AA decreased meat tenderness (P=0.0175) and overall quality (P=0,0401) when compared to the CON treatment. There was no difference between RAC and ZIL for any trait.

According to Schroeder et al. [5] cattle supplemented with ractopamine (300mg/animal per day) showed an increase in shear force and decrease a texture score in when compared to the control diet. Similar to observed in this work, Strydom et al. [6] also observed a decrease in WBSF when cattle was supplement with zilpaterol.

Table 2 - Means, standard errors of means (SEM) and probabilities of meat sensory traits according to the treatments.

Attributes	Treatments <sup>1</sup>			SEM	Pr>F
	CON	RAC	ZIL		
Aroma	6.1 <sup>a</sup>	6.0 <sup>a</sup>	6.0 <sup>a</sup>	0.14	0.6920
Tenderness	6.1 <sup>a</sup>	5.6 <sup>b</sup>	5.6 <sup>b</sup>	0.15	0.0175
Juiciness	6.2 <sup>a</sup>	5.9 <sup>a</sup>	6.0 <sup>a</sup>	0.14	0.4825
Flavour	6.5 <sup>a</sup>	6.2 <sup>a</sup>	6.3 <sup>a</sup>	0.13	0.2073
Overall quality	6.4 <sup>a</sup>	6.0 <sup>b</sup>	6.1 <sup>b</sup>	0.12	0.0401

<sup>a,b</sup> Different letters in the same row differ (P<0.05).

<sup>1</sup> CON - control diet; RAC – ractopamine hydrochloride; ZIL - zilpaterol hydrochloride.

#### 4- CONCLUSION

The immunocastration has a small effect on meat sensory attributes. The use of  $\beta$ AA decreased tenderness and meat quality of Nellore cattle.

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