TIME FROM LAST FEED TO SLAUGHTER IN RELATION TO SKATOLE LEVEL OF ENTIRE MALE PIGS

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SUMMARY

The aim of this work was to find out whether the length of time from last feed to slaughter had an effect on the skatole level in backfat and meat quality of entire male pig carcasses. The experimental material consisted of 300 entire male pigs supplied from three farms. The farms were selected according to the average skatole content in their previous deliveries. Each farm was represented in each of the three groups: low, medium and high skatole level. All pigs were fed ad libitum. Group 1 male pigs were last fed the evening before delivery, Group 2 had access to feed until dispatch to the slaughterhouse. Group 1 had a significantly lower skatole content in the backfat than Group 2. The average skatole content in male pigs was [illegible]2 ppm for Group 1 and 0.15 ppm for Group 2. The effect of time from last feeding before slaughter was highest in pigs delivered from the farm with the highest average skatole content. There was no effect of time of last feed on the slaughter weight, meat content or meat quality (pH_1, rigor, probe values or skin damage).

INTRODUCTION

The use of entire male pigs for meat production has now been introduced in Denmark and is expected to increase rapidly from 1992 to 1993. In Denmark all entire male pigs are analysed for skatole. The method is adapted to a fully automated system in which 150–180 samples per hour can be analysed (Mortensen and Sørensen, 1984). Entire male pigs containing more than 0.25 ppm skatole in the backfat are sorted out as boars. Installation of the fully automated system in all Danish slaughterhouses is expected to be completed by Autumn 1993.

The main problem is boar taint in about 5% of the entire male pigs. The main contributing component to boar taint has for a long time been considered to be androstenone (Bonneau, 1991), but skatole has also been demonstrated in tainted boar fat (Mortensen et al., 1986). Walstra et al. (1986) and Lundström et al. (1988) found skatole to be a better predictor for boar taint than androstenone.

There are large variations in skatole level between farms that deliver male pigs to the slaughterhouse. For farms with a high percentage of pigs with skatole >0.25 ppm lowering the skatole level is economically important, because the farmers are punished economically if they have too many male pigs with skatole >0.25 ppm. It has previously been indicated, that some of the variation in skatole level between farms is caused by the treatment up to and during the dispatch (Sørensen et al. 1985). Later investigations showed that transportation time varying from 30 minutes to 4 hours and the lairage period at the slaughterhouse varying from 1 to 20 hours did not influence the skatole level in male pigs (Maribo, 1990 and 1991). The quality of meat from boars is also influenced by the treatment before slaughter. Fighting is more frequent when boars are lairaged for a long period, and this affects the incidence of skin damage and frequency of DFD meat. Previous work has shown that mixing boars from different pens and farms and lairage for 24 hours before slaughter lead to a significantly higher frequency of skin damage and DFD meat (Warriss & Brown, 1985, Moss & Trimble, 1988, Maribo 1990, 1991). It has also been shown that frequency of DFD meat is higher when pigs have fasted for a long period (Rasmussen et al. 1987). Danish work has shown that there are no difference in DFD frequency between uncastrated males, gilts or barrows as long as they are treated equal before slaughter (Barton–Gade 1987, 1990).

The purpose of this work was to investigate whether the period from last feed until slaughter influences the skatole level and meat quality in carcasses from entire male pigs.

MATERIALS AND METHODS

The experimental material consisted of male pigs delivered from 3 farms. The farms had been selected according to the average skatole content in their previous deliveries. Each farm was represented in each of the three groups: low, medium and high skatole level. All pigs were fed ad libitum. At the farms the male pigs were divided in to two groups. Group 1 was last fed the evening before delivery to the slaughterhouse, whereas Group 2 had access to feed until dispatch to the slaughterhouse. Time of fasting for Group 1 pigs was approx. 16 hours. All male pigs were lairaged for about 1 hour before slaughter in separate pens according to the farm from which they had been delivered. 45 mins. after slaughter pH_1 was measured in longissimus dorsi and biceps femoris, and skin damage was evaluated using a 4 point scale (1 = none, 2 = slight, 3 = moderate, 4 = severe). Rigor was measured in the foreleg subjectively using a 4 point scale: 1 = relaxed, 4 = complete rigor, as well as objectively using a rigormeter (Sybesma, 1966). Fat samples were taken for analysis of the skatole content. The samples were analysed using the fully automated system. The skatole results are an average of 3 analyses from each male pig. The meat content and slaughter weight were noted. The day of slaughter pH_2 values were measured in semispinalis capitis, longissimus dorsi and biceps femoris. Probe values were also measured longissimus dorsi and biceps femoris using the MQM-equipment (Barton-Gade & Olsen, 1984, Borggaard 1989).

All calculations were performed using the Statistical Analysing System (SAS Institute Inc., 1985). The effect of farm and treatment were tested using the following model:

$$Y_{ijk} = \mu + L_i + N_j + LN_{ij} + L_iK_j$$

Where Y_{ijk} = the i,j,k observation; μ = general mean L_i = effect of the i'th group N_j = effect of the J'th farm, LN_{ij} = interaction between group farm and L_iK_j = residual effect.

