MEAT QUALITY OF HEIFERS FINISHED WITH CONCENTRATE RICH ON CORN GLUTEN FEED AND CASSAVA FLOUR

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SUMMARY

The employ of cassava flour and corn gluten feed for reducing the concentrate cost on beef finishing diets it is a goal for the feed manufacturing industry, however meat quality could be modified.

The aim of this work was to study the influence of replacing maize by cassava flour, corn gluten feed and others products on concentrate for finishing heifers and to value the effect on performance and meat quality. Eighteen Charolais x Montbeliard heifers were fed, from 160 to 400 kg, to one of three concentrates: 1) comprising 75% cereal; 2) containing 62% cereal and 15% corn gluten feed; or 3) with 38% cereal, 25% corn gluten feed and 9% cassava flour.

Type of concentrate had no effect on conformation and fatness grade of carcasses or on 10th rib composition. Muscle pH at 24 hours was not significantly different between treatments neither expressed juice, cooking loss, shear value, palatability traits nor subcutaneous fat colour between groups. The meat colour of heifers fed concentrate rich on cereals showed a slightly lower lightness, however this difference was small and probably without any commercial significance.

Results suggested that the partial replacement of cereal by cassava flour and corn gluten feed on concentrate for beef finishing diets did not affect the carcass grade or the meat quality.

INTRODUCTION

Cereals are wide used on concentrates for beef cattle in Spain, corn gluten feed is an usual ingredient too. Recently the employ of cassava, also called tapioca, flour for reducing the concentrate cost on beef finishing diets is a goal for the feed manufacturing industry. However, few information is available regarding the meat quality obtained with finishing feedlot cattle.

The objective of this work was to study the influence of replacing maize by cassava flour and others products on concentrate for finishing heifers and to value the effect on performance and meat quality.

MATERIAL AND METHODS

Eighteen Charolais x Montbeliard crossbred heifers, approximately 6 old and an average initial weight of 162 kg were randomly allotted to 3 lots and fed ad libitum on concentrates.

Treatments were three concentrates: 1) comprising 75% cereal; 2) containing 62% cereal and 15% corn gluten feed; or 3) with 38% cereal, 25% corn gluten feed and 9% cassava flour. Composition of concentrates are shown in Table 1. The intake was controlled by lot. The three heavy animals of each lot were slaughtered on one day (1) and the rest of animals a week later (2). After slaughter, carcasses weight were recorded, and carcasses were scored for conformation according to the European Communities Beef Carcass Classification Schemes EUROP grid for conformation (1= poorest, 15=best) and subcutaneous fat cover (1=leanest 15=fattest) (Anonymous, 1981).

The kidney and channel fat and the 8-9-10th ribs were removed from carcasses at 24h and then the pH of muscle Longissimus dorsi was measured with a penetration pH-meter. Colour was measured on a photocolorimeter at 24 h on subcutaneous fat and at 48 h on the M. Longissimus dorsi, results were expressed as lightness (L^*) redness (a^*) and yellowness (b^*) in the CIELAB 1976 uniform colour space (Wyszecki and Stiles, 1967). At 7th day, water holding capacity (W.H.C.) was measured on 5 g of muscle using the filter paper method. Samples of M. Longissimus dorsi for Warner-Bratzler shear force determination were boiled on water

bath at 70°C for 45 minutes. Subsequently, boiled juice loss was evaluated. Ten prismatic bars were removed from each sample in the direction of the muscle fibres and the average of shear fibre values was reported. After aging 7 days at 4°C the 8-9 M. Longissimus dorsi ribs were cut into 2.5 cm steaks and frozen for subsequent taste panel evaluation. Afterwards, the steaks were thawed at 4°C for 24 h prior to cooking and serving. One steak per diet evaluated at the same time were placed in a preheated grill at 160°C and removed when internal temperature was 55°C. Muscle strips were served on preheated plates to eight trained taste panel members. The panel sampled for tenderness, juiciness and flavour. The rating scale was 100 = extremely tender, extremely juicy, intense beef flavour and 1= extremely tough, extremely dry, tasteless.

