

CARCASS AND MEAT CHARACTERISTICS OF PIEMONTESE BULLS AS INFLUENCED BY DIFFERENT FEEDING SYSTEMS

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Introduction

The problem of bovine meat quality in general is presently gaining extreme interest in Italy. A large number of Italian consumers is basing its choice on quality thanks to characteristics offered by some local breeds (Piemontese, Chianina, Marchigiana, Romagnola). In order to reach both good productive performances and good quality, particular attention must be paid to the use of proper feeding systems. Italian beef production is based mainly on two feeding systems: grass hay + concentrate; maize silage + concentrate. As for the feeding systems it can be pointed out that diets with a high energetic content: forage ad lib. + limited concentrate; limited forage + concentrate ad lib. are mainly used. A less utilized feeding system is based on a diet containing a fixed amount of forage + concentrate in increasing quantities in order to meet the nutritional requirements for a daily gain ranging between 1-1.2 kg. The present study is part of a series of investigations conducted for verifying the effect of the difference in diets, and consequently, in their cost, on

carcass and meat quality of bulls bred in Italian countries (Bosticco et al., 1988).

Materials and Methods

32 Piemontese bulls of a live weight of 240-250 kg were divided into 4 groups and fed, individually, these diets: concentrate + 1) maize silage ad lib.; 2) maize silage limited; 3) grass hay ad lib.; 4) grass hay limited. The diets of the limited groups (2 and 4) were isoenergetic and isoproteic for a daily gain of 1 kg. The trial lasted 237, 250 days for groups 1-3 and 2-4 respectively until the slaughter weight of 480-500 kg.

During the trial observations were made on weight gains, on food intake and feed efficiency. During the trial two bulls were eliminated for chronic bloat. Slaughter measurements regarding dressing percentage and interiora weight were conducted on 6 subjects for group.

From the right side of all carcasses part of Longissimus dorsi muscle was taken (9th - 13th back vertebra) and used, as fresh, to make chemical, physical and sensory analysis. For the latter

TABLE 1. BULL PERFORMANCES

	Group				Mean square error
	1	2	3	4	
No. of bulls	7	8	7	8	—
Initial wt (kg)	238.9	244.5	253.7	244.4	299.1
Final wt (kg)	500.9	480.4	497.7	480.0	1144.4
Avg daily gain (g)	1101 ^b	944 ^a	1026 ^b	943 ^a	12478.0
Daily dry matter intake (kg)					
Forage	3.92	2.45	3.57	1.22	—
Concentrate	2.84	2.85	4.01	4.04	—
Energetic efficiency ^a	5.97 ^a	5.64 ^a	6.78 ^b	5.73 ^a	0.45
Feed efficiency ^b	6.16 ^A	5.66 ^A	7.53 ^B	5.64 ^A	0.50

A,B: $p < .01$; a,b: $p < .05$

^aU.F.V./kg gain

^bkg feed dry matter/kg gain

a panel of 7 judges evaluated the appearance of raw meat (as a general judgement of its colour, texture, lean and fat development); its tenderness (ease at sinking, friability, residue after chewing), its juiciness (initial and prolonged) and its overall acceptability after cooking at an inner temperature of 60°C.

Results and Discussion

Bull performances are summarized in table 1. The most relevant daily gains ($p < .05$) were found in groups 1 and 3 (g 1101 and g 1026) while the performances of groups 2 and 4 showed inferior results (g 944 and g 943).

The energetic efficiency was in favour of groups 2 and 4 (5.64 and 5.73) in comparison with group 1 (5.97) and group 3 (6.78), the latter resulting in values of significant superiority ($p < .05$). The

TABLE 2. CARCASS YIELD AND ORGAN AND VISCERAL WEIGHTS

	Group				Mean square error
	1	2	3	4	
Live wt (kg)	513.5	488.3	505.8	489.2	
Dressing percentage (hot) ¹	74.84	74.72	74.09	74.02	1.18
Dressing percentage (cold) ¹	73.16	72.87	72.38	72.30	1.18
Head (%)	4.85	4.82	4.91	5.07	0.03
Feet (%)	1.69	1.61	1.74	1.62	0.01
Hide (%)	6.47	6.27	6.40	6.94	0.20
Empty intestines (%)	1.47	1.47	1.72	1.64	0.04
Empty stomachs (%)	3.26	3.24	3.52	3.44	0.14

