EFFECT OF GENDER IN HOLSTEIN ANIMALS ON GROWTH, CARCASS AND MEAT QUALITY TRAITS

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Abstract — Thirty Holstein calves were assigned to the following treatments groups: T1=bulls (n=10); T2=cryptorchids (n=10) and T3=steers (n=10). All animals had an initial liveweight (LW) of 150 ± 21 kg fed with the same diet based on an oversown pasture grazed at 5% of LW and at 2.5% LW + supplementation at 1% LW using entire corn grain (winter). Information of carcass yield and meat quality was recorded. Daily live weight gain presented differences amongst treatments, being T1=T2>T3 (P<0.01). Higher values of hot carcass weights and carcass yield were observed (P<0.01) in T1 and T2 compared with T3. There was a significant effect (P<0.01) of the animal gender in main cuts (striploin, tenderloin, sirloin and outside flat) weights, being higher (P<0.01) for T1 and T2 compared withT3, and also in most of each cuts weights measured. The results on meat quality traits show that marbling values and fat colour where higher for T3 (P>0.01). For muscle colour, no differences were found among treatments, but a trend of lower values was observed (P<0.05) for T1 (less birghtness, red level and yellowing). These results suggest that in Holstein beef production systems, gender could play an important role to improve productivity and carcass traits.

Keywords—**Holstein beef, gender, carcass, meat quality.**

I. INTRODUCTION

Global demand for food is expected to expand more than twice by 2050. The main reasons for this include further growth in world population and an increase in income in emergent economies, which will result in an increasing demand for the consumptions of livestock-based food(1). In this scenario, meat production from non traditional breeds can play an important role in supplying animal protein. In Uruguay, Holstein meat production is gaining importance when exports associated to the NAFTA market increased. This new productive alternative has contributed to the intensification of the Uruguayan tratidional fatteing systems (2). In this country, meat derived from dairy cattle is obtained mainly from cows and steers. According to previous studies carried out in other countries, Holstein bulls grew between 10 to20% faster than steers and generate better carcass traits (3). However, little information this area of beef production has been generated in Uruguay, in particular comparing the performance, carcass traits and meat quality attributed to the effect of gender in Holstein breed. . The main objective of this study was to evaluate animal performance, carcass traits and meat quality attributes associated with gender effect in fatteing systems using Holstein breed.

II. MATERIAL AND METHODS

Thirty Holstein males were assigned to each of the following treatments: T1=bulls (n=10), T2=cryptorchids (n=10) and T3=steers (n=10). All male categories (150 ± 21 kg) were fed with the same diet. An extensive oversown pasture (Lotus subbiflorum cv El Rincón) was grazed at 5% of LW (spring, autumn and summer) and at 2.5% LW + supplementation at 1% LW using entire corn grain (winter). In three Holstein male categories (bulls, cryptorchids and steers), the following information was recorded: a) animal performance (daily LW gain-DLWG), carcass traits (Hot carcass weight-HCW; Carcass Yield–CY; sirloin, striploin and tenderloin cuts yield–R&LY; ratio of the sum of main cuts of Pistola

cut-C:F; pistola weight–P; striploin weight–SL; sirloin weight–R; tenderloin weight-TL; outside flat weight-O; sum of these cut weights-C and b) meat quality attributes (pH, fat colour-FC and meat colour-MC, marbling-MARB). The muscle pH was measured using a hand-held pH meter (Orion A 230) with a probe type electrode (BC 200, Hanna Instruments), standardized against two pH buffers (4 and 7). Muscle and fat colour measurements were made using a Minolta Colorimeter (model C-10). They were recorded in triplicate from the approximate geometric center of the exposed *Longissimus dorsi* muscle, determinig values for L*, a* and b* parameters, according to the CIE system. The animal data was analyzed as repeated measurements, through the MIXED procedure of SAS and the results of carcass quality were analyzed by the GLM SAS procedure (4). LS means and differences among treatments were estimated (P<0.01).

