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Finishing effect on carcass composition and meat quality in Friesian young bulls

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SUMMARY: The trial effect was carried out on 65 Friesian young bulls subdivided into 5 groups: **a** - fed mais-silage ad libitum and 1.000 g/d of soybean meal from 420 kg to 570 kg, **b** - as **a** + 1 kg/q live weight of corn-mais from 420 to 570 kg, **c** - as **b** but from 500 to 570 kg, **d** - as **a** + beet-pulp equivalent to corn-mais energy of b, **e** - as **d** but from 500 kg to 570 kg. The half-carcass were anatomically dissected in meat, fat (subcutaneous and intermuscular) and bone. On Longissimus dorsi, pH and colour (L, C and H) with C illuminant only on raw meat, water holding capacity and tenderness (Warner Bratzler Shear) on raw and cooked meat were determined. The long time of finishing affect significantly A.D.G (1.480 kg, 1.270 kg for **b** and **d** groups vs 0.998 for **a** group). Conformation of **c** and **d** groups is hardly better (3 vs 3-) as the fatness is major for **c** group (3- vs 2+) as the others. The animals of **d** group showed the maximum of meat percentage (65,3%) while the total fat percentage is maximum in **c** group and minimum in **b** group (14.8% vs 13.1%). Tenderness and water holding capacity is not affected by finishing, while colour, in particular Chroma (C), shows differences among groups.

INTRODUCTION: The use of finishing techniques was investigated by a lot of authors, wheter on steers (KEANE et al, 1989; KEANE et al., 1990) or bulls (PODOROV, 1990; ZAKHARIEV et al., 1990) or cows (ROMITA et al., 1987; ROMITA et al., 1989; GIGLI et al., 1991). This technique is used in order to improve performances but especially carcass and meat quality in order to orientate it to market's request. Our group is taking an interest in this methodology even in order to achieve a better standardization of qualitative carcass and meat characteristics to supply the consumer with a guaranteed product.

MATERIAL AND METHODS: 65 Friesian young bulls of 260 kg average live weight were divided into 5 groups: **a**) the control group fed on mais-silage ad libitum and 1.000 g/d of soybean meal and slaughtered without finishing; **b**) group fed as group **a** with finishing corn-mais based (1 kg/q live weight) from 420 kg live weight; **c**) group fed as group **a** with finishing from 500 kg live weight and integrated as group **b**; **d**) fed as group **b** with finishing sugar-beet pulp based (equivalent to corn-mais energy); **e**) fed as group **a** with finishing from 500 kg weight, and integred as group **d**. The animals were periodically weighted to estimate the average daily gain. All the animals were slaughtered when their weight was 560 - 580 kg. Slaughtering and subsequent operations of dissection were carried out following ASPA method (ASPA Commission, 1989).

At slaughtering were recorded the weights: full and empty stomachs, stomach's fat, full and empty intestine, instestin's fat, skin, head, tongue, horns, tail, liver, spleen, heart + lung, fore and back quarter, conformation and fatness scores, lenght of carcass and leg, depth of chest, maximum and minimum width of leg. Net and gross yield were calculated. After 1 hour the carcass was subdivided in 2 half-carcasses and put into refrigerating cell for 8 days at temperature of 0-4°C.

After the refrigeration from the right half-carcass were removed and weighted kidney, kidney fat, pelvic fat, diaphragm. On the cleaned right half-carcass anatomical dissection were made.

The right carcass was divided in two quarters by separating cut between the last dorsal and the first lumbar vertebra. The quarters were divided in 11 anatomical regions. In the fore quarter: proximal thoracic limb, distal thoracic limb, neck, steaks 1-6, brisket 1-6, steaks 7-13, brisket 7-13; in the back quarter lumbar region, abdominal region, proximal pelvic limb and distal pelvic limb.

Regions and cuts were weighed and anatomically dissected in their component: meat, bone, subcutaneous and intermuscular fat, other tissues. The sum of the homologous tissues of the regions and cuts cited gave the exact composition of the half-carcass. During dissection, were taken 3 samples form muscles: Longissimus dorsi

(LD), semitendinosus (St) and gluteobiceps (Gb).

The quality of meat was examinated in these samples. The parameter studied were: 1) Hardness (on raw and cooked sample) performed with Instron Table Model Food Tester using Warner Bratzler Shear (WBS); 2) colour of raw meat using a spectrofotometer Macbeth 1500 (were studied saturation, luminosity (L*) with 2 systems (Hunter and CIELAB), red (a*) and yellow (b*) indexes by using 3 different light sources A, F and C); 3) water holding capacity (WHC) during conservation and after cooking (in water, 75°C x 55 mins).

Data were analyzed using a monofactorial model:

$$Y_{ik} = M + A_i + E_{ik}$$

where:

M = overall mean;

A = effect of diet (i=1,5).

