

PRELIMINARY OBSERVATIONS ON THE BEHAVIOUR AND MEAT QUALITY OF FREE RANGE PIGS

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INTRODUCTION

Consumers are becoming more and more critical and some are beginning to demand that the meat they buy comes from animals that have been reared under conditions that they consider "acceptable". This is a difficult area as such demands are often emotionally based and differ from one consumer group to another. Moreover, consumers who are willing to pay a premium for such meat only cover at most 5-10% of the market. In spite of this many different types of "alternative" productions are being considered in Denmark to cater for these market segments. One of these productions is free range pigs.

This paper describes some preliminary observations on the behaviour of free range pigs at the abattoir and their meat quality after slaughter. The work was carried out to give an indication of the factors to be taken into account in future comparative experiments with "organic" pigs.

MATERIALS AND METHOD

The free range pigs were supplied on three separate occasions in November 1988. Each week a similar number of pigs raised under moderately intensive conditions at the same farm were randomly chosen. No attempt was made to make the experimental groups genetically identical. The experimental conditions during fattening are shown in Table 1.

Pigs had access to feed up until collection for the first week; for the final two weeks the last feed occurred the evening before.

Table 1. Production conditions

	Free range	Indoor
No. of pigs	86	86
Breed	DH-YL/H-YL*	DH-YL/H-YL*
Floor space	25 m ² /pig outdoors 0.5 m ² /pig lying area (hut)	0.65 m ² /pig concrete flooring, slats in dunging area
Water system	drinking nipples	drinking nipples
Feeding	Ad libitum dry feeding	ad libitum wet feeding up to 50 kg, then 2.8 feed units/day until slaughter
Live wt. slaughter	Average 93 kg	Average 100 kg

* D=Duroc, H=Hampshire, Y=Large White, L=Landrace.

Both groups of pigs were transported (separately) on the same lorry for approximately 1 hr and they were kept separately from each other in the lairage. Behaviour was observed in both groups both in the lairage and on passage to the CO₂-stunning chamber.

Pigs were slaughtered at abattoir 1 during the first two weeks of the experiment. Holding time was about 1 hr for week 1, but because of lack of pigs at the factory the experimental pigs were slaughtered immediately on arrival for week 2. Slaughter speed was 50-55 pigs per hour and chilling was mild. In week 3 pigs were slaughtered in abattoir 2 after a holding period of 2 hrs. The slaughter speed was 255 per hour and chilling effective. Both factories used CO₂-stunning in the compact equipment.

All pigs were investigated for probe values in biceps femoris and longissimus dorsi the day after slaughter (Barton Gade & Olsen, 1987) and pH₂-values in these two muscles and semispinalis capitis. These measurements were supplemented with pH₁-values in biceps femoris, longissimus dorsi and semispinalis capitis in the last two weeks of the experiment.

RESULTS

BEHAVIOUR AT THE ABATTOIR

Free range pigs had a completely different pattern of behaviour at the abattoir. They were calm, did not show exploratory behaviour in the lairage and quickly lay down. Individual pigs showed aggressive behaviour, but this seldom led to fighting proper. Even at the entrance to the race, where problems perhaps could be expected in

pigs that have had open conditions during fattening, there were no problems. Free range pigs entered with no more difficulty than the pigs raised indoors.

The pigs raised indoors showed normal behaviour in the lairage. They actively explored the new area, some pigs fought aggressively and it took much longer for pigs to lie down than in the free range groups.

MEAT QUALITY

Because of the experimental set up with among other things different holding periods in the lairage for the 3 weeks of the experiment, it was only possible to compare the two experimental groups within any one week. The results are shown in Table 2.

Table 2. Average values for meat quality characteristics

Average values within any one week with different superscripts are significantly different (p at least <0.05 with a paired t-test)

Description	Week 1		Week 2		Week 3	
	Free range	Indoors	Free range	Indoors	Free range	Indoors
No. of pigs	15	15	29	28	42	40
pH ₁ - b. femoris	-	-	6.84	6.99	6.76	6.80
pH ₁ - l. dorsi	-	-	6.41	6.54	6.48	6.40
pH ₁ - s. capitis	-	-	6.02	6.19	-	-
Probe b. femoris	79.7	75.2	81.8	74.4	79.1 ^b	73.7 ^a
Probe l. dorsi	64.6	59.8	68.8 ^b	59.9 ^a	45.3	45.6
pH ₂ - b. femoris	5.58 ^a	5.65 ^b	5.78	5.83	5.50 ^a	5.62 ^b
pH ₂ - l. dorsi	5.63 ^a	5.73 ^b	5.74 ^a	5.83 ^b	5.65 ^a	5.74 ^b
pH ₂ - s. capitis	5.82 ^a	6.08 ^b	6.04 ^a	6.29 ^b	5.93 ^a	6.15 ^b

