

Free range pigs: carcass characteristics and meat quality

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SUMMARY

Carcass composition and meat quality of 39 scharrel (= free range) pigs were compared with that of 38 littermates (equal genetic background) raised according to regular farming conditions. No significant differences in carcass composition (backfat- and muscle thickness, lean meat percentage) and meat quality (PSE-, FOP-, pH- and rigor values) could be demonstrated between both groups at 45 minutes post mortem. Furthermore, meat quality determinations proved that fat deposition on the inside of the chest, marbling and the percentage of intramuscular fat were also identical. This was also valid for water holding capacity, colour, shear force and subjective quality evaluations. In contrast to the assumption that scharrel pigs are fatter or the meat should have a better water holding capacity, neither could be shown.

INTRODUCTION

Only those pigs are allowed to be indicated as free range, or 'scharrel' pigs that are raised according to the regulations drawn up by the ISC (1985). These regulations contain that scharrel pigs must be kept in groups and that in the case of indoor keeping the sows' pens have an outlet. Furthermore, it is laid down that next to concentrate, at least 10 % of the pigs' rations must be roughage. The food must not contain antibiotics, chemotherapeutics, growth stimulating factors and only a limited amount of copper below 25 mg per kg concentrate for pigs weighing 35 kg and over. Suppletion of copper is not allowed.

Meat of scharrel pigs is supposed to have a better quality, especially owing to an improved water holding capacity. On the other hand, however, also complaints can be registered; viz. the carcass composition should be less good caused by higher amounts of fat deposited as inter- and intramuscular fat.

To study the advantages as well as the disadvantages of scharrel pigs, it was decided to compare pigs from intensive fattening systems with animals of equal genetic background, raised as scharrel pigs.

MATERIALS and METHODS

Carcass composition and meat quality of 39 scharrel pigs were compared with those of 38 littermates from an intensive fattening system, comparable to regular farming conditions. All animals were crossbreds (GY x (GY x Dutch Landrace)), while the sex ratio (barrows - gilts) in both groups was equal (1 to 1). The scharrel pigs were housed on straw in a danish type pig house provided with outlet. The control animals were kept indoor on a partly slatted floor. Feeding was ad libitum. After fattening half of both groups of animals, the heaviest ones were slaughtered immediately in a commercial slaughterhouse; the remaining pigs followed two weeks after that.

The evaluation of carcass composition was based on the results of HGP (Hennessy Grading Probe) measurements, i.e. fat and muscle thickness and the calculated lean meat percentage, performed in the thoracic region of the longissimus muscle between the 3rd- and 4th-from-last ribs (3/4LR), the hot carcass weight and a subjective score (1 - 5) for fat deposition along the ribs on the inside of the chest. Pork quality determinations were carried out at 45 min and 24 h post mortem. The former ones consisted of PSE-reflection values (1 - 100) given by the HGP (3/4LR), FOP-measurements at 3/4LR and between the 3rd and 4th lumbar vertebrae, pH-measurements also in the longissimus lumborum muscle (LV) and measurements of rigor mortis of the m. semimembranosus (SYBESMA, 1966). Other quality measurements (24 h p.m.) were made on samples from the m. longissimus lumborum (LV). These consisted of ultimate pH, a score for the quality category (1 - 6: DFD, beginning DFD, Normal, slightly aberrant, beginning PSE, PSE) based on moisture (0 - 3), colour (0 - 3) and texture (1 - 3) as described in 1988 (VAN DER WAL et al.), colour according to NAKAI et al. (1975), water holding capacity with the filter paper test (KAUFFMAN et al., 1986), drip (HONIKEL, 1987) after storage during 24 h at 4 °C, cooking loss after heating during 1 h at 75 °C followed by Warner-Bratzler shear force measurements with Adamel Lhomargy DY 20B equipment (speed 100 mm/min) on 10 cores (1.26 mm) (BOCCARD et al., 1981), marbling (score 1 - 5), intramuscular fat with the Soxhlet procedure, and colour measurements with a Hunter Labscan (L*a*b*, light source D65, observation angle 10°, opening 30 mm).

The mean values of the variables of carcass characteristics and pork quality determinations have been compared between the two groups with a Student t-test.

RESULTS and DISCUSSION

As the number of gilts and barrows of both groups was nearly equal, it was decided to compare only the mean values of each parameter between groups, without making a subdivision into gilts and barrows or day of slaughter. No statistically significant differences in carcass characteristics could be demonstrated between scharrel pigs and animals from intensive fattening systems according to regular farming conditions (Table 1). This was also valid for backfat thickness at which the calculation of the percentage of lean meat largely has been based. Despite the lack of significance the difference in lean meat percentage of 0.8 % in favour of the scharrel pigs attracted attention. Later experiments, however, could not reconfirm such differences as will be reported elsewhere (VAN DER WAL et al., in preparation). This supported the suggestion that the complaints against the increased fatness of scharrel pigs is at least less seriously compared to the general opinion. Another support for this statement can be found in the amounts of fat deposition on the chest's inside which were identical for the two groups of pigs.