Data were subjected to analyses of variance with a model that contained treatment and slaughter date, except for intake, efficiency and panel scores, as main effects together with the interaction term, and the Duncan test was used to separate means.

RESULTS AND DISCUSSION

The influence of composition of concentrates fed to heifers on growth rate, carcass weight, dressing percentage, and feed intake are presented in Table 2. Slaughter weight, growth rate and carcass weight of all groups of heifers were similar ($P>0.10$). Feed intake and efficiency did not differ between treatment groups. However, the efficiency of concentrate 1, with 5.37 was lower than that observed when concentrate 2 and 3 were fed with 4.90 and 5.07, respectively. In relation with efficiency, Zinn and DePeters (1991) found that feed/gain increased linearly with cassava pellets substitution on a finishing diet for feeding steers.

Dressing percentage of heifers fed with concentrate 3 (57.3%) reflected a tendency ($P>0.10$) to increase in relation to heifers fed with the rest of concentrates which had an average of 55.5%. Also, longissimus muscle area and the muscle/bone ratio tend toward greater values for animals fed with concentrate 3. Quality grades of carcasses were similar on conformation score (R+) and fattening score (3) though kidney and pelvic fat tend to increase on heifers fed with concentrate 3.

Heifers firstly slaughtered were heavier ($P<0.01$) with heavier carcass weight (229.1 kg v. 218.2 kg, $P<0.05$) and gained faster (1.44 kg/d, v. 1.32 kg/d, $P<0.05$), with lower kidney and pelvic fat ($P<0.05$) and higher conformation score ($P<0.01$) than heifers slaughtered one week later. Tough, firstly slaughtered tended to a high fattening score and low muscle/bone ratio, the dressing percentage and rib eye area were similar.

The effect of concentrate on pH of muscle samples at 24 h was not significant (Table 3). The pH values were normal with a mean value of 5.48 for concentrate 1, 5.45 for concentrate 2 and 5.40 for concentrate 3. Neither subcutaneous fat colour was affected by treatment. Muscle colour of heifers fed with concentrate 3 was intermediate between the slightly lower lightness (L* value) ($P<0.05$) of meat of heifers fed with concentrate 1 and the slightly high lightness of meat of heifers fed with concentrate 2. However these differences were relatively minor and unlikely to be any commercial significance, confirmed by similar redness and yellowness values.

No significant difference was found across treatments studied in almost all measures of muscle quality, neither W.H.C., cooking loss nor shear force ($P>0.10$).

Meat flavour was reduced ($P<0.05$) when the cassava flour was introduced on the concentrate and tenderness and juiciness tend to decrease when maize level was reduced. These small palatability differences between treatments could be attributed to a low fat/bone ratio at 10th rib corresponding to a slightly high muscle/bone ratio of heifers fed with concentrate 3.

Heifers slaughtered on second day had higher pH 24 h ($P<0.05$), lower muscle lightness and yellowness ($P<0.01$), lower fat redness ($P<0.01$) and lower shear force ($P<0.01$) than heifers firstly slaughtered. In this experiment, the slaughter day had influenced more the meat quality traits than the different composition of concentrates eaten by the heifers.

No interactions were found between concentrate x slaughter day for any parameter studied.

Meat quality of beef is a result from a wide range of factors. The pH 24 h is negatively correlated with WHC, muscle colour and toughness of meat (Sañudo et al., 1993). In this study small or a lack of variation on final meat quality was expected, because of the no effect of concentrate on ultimate pH besides of the no variation among animals due to breed, sex o maturity. Moreover, if the fattening carcass score, rib composition and fatty acids composition had not differences between lots either, these lead to a small and without any commercial difference on meat quality traits.

CONCLUSION

Results suggested that the substitution of maize by corn gluten feed and 10% of cassava flour on concentrates for fattening heifers did not change the rate of gain, the intake, efficiency of concentrate, the carcass characteristics nor the meat quality.

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