ORK QUALITY AND CUTTING YIELDS OF BREEDING PIGS IN FINLAND

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Background

In order to improve the meat quality of purebred Finnish Landrace and Yorkshire breeding pigs, pork quality was included in the breeding index with a significant weight (30 %) two years ago. Because crosses between Landrace and Yorkshire pigs are used for slaughter pigs, it is important to control the achieved developments both in purebred and slaughter pigs. The quality of breeding pigs determines the final quality of slaughter pigs. The transfer of quality factors between these two groups takes two to four years. Also, the quality of ham muscles has never been measured neither in breeding nor in slaughter pigs. Therefore, to achieve a uniform pink colour in ham muscles takes many years and needs continuous control.

Objectives

The objectives were to improve pork colour and to increase the ultimate meat pH value. Moreover, cutting yields of purebred pigs should remain on the same level as two years ago.

Methods

For two years, the Finnish Meat Research Institute has been cutting and measuring the meat quality of 200 breeding pigs according to a commercial meat-cutting pattern in a random test. At the same time, about 2,000 samples of the *semimembranosus* (SM) muscle have been evaluated for colour and ultimate pH value in two commercial cutting rooms. The used cutting pattern is described by Swatland 2000. First, a half pig carcass is separated into six primal cuts: head, forequarter, back, side, ham and the *psoas* muscle. After that, the head is subdivided into skin, bones and fatty trimmings; the forequarter is subdivided into anterior back cut, boneless shoulder, fatty trimmings, foreshank meat, skin, subcutaneous fat and bones; the back is subdivided into the *longissimus dorsi* (LD) muscle, subcutaneous fat, fatty trimmings, skin and bones; the side is subdivided into barbecue flank, postero-ventral abdominal cut, fatty trimmings, skin and bones, and the ham is subdivided into roasting joint, corner joint (the *gluteus medius* m.), inside joint (the *semimembranosus* m., SM), outside joint (the *semitendinosus* m.), hindshank meat, subcutaneous fat, fatty trimmings, skin and bones.

Meat cuts were classified into four categories according to their commercial value: most valuable cuts (the *psoas* and LD muscles, roasting, outside, corner and inside joints), valuable cuts (anterior back cut, boneless shoulder, barbecue flank and shank meat), less valuable cuts (subcutaneous fat, fatty trimmings and postero-ventral abdominal cut) and almost valueless cuts (bones and skins). The yields of these cuts were calculated as percentages of the half carcass weight without head.

Pork quality was analysed by colour (Minolta CR 200 L*, a* and b* values) and by pH value measurements in the caudal and medial part of the SM in all pigs, whereas quality of the LD muscle was measured only in breeding pigs during cutting (from one to six days post mortem).

Results and discussion

Results showed that prolongation of the time between slaughter and cutting from one to three days resulted in lighter pork colour. In order to maximise this paling effect of time, the majority of the purebred pigs were cut three or more days after slaughter. On the other hand, in commercial cutting rooms, almost 80 % of pigs were cut one day after slaughter.

In 2001, it was found that breeding pigs had a significantly higher pH value (0.06 pH units) in the caudal part of the SM muscle compared to a year earlier ($P<0.001$). Yet, the meat was as pale as before, the respective mean L* values were 61.6 and 61.9 in 2000 and 2001. Furthermore, results showed that the mean pH and colour values in the caudal part of the SM muscle of slaughter pigs did not change from 2000 to 2001.

Table 1 shows that in breeding pigs, the medial part of the SM muscle had better pH and colour values than the caudal part. In addition, breeding pigs had a lower mean pH value but a better colour (L* value) in the LD muscle than in the SM muscle. Slaughter pigs had lower pH values in the SM muscle than breeding pigs, but better L* values in the caudal part of the SM muscle than breeding pigs.