The comparison between different diets' parameters was performed by using SAS software (proc GLM). Only a little number of releved data is here shoved.

RESULTS AND DISCUSSION: The ADG was 1.170 kg/d in pre-experimental period. This gain did not change during the experiment, but showed significant high differences between groups (tab.1). Indipendently from type of integration receved (corn-mais or beet pulp) animals with a longer finishing period were those with higher growth. At slaughtering (tab. 1), bulls with long finishing period and fed corn-mais had the lower net live weight. This value was significantly different from **c**, **d** and **e** groups while it didn't differ from the control groups' one. Conformation was better in **c** and **d** group than in **a** (control) group (3 vs 3-).

Refering to fattening state of groups **c** and **d** even if the difference was not significant, carcass belonging to **d** group seeems to be preferred because, in equality of conformation score (3), had a smaller fattening state (2+ vs 3-) with advantage on carcass fleshiness. This hypothesis was confirmed by anatomical dissection (tab. 2); **d** group had the higher percentage in meat (65.3%) even if the difference was significant only referring to control group (63.4%), and a low value in percentage of separable fat (14.2%). In parity of alimentary integration received during the finishing period, particularly for **b** and **c** group (fed corn-mais), the assumption of these integrators for a longer period determinated a significant reduction of separable fat (13.1% vs 14.8%).

For pH and WHC were not found differences on raw and cooked meat, while significant difference were found in tenderness of raw meat (tab. 3). Animals with longer finishing period fed beet pulp had a more tender meat (shear force value), while the reduction of finishing period determined a significant worsening of meat tenderness. As already verified by us (GIGLI et al., 1988) cooking caused a reduction in values of shear force, improving tenderness and cleaning the differences between groups.

In muscle LD (tab. 3) lightness and hue were not influenced by finishing and aliment ingested, while the C was significantly higher in animal with finishing based on beet pulp, indipendently by the lenght of the period, versus control group.

CONCLUSIONS: Finishing effect resulted to be evident not only about productive parameters (increase of ADG) but even on the qualitative ones of the carcass (conformation and fattness state improvement). This results must be attributed to the protracted length of treatment while the partial improvement of meat quality (tenderness and colour) is due to the type of aliment given.

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Table 1 - "In vivo" and at slaughtering for performance

Group	N	Initial weight kg	ADG kg	Net live weight kg	Conformation (*)		Fatness (*)	
a	13	251.6 a	0.998 c	511.4 ab	7.3 b	(3-)	6.5 ab	(2+)
b	16	265.2 a	1.480 a	505.6 b	7.3 b	(3-)	5.6 b	(2)
c	12	259.8 a	1.044 c	522.0 a	7.8 ab	(3)	6.8 a	(3-)
d	12	261.3 a	1.270 b	525.4 a	8.4 a	(3)	6.6 ab	(2+)
e	12	259.9 a	1.004 c	522.5 a	7.4 b	(3-)	6.2 ab	(2+)
Mean	65	259.8	1.176	516.6	7.6		6.3	
Residual variance		1383.31	0.0542	820.95	1.19		1.66	

* Transformation data: 1,...,15 = 1-,...,5+
Note: Different letters equal P=0.05

Table 2 - Anatomical dissection (%)

Group	Meat	Bone	Fat		
			Subcutaneous	Intermuscular	Total
a	63.4 b	19.1 a	5.2 a	9.4 a	14.6 ab
b	65.0 ab	18.5 ab	4.4 a	8.9 a	13.1 b
c	64.3 ab	18.3 ab	4.8 a	10.0 a	14.8 a
d	65.3 a	17.8 b	4.5 a	9.7 a	14.2 ab
e	64.1 ab	18.4 ab	4.4 a	10.2 a	14.6 ab
Mean	64.5	18.4	4.7	9.6	14.2
Residual variance	4.68	1.20	1.67	4.19	6.93

Note: See tab. 1

Table 3 - Hardness and colour (*) of LD muscle

Group	Hardness kg/cm^2		Lightness	Chroma	Hue
	Raw	Cooked	L	C	H
a	2.54 b	1.47 a	40.6 a	23.8 b	33.9 a
b	2.56 b	1.32 a	41.8 a	24.8 ab	34.8 a
c	2.27 b	1.56 a	40.8 a	25.0 ab	33.8 a
d	2.08 b	1.30 a	40.1 a	26.2 a	33.8 a
e	3.29 a	1.48 a	40.9 a	26.5 a	34.4 a
Mean	2.58	1.43	40.9	25.1	34.1
Residual variance	0.384	0.111	7.33	3.54	3.65

Note: See tab. 1
(*): Illuminant C (6770°K) = Cloudy weather day light