There was a general tendency to higher probe values in free range pigs for all 3 weeks of the experiment, but the differences were only significant for 1. dorsi (week 2) and biceps femoris (week 3):

	Difference free range - indoors		
	week 1	week 2	week 3
b. femoris	+4.5	+7.4	+5.4*
1. dorsi	+4.8	+8.9*	-0.3

On the other hand pH_2 -values with the exception of biceps femoris in week 2 were always lower in free range pigs:

	Difference free range - indoors		
	week 1	week 2	week 3
b. femoris	-0.07*	-0.05	-0.12*
1. dorsi	-0.10*	-0.09*	-0.09*
s. capitis	-0.26*	-0.25*	-0.22*

The incidence of PSE- & DFD-meat confirmed the above (Table 3). There was a slight tendency to more PSE-meat in free range pigs (most pronounced in week 2 where lairage times were short). However, free range pigs showed very little DFD-meat (0-10% depending on week as against 20-46% for pigs raised indoors).

Table 3. Incidence of low pH_1 -values, PSE- & DFD-meat

Low pH_1 : pH in biceps femoris and 1. dorsi <5.90
PSE: probe value in biceps femoris & 1. dorsi respectively ≥ 90 & ≥ 80
DFD: PH_2 in biceps femoris, 1. dorsi & semispinalis capitis respectively ≥ 5.90 , ≥ 5.90 & ≥ 6.30

Description	Week 1		Week 2		Week 3	
	Free range	Indoors	Free range	Indoors	Free range	Indoors
No. of pigs	15	15	29	28	42	40
Low pH_1 -b.femoris	-	-	3.4	0	2.3	0
Low pH_1 -1. dorsi	-	-	0	7.1	9.5	2.5
PSE-b. femoris	13.3	13.3	17.2	14.3	2.4	0
PSE-1. dorsi	0	0	10.3	0	0	0
PSE-pig	13.3	13.3	20.7	14.3	2.4	0
DFD - b. femoris	0	0	3.4	10.7	0	2.5
DFD - 1. dorsi	0	6.7	3.4	21.4	4.8	17.5
DFD - s. capitis	0	20.0	0	35.7	4.8	22.5
DFD - pig	0	20.0	3.4	46.4	9.5	30.0

DFD, when it did occur in free range pigs, was only moderate. It was much more pronounced in pigs raised indoors. The highest pH_2 -value measured was thus 6.37 in free range pigs as against 7.07 for pigs raised indoors.

Table 3 also shows that PSE was mainly a problem in biceps femoris. As very few pigs showed low pH_1 -values in this muscle, the higher PSE-frequency was not due to the pigs' heritable disposition. A closer examination of the reflectance profiles showed that PSE most often occurred towards the centre of the ham.

DISCUSSION & CONCLUSIONS

Even though this was a preliminary experiment, a number of interesting observations have been obtained, which should be taken into account in future work.

The most important result is that free range pigs show lower pH_2 -values and a much lower DFD-incidence, irrespective of lairage time, than pigs raised indoors under moderately intensive conditions. The reason for this lies undoubtedly in the better condition of the free range pigs (they are more used to exercise) as well as their calmer behaviour in the lairage, where they rested more quickly without severe fighting.

However, the fact that pigs have higher energy levels at slaughter is known to predispose to PSE in those pigs with a heritable disposition for PSE (Nielsen, 1981). Free range pigs did show a tendency in this direction, although it was not marked, probably because the crossbreeds used are known to have a low predisposition for PSE.

High energy reserves at slaughter seem to be especially unfavourable for ham muscles when chilling is mild (as at abattoir 1). The temperature at the centre of the ham will remain high, long enough for the critical pH-value for denaturation of proteins to be reached, even in hams with a slow pH-fall after slaughter. Slaughter at factory 2 (effective chilling), no feeding on the day of slaughter as well as a longer lairage time improved the situation - as expected - considerably.

Many of the Danish experiments carried out to improve pre-slaughter treatment from the point of view of welfare will lead to less exhaustion in animals, i.e. higher energy reserves at slaughter. Future work should take this fact into account, so that a better pre-slaughter treatment does not lead to a higher PSE-incidence.

REFERENCES

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