¹On the basis of net body weight

TABLE 3. CHEMICAL AND PALATABILITY CHARACTERISTICS OF MEAT

	Group				Mean square error
	1	2	3	4	
Moisture (%)	75.26	75.44	75.28	75.69	0.34
Protein (%)	22.34	21.92	22.16	21.56	0.30
Ether extract (%)	0.28	0.25	0.38	0.28	0.01
Weep losses (%)	2.40 ^a	2.00 ^a	2.31 ^a	3.29 ^b	0.37
Cooking losses (%)	28.21	28.74	27.92	29.01	3.03
Warner-Bratzler shear force (kg)	6.62	8.43	6.93	7.40	4.12
Loin eye area (cm ²)	99.23 ^{ab}	110.82 ^a	91.23 ^b	99.58 ^{ab}	100.21
Appearance ^a	6.48 ^a	6.78 ^b	5.91 ^b	6.96 ^a	1.26
Tenderness:					
ease of sinking	7.25 ^a	6.58 ^b	7.23 ^a	7.19 ^a	0.77
friability	7.19 ^a	6.31 ^b	7.28 ^a	7.05 ^a	0.91
residue after chewing	6.73 ^a	5.83 ^b	6.99 ^a	6.70 ^a	1.04
Juiciness ^a					
initial	6.96 ^a	6.18 ^b	6.89 ^a	6.98 ^a	0.77
prolonged	6.91 ^a	6.07 ^b	6.98 ^a	6.73 ^a	0.88
Overall acceptability ^a	7.07 ^a	6.36 ^b	7.25 ^a	6.86 ^a	0.81

^{a,b} $p < .05$

^a8-point scale: 1 extremely undesirable; 8 extremely desirable

same trend was observed in the feed efficiency of dry matter with a higher value ($p < .01$) for the group fed with hay ad lib. (7.53) than for the other groups.

The slaughter data reported in table 2 show that only slight statistically unimportant differences exist among the various parameters. This means that the different feeding systems did not show a relevant influence on dressing percentage and weight of organs and viscera.

In table 3 results of chemical, physical and sensory analysis are reported. Treatment did not produce any difference of statistical importance in the chemical composition, characterized by a low percentage in ether extract (from .25 to .38%) which is typical of the Piemontese breed (Bosticco et al., 1988). The weep losses resulted to be higher ($p < .05$) for group 4, which also seemed to be subjected to higher cooking losses. Shear force did not appear to be different among the groups; generally, however, the groups limited (2 and 4) and particularly the maize silage one, seem to suffer from a higher resistance to shearing. The loin eye area resulted smaller in group 3; this difference appeared statistically significant in comparison with group 2, where a wider area was observed. The appearance resulted in a lower value in group 3 ($p < .05$) mainly for its less favourable situation of the texture.

The results of sensory analysis for tenderness,

juiciness, overall acceptability were significantly inferior in group 2 in comparison with the other groups. Group 2 showed the highest shear force value, which is a tenderness-related characteristics. Besides, in group 2 a lower value in ether extract was reported. This would be related to the scarce results found for juiciness.

Ultimately the results of trial show that the bulls fed ad lib. gave meat of better quality. The most favourable productive costs – taking into account the qualitative value of carcasses and meat – were expressed by the subjects fed maize silage ad lib.

Apart from the differences found among the treatments, the sensory evaluation shows a remarkable degree of acceptability, which is typical of Piemontese breed (Bosticco et al., 1988).

(Key Words: Piemontese Bulls, Feeding, Palatability)

Literature Cited

- Bosticco, A., M.T. Barge, G. Benatti, G. Deste-fanis, C. Lazzaroni, E. Tartari and I. Zoccarato. 1988. La qualita' della carne e le sue variazioni in funzione delle razze di appartenenza dei soggetti allevati. Suppl. N. 7 a "Quaderno Agricolo", Federagrario, Torino, pp.73-145.