Although it is difficult to discriminate between individual animals, differences between groups can be detected with slaughterline measurements to a certain point if present. In the case of scharrel pigs and the genetically comparable control animals, however, no indication for quality differences could be demonstrated. All variables like HGP-reflection (= PSE-), FOP-, pH- and rigor mortis values were of the same magnitude (Table 1). So it might be concluded that both groups don't differ. This statement has limitations because it takes much more time than 45 min to develop the ultimate pork quality (VAN DER WAL, 1986). Therefore, it is very important to compare the quality characteristics at 24 h post mortem after which the ultimate quality can have developed.

The most important indications for quality at 24 h are water holding capacity, colour and a subjective quality evaluation, together with the ultimate pH. This latter variable did not show any difference. The various parameters for water holding capacity, i.e. subj. scores for moisture, the filter paper test, drip and cooking losses were as much equal as those for colour (Table 2). So it could be concluded that ultimate pork quality of both groups of pigs is identical. This statement was supported by the results of the subjective evaluations for quality (= quality category) and the lack of difference in Warner-Bratzler shear force values.

Table 1. Mean values (x) and standard deviations (SD) of hot carcass weight, HGP-measurements between the 3rd- and 4th-from-last ribs, a score for fat deposition on the inside of the chest and meat quality measurements at 45 min post mortem of scharrel pigs and littermates raised according to regular farming conditions (control group).

	scharrel pigs		control pigs		sign.
	n = 39		n = 38		
	x	SD	x	SD	
hot carcass weight (kg)	84.2	4.3	85.8	5.2	NS
HGP lean meat perc.	52.9	2.9	52.1	3.2	NS
backfat thickness (mm)	17.8	3.6	18.6	4.2	NS
muscle thickness (mm)	50.2	4.5	49.4	5.5	NS
reflectance (PSE)	42.2	3.5	41.6	2.5	NS
fat deposition	2.8	0.7	2.8	0.7	NS
FOP (3/4LR)	108.6	2.0	108.0	2.1	NS
pH (LV)	110.1	3.0	110.9	6.7	NS
rigor mortis (SM)	6.31	0.33	6.27	0.32	NS
3/4LR: between 3rd- and 4th-from-last ribs	10.8	2.9	10.2	2.9	NS
LV: between 3rd and 4th lumbar vertebrae					
SM: musculus semimembranosus					

Table 2. Mean values (x) and standard deviations (SD) of meat quality measurements at 24 h post mortem at position LV.

	scharrel pigs		control pigs		sign.
	n = 39		n = 38		
	x	SD	x	SD	
ultimate pH	5.81	0.15	5.79	0.19	NS
<u>subj. score</u> moisture	1.8	0.6	1.8	0.8	NS
colour	1.7	0.6	1.6	0.6	NS
texture	1.1	0.3	1.2	0.4	NS
quality category	3.9	0.5	3.8	0.7	NS
<u>filter paper</u> score	2.2	1.4	2.1	1.4	NS
weight (mg)	70.4	28.5	67.2	31.5	NS
drip (%)	3.3	1.7	3.1	2.0	NS
cooking loss (%)	34.4	2.0	34.2	1.7	NS
colour scale (NAKAI)	2.4	0.6	2.5	0.7	NS
<u>Hunter</u> L* (brightness)	56.0	3.1	55.5	3.2	NS
a* (redness)	5.4	1.0	5.7	1.0	NS
b* (yellowness)	14.5	0.7	14.6	0.9	NS
shear force (N)	42.5	5.7	43.4	6.3	NS
marbling score	1.2	0.3	1.1	0.4	NS
intramuscular fat (%)	1.3	0.7	1.2	0.6	NS

Another topic related to meat quality and carcass composition is fatness. As indicated no differences in fatness were present between the two groups of pigs. Fatness, however, can also be approached from the scores for marbling and the amounts of i.m. fat. Neither marbling nor i.m. fat showed any significant difference. Therefore, it could be concluded that fatness of scharrel pigs need not to be different from that of pigs with an equal genetic background raised according to regular farming conditions.

Complaints against the conclusions laid down before, may especially be the fact that both groups were genetically equal and no results of taste panel studies were available. Later research, however, proved that even at totally different pig populations the results of carcass and meat quality characteristics are comparable to what was already reported, while taste panel studies did not add relevant information (VAN DER WAL et al., in preparation).

CONCLUSIONS

No significant differences in carcass composition nor in meat quality could be demonstrated between scharrel pigs and pigs (littermates) raised according to regular farming conditions.

Carcasses of scharrel pigs did not contain more fat than those of control animals: the scores for fat deposition on the chest's inside, the marbling scores, the amounts of intramuscular fat and backfat thickness of both groups of pigs were not significantly different.

The assumption that meat of scharrel pigs has a better water holding capacity in comparison to that of the control pigs could not be demonstrated; all tests (subj. score, filter paper test, drip and cooking loss) gave nearly identical results.

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NOTE

The publication is based on a report of the Research Institute for Animal Production 'Schoonoord' (IVO Report B-322) by: P.G. van der Wal, J.H. Huiskes, G. Mateman and A.H. Bolink.

More extensive studies were carried out in close co-operation with G. Mateman of the Research Institute for Animal Production 'Schoonoord', A.W. de Vries, G.M.A. Vonder of the Spelderholt Centre for Poultry Research and Information Services, F.J.M. Smulders, G. Geesink of the Dept of the Science of Food of Animal Origin, Fac. Vet. Med., Univ. Utrecht and B. Engel of the Agricultural Mathematics Group.