

Strategies for a diversified organic pork production

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Abstract

Possible reasons for the low market share of organic pork may be heavy price competition with conventional produced pork products combined with no or small distinctive characteristics in appearance and quality, both regarding eating quality (flavour, tenderness) and ethical quality (production methods). The overall aim of this study is to identify strategies for a diversified organic pork production with high credibility and superior eating quality based on pigs foraging in the cropping system, use of a traditional breed and no castration. Preliminary results indicate that the use of a traditional breed, the Danish Black-Spotted pig, might be a way to produce pork, which in appearance differ from conventional pork and at the same time improve the credibility of organic pig production.

Introduction

There has been a considerable increase in the consumption of organic pork in Denmark as well as in other European countries the last few years, however, the relative consumption of organic pork is still considerably lower than e.g. organic egg and milk (GfK, 2007). One possible reason for the low market share may be heavy price competition with conventional produced pork products combined with no distinctive characteristics in the organic pork products *per se*. A smaller consumer survey in Denmark (Beck & Søndergård, 2004) indicated that consumers who valued pork products were very price sensitive and not in particular interested in organic products as such. On the other hand, the consumers who were very interested in organic products did not value pork products very much. This calls for a consideration that organic pork should differentiate *per se* from conventional pork, e.g. regarding cuttings and flavour. The low market share may also be due to small distinctive characteristics in the ethical quality of organic pork. In Denmark, the organic pig production of today typically includes production methods, which do not comply particularly well with the principles of organic farming - and thereby probably not with the consumers' expectation to organic pig production: Castration of male pigs, use of specialised high-producing crossbreeds, housing of growing pigs in stables with no access to pasture. None of these characteristics live up to the intentions of organic farming in terms