INFLUENCE OF FATTENING TECHNOLOGY ON CARCASS AND MEAT QUALITY IN YOUNG BULLS

Cepin, S., Biotechnical faculty, Zootechnical Department, Ljubljana, Yugoslavia

SUMMARY

Two different fattening technologies of Simmental bulls and their influence on carcass and meat quality were investigated in the research. The technologies differed in nutrition intensity. The first group of bulls was very intensively fattened on large socially owned farm (over 2,000 head), while the second group of bulls had less intensive nutrition and was raised on smaller privately owned farms (10-40 head). Bulls of the first group with very intensive fattening technology were finished at much lower final weight (462 kg) while the bulls from second group with less intensive fattening were finished at higher final weight (493 kg). The differences were highly significant ($P < 0.001$). Dressing percentage and carcass quality were significantly better in the first group, but meat colour was contrary to expectations darker and pH value higher. It has been concluded that apart from genetic and environmental factors intensive fattening technologies may influence the sensibility to stress in animals.

INTRODUCTION

Carcass and meat quality is getting more and more important regarding economical beef production especially in the countries like Yugoslavia, where we are to a great extend orientated to export of beef on West European market with high quality demand.

Carcass and meat quality depends on numerous genetic and environmental factors, both the main aim of the present paper is the study of intensive nutrition on carcass quality, with special emphasis to the colour of meat, thus being a very strong criterion especially on Italian market where most of our beef is exported. Although dark, firm and dry meat (DFD) in beef is not such a problem as PSE in pork, the problem with DFD meat in modern breeds with high capacity of weight gain and intensive fattening technologies stays and is even getting more frequent. There are a number of research workers (Augustini 1981; Hedrick 1981; Kallweit et al. 1981 et al.) claiming that unsatisfactory dealing with animals before slaughter is the main reason for stress and therefore dark meat, there are a some researchers (Fischer 1981; Tarrant 1981) point to climate and nutrition as a potential reason for dark cutting beef.

I got the claim for this research project from the slaughtering and meat processing industry which is concerned about the frequent problem of dark meat, noticed especially in very intensive fattening technology. The aim of this research is to determine intensive nutrition influence on dark cutting beef and to investigate the question of feedstuff and its influence on meat colour.

MATERIALS AND METHODS

Seventy-four bulls of Simmental breed were included in the experiment with two different fattening technologies. The first group (38 bulls) was fattened on a large feedlot (over 2,000 head) on socially owned farm, where they had extremely intensive nutrition. They were fed concentrate and roughage (maize silage) ad libitum. The average daily gains of live weight were high, between 1,100 and 1,200 g per day. The second group (36 bulls) was raised on a few smaller privately owned farms from the same place but with much less intensive nutrition. They were given only 2 kg of concentrate per day and they were fed with roughage ad libitum. The average weight gains for live weight were between 900 and 1,000 g per day.

The animals were slaughtered in July 1987 at the average daily temperature of 25°C in the slaughter house 300 km away from the place of raising.

After 24 hours of cooling carcasses were evaluated with subjective method, getting 10 to 50 points, pH was measured with portable pH meter, and colour determined by göfo apparatus. The research results were processed with variance analysis.

RESULTS AND DISCUSSION

Slaughter results are shown in Table 1. The first group of bulls with intensive fattening were approximately 410 days old at slaughter and weighing 462 kg. The bulls from the second group with less intensive nutrition were slaughtered at an age of approximately 490 days, weighing 493 kg. The differences in final weight are therefore highly significant ($P < 0.001$). The differences in weights of warm halves are somehow lower, but still highly significant. Dressing percentage calculated on the basis of warm halves weights was significantly higher in the first intensively fed group, which was expected. The same is true for grading of carcasses on slaughter line, thus being significantly higher in the first group, while the colour of meat spectrophotometrically measured (göfo) and the pH value were contrary to expectations.

Normal light red colour of meat of young cattle appears up to Göfo value 88, above that value meat appears darker. In the case of our first group, meat colour and pH value are both close to the level, distinctive for dark cutting beef. With the second group meat colour and pH

Table: Slaughter data and carcass quality

	Group I		Group II		F-ratio
	$\bar{x}$ n=38	SD	$\bar{x}$ n=36	SD	
Weight of animals at slaughter house (kg)	462,21	16,65	493,41	19,32	55,55**
Weight of warm halves (kg)	273,02	12,88	286,59	15,23	16,94**
Dressing percentage of warm halves (%)	59,05	0,84	58,06	1,13	18,40**
Grading carcass quality (10-50 points)	44,00	3,15	42,16	3,47	5,65*
Color of meat (göfo)	87,68	3,63	85,72	1,92	8,27**
pH after 24 hours	5,74	0,31	5,54	0,19	10,68**

* $P \leq 0,05$

** $P \leq 0,01$

value are normal; the differences between both groups are highly significant ($P < 0.01$).

Although the majority of research workers point to three main factors causing stress in animals before slaughter (inappropriate keeping, mismanagement and mixing of animals from different groups and unsuitable transport, there are others (Fischer 1981; Tarrant 1981) who claim that nutrition and climate are contributing factors for stress and therefore DFD meat. In our case the animals of both groups were treated in the same manner before slaughter, they had the same kind of transport - lasting 4 to 5 hours, and they were slaughtered immediately after arrival at the slaughter house. High summer temperature (22-28°C) during transport could be one of the factors causing stress incidence, which definitely increases stress occurrence in the case of pigs. According to Fischer (1981) the temperature, unless extremely high, does not present significant influence in cattle.

Taking into consideration that other factors influencing the colour of meat and pH were eliminated, the only remaining significant difference between the two groups was different fattening technology. The first group of bulls was raised on large socially owned farm (over 2,000 head), very intensively fed while the second group was raised on smaller, privately owned farms (10-40 head). The second group was finished at higher weight because of less intensive feeding, the animals were calm, accustomed to people and therefore less susceptible to stress situation in the preslaughter period. This conclusion opens up a necessity for further and thorough research work regarding the study of fattening technologies and stress incidence in animals.

CONCLUSION

The study of two different intensive fattening technologies in Simmental bulls and their influence on carcass and meat properties gave the following results:

- Intensively fattened bulls of the first group were finished at significantly lower final weight, they had significantly higher dressing percentage and grading;

- To the contrary the colour of meat in the first group was significantly darker and pH value was higher. There were 26 % of DFD meat in carcasses of the first group, while only 11 % in the second one;

- Apart from genetic and numerous environmental factors intensive fattening technologies appear as a frequent factor causing stress incidence and DFD meat in cattle also.

REFERENCES

Augustini, Chr. (1981). The Problem of Dark-cutting in Beef p.379.

Cepin, S. (1980). Influence of Food Intensity on Fattening and carcass results in Cattle. PhD Thesis.

Cepin, S. et al. (1986). Proceedings 32rd International Congress of Meat Science and Technology p.127.

Fisher, K. (1981). The Problem of Dark-cutting in Beef p 387.

Hedrick, H.B. (1981). The Problem of Dark-cutting in Beef p.213.

Kallweit, E. et al. (1981). The Problem of Dark-cutting in Beef p.404.

Puolanne, E. and Aalto, H. (1981). The Problem of Dark-cutting in Beef p.463.

Tarrant, P.V. (1981). The Problem of Dark-cutting in Beef p.3.