III. RESULTS AND DISCUSSION

Initial live weight (ILW), final live weight (FLW) and daily LW gains (DLWG) of different Holstein categories are shown in Table 1. Animals in T1 and T2 had higher (P<0.01) DLWG than those in T3. These results are in accordance with numerous studies, which consistently showed that bulls grew 10-20% faster than steers (3).

Table 1. Daily LW gains for different categories

	Treatment		
	T1	**T2**	**T3**
ILW (kg)	154	160	155
FLW (kg)	518a	541a	487b
DLWG (kg/an/day)	0.72a	0.76a	0.66b

Note: IBW=Initial LW; FLW=Final Liveweight. ab – Means within the same row with uncommon uperscripts differ (P<0.01)

Carcass traits and yield for different Holstein male categories are shown in Table 2. Animals in T3 had lower (P<0.01) HCW than those in T1 and T2. FLW ranging between 510 and 540 kg allowed HCW of 270 kg. The carcass yield (CY) was 2% higher (P<0.01) in T1 than in T2. Similar differences were found by (5) when comparing CY of Holstein bulls and steers in a feedlot regime, where CY values were higher (57.9 and 559%) for bulls and steers, respectively. No treatment effect was found (P>0.01) in R&LY, but yields in forequarter cuts was lower in T3 (67.5%) than in T1 and T2 (69.7% and 70.4% respectively (data not showed). Furthermore, significant differences in C:F ratio were observed, being lower (P<0.01) in T3 than T1 and T2. Pistola Cut weight was higher (P<0.01) in T1 and T2 when compared with T3. As it was expected, differences in weights of main cuts as SL, R and O were observed as well in total sum of the cuts (C), which showed higher values (P<0.01) for T1 and T2 compared with T3.

Table 2. Carcass traits and yield cutability

	Treatment		
	T1	**T2**	**T3**
HCW (kg)	265.9a	278.3a	244.1b
CY (%)	51.9a	51.4ab	50.0b
R&LY (%)	0.72a	0.76a	0.66b
C:F (%)	23.1a	22.5a	21.2b
P (kg)	61.5a	62.9a	55.1b
SL (kg)	3.5a	3.6a	2.6b
R (kg)	2.8a	2.8a	2.3b
TL (kg)	2.2	2.1	1.9
O (kg)	5.6a	5.7a	4.9b
C (kg)	14.2a	14.2a	11.7b

Note: ab – Means within the same row with uncommon uperscripts differ (P<0.01)

Results related to meat quality traits associated with gender effect are shown in Table 3. The MARB score was different between treatments, being higher for T3 animals. These animals in T3 presented low levels of marbling, being between traces and practically devoid according to the scale of USDA Qualtiy Grade . pH values did not present any differences amongst treatments (P>0.01), and also meat colour was similar. When all three parameters of muscle colour (L*, a* and b*) were considered, no significant differences were observed. In spite of this, a better colouring trend (P>0.05) was evidenced in T2 and T3 compared to T1, showing higher values for L*, contributing to brightness and more desirable red colours. Differences by treatments in fat colour were detected, where animals in T3 had fat with more brightness (L*) and slightly more yellow (b*) than the others.

Table 3. Meat quality traits

	Treatment		
	T1	**T2**	**T3**
MARB	200b	200b	230a
pH	5.9	5.8	5.8
L* fat	60.9ab	60.0b	63.7a
a* fat	11.8a	11.6ab	9.5b
b* fat	8.8b	8.9b	11.7a
L* muscle	38.9	39.7	39.8
a* muscle	17.9	19.1	19.2
b* muscle	12.4	13.2	13.2

Note: ab – Means within the same row with uncommon uperscripts differ (P<0.01)

IV. CONCLUSIONS

The results of the present study suggest that the inclusion of bulls or cryptorchid animals in Holstein finnshing systems on grazing conditions could improve animal performance and carcass traits in Uruguay. On those systems, further research is needed associated with the achievement or not of the carcass fatness levels required by different markets as well as to study and aplly better management practices to control aggressive behavoiur of bulls in these intensive systems.

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