There were no significant differences in average carcass weight or lean meat content of the cut breeding pigs in 2000 and 2001 (74.7 ± 4.4 kg and 74.1 ± 5.1 kg; 59.9 ± 2.0 % and 60.2 ± 1.9 %). Thus, the yields of both years were comparable. Table 2 shows that the amount of the most valuable cuts increased a little (not significantly) while, however, the proportion of the *psoas* muscle decreased, but that of the LD muscle was constant, whereas the yields of corner and outside joints increased significantly ($P<0.001$).

Furthermore, the yield of valuable cuts decreased significantly from 2000 to 2001 ($P<0.001$) while the amount of anterior back cut, boneless shoulder, barbecue flank and shank meat diminished.

The amount of less valuable cuts remained unchanged from 2000 to 2001 but the proportion of subcutaneous fat decreased significantly ($P<0.001$), whereas the proportion of fatty trimmings increased significantly ($P<0.001$).

In 2001, the yield of almost valueless cuts was significantly higher than in 2000 ($P<0.001$).

Conclusions

These results indicate that it is possible to achieve some quick improvement in pork quality by breeding. But in the longer term, new measurements must be included due to the low inheritability of meat quality. The overall results of meat cuts, however, show that there were significant changes in the yields of valuable and almost valueless cuts. This has an effect on the commercial value of pig carcasses.

Pertinent literature

H.J. Swatland, 2000. Meat Cuts and Muscle Foods, Nottingham University Press, Nottingham, United Kingdom, pp 68 – 69.
P.D. Warris, 1996. Instrumental measurement of colour, ECCEAMST, Utrecht, The Netherlands, pp 221 – 232.
NPPC Official Color and Marbling Standards, The U.S. National Pork Producers Council 1999.

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Table 1. Mean pH and colour values in pork during cutting in 2001. SM, the *semimembranosus* muscle; LD, the *longissimus dorsi* muscle.

Location of measurement	Breeding pigs		Slaughter pigs	
	Mean ± std dev	Median	Mean ± std dev	Median
pH of caudal part of the SM	5.59 ± 0.11	5.57	5.48 ± 0.11	5.47
pH of medial part of the SM	5.69 ± 0.12	5.69	5.59 ± 0.14	5.55
pH of posterior part of the LD	5.52 ± 0.13	5.47	-	-
L* of caudal part of the SM	61.9 ± 3.7	62.0	58.5 ± 3.7	58.9
a* of caudal part of the SM	6.4 ± 1.4	6.4	7.2 ± 1.9	7.1
b* of caudal part of the SM	5.3 ± 1.1	5.5	5.6 ± 1.5	5.6
L* of medial part of the SM	55.1 ± 5.2	55.7	55.8 ± 4.7	55.9
a* of medial part of the SM	10.2 ± 3.3	10.3	11.5 ± 2.7	11.4
b* of medial part of the SM	4.0 ± 2.5	4.0	5.6 ± 2.4	5.5
L* of posterior part of the LD	54.7 ± 3.4	55.0	-	-
a* of posterior part of the LD	7.0 ± 1.1	7.0	-	-
b* of posterior part of the LD	3.6 ± 1.2	3.5	-	-
n	100	100	1023	1023

Table 2. Yield of retail cuts of breeding pigs in 2000 and 2001.

Classification of retail cuts	Year	Yield of retail cuts. %			
		Mean ± std dev	Min	Median	Max
Most valuable cuts	2000	25.2 ± 1.6	20.7	25.2	28.4
	2001	25.6 ± 1.5	22.3	25.8	30.2
Valuable cuts	2000	25.3 ± 1.0^{A}	22.4	25.4	27.8
	2001	23.5 ± 0.9^{B}	21.5	23.4	26.0
Less valuable cuts	2000	25.2 ± 2.2	20.1	25.2	30.4
	2001	24.9 ± 2.3	20.1	24.9	32.3
Almost valueless cuts	2000	24.2 ± 1.3^{A}	21.7	24.3	26.9
	2001	26.0 ± 1.3^{B}	22.5	26.0	29.1

Means with different superscripts are significantly different ($P<0.001$)^{A,B}.