RESULTS AND DISCUSSION

The results of the analysis of variance is shown in Tables 1, 2 and 3. Table 4 shows the frequency of quality defects. A significant interaction between farm and group was found with respect to skatole content, slaughter weight and pH_1 in biceps femoris.

Skatole

The two experimental groups were significantly different with respect to skatole. Skatole content was lowest in the group that was last fed evening before slaughter. The average skatole content for the two groups was 0,12 ppm and 0,15 ppm for group 1 and 2 respectively. There was a significant interaction beween farm and feed group, the farm with the highest average skatole content showing the greatest effect of time of feeding (See Table 2). There was also a significant difference between the skatole level of the farms. Average for farms 1, 2 and 3 was 0.08 ppm, 0.12 ppm and 0.23 ppm respectively.

Meat Quality

Meat quality was not affected by time of last feed to slaughter. Slaughter weight was different with Group 1 being 0.8 kg lower than that of Group 2. This result is primarily caused by one of the farms in the group. The difference cannot be explained by differences in treatment, but could be an effect of different live weight, which was not registered. The incidence of skin damage that depreciates the quality of the carcasses were shoulder, middle and ham 15.3%, 2.9% and 2.5% respectively. The incidence of DFD did not differ between the two groups. The low incidence of skin damage and DFD in both groups shows that the male pigs have not fought and were not exhausted at the time of slaughter despite the hours of fast. Previous work has shown that the frequency of high ultimate pH is found to be higher in carcasses showing greatest skin damage (Warriss and Brown, 1985). The low incidence of skin damage and DFD frequency is probably due to the transportation and lairage where the pigs were held separate according to farm. The incidence of low pH_1 values was very low 1.1% in longissimus dorsi, 0 in semimembranosus 2.4% in biceps femoris. Intramuscular fat in longissimus dorsi and biceps femoris was 1.25 and 1.66% and had not been affected by the treatment as expected. PSE incidence as measured by MQM-equipment varied from 0 for l. dorsi to 2.0% in biceps femoris.

CONCLUSION

The skatole content in carcasses was affected by the length of period from last feed until slaughter. The skatole content was lowest in male pigs that had fasted for 16 hours compared to feeding until dispatch. There was a considerable difference between skatole content in carcasses of male pigs delivered from different farms. The effect of treatment was affected by the farm's skatole level. Farms with high skatole average had a larger effect of omitting feeding on day of dispatch to slaughterhouse.

Meat quality was not affected by the period from last feeding to slaughter. There was a very low incidence of DFD and skin damage.

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Table 1 – Average Skatole Content i Carcasses in relation to Feed Group and Farm.

Average values with different superscripts were significantly different.

*** = p <0.001, ** = p <0.01, * = p <0.05

	Group		Farm			Significance		
	1	2	1	2	3	Group	Farm	Group x Farm
Number of male pigs	148	165	121	105	87	–	–	–
Average skatole	0.12^a	0.15^b	0.08^a	0.12^b	0.23^c	**	***	**
% > 0.25 ppm	6.8	11.7	0	2.9	29.9	–	–	–

Table 2 – Interaction between Skatole content anf Feed Group/Farm

Farm	1		2		3	
Group	1	2	1	2	1	2
Number of Male Pigs	62	59	42	61	44	43
Average Skatole	0.09	0.08	0.09	0.14	0.20	0.26

Table 3 – Quality in relation to Group and Farm

Average values with different superscripts were significantly different.

*** = p <0.001, ** = p <0.01, * = p <0.05

	Group		Farm			Significance		
	1	2	1	2	3	Group	Farm	Group x Farm
Number of male pigs	148	165	121	105	87	–	–	–
Slaughter weight (Kg)	70.4^a	71.2^b	72.3^a	69.5^b	70.6^c	*	***	***
Meat percentage	61.8	61.6	61.9	61.8	61.4	–	–	–
pH_1 in l.dorsi	6.47	6.48	6.45^a	6.56^b	6.40^a	–	**	–
pH_1 in biceps femoris	6.46	6.25	6.48^{ab}	6.58^{ab}	6.42^a	–	**	**
Rigor objective	3.82	4.33	4.18	4.00	4.13	–	–	–
Skin damage shoulder	1.94	1.91	1.85	1.90	2.05	–	–	–
Skin damage middle	1.46	1.45	1.39	1.50	1.49	–	–	–
Skin damage ham	1.20	1.18	1.18	1.22	1.18	–	–	–
Rigor subjective	1,72	1.81	1.75	1.68	1.91	–	–	–

Table 4 - Quality Variation in relation to Group and Total

		Group 1	Group 2	Total
Semispinalis Capitis	pH_2 >6.50	3.2	2.1	2.8
L. dorsi	pH_2 >6.10	0.8	0.0	0.4
Semimembranosus	pH_2 >6.10	3.4	1.4	2.0
L.dorsi	pH <5.9	1.1	0.0	0.5
Semimembranosus	pH >5.9	0.0	0.0	0.0
Probe L.dorsi	> 80	0.0	0.0	0.0
Probe S.membranosus	> 85	0.0	0.9	0.5
Probe Biceps femoris	> 90	2.4	1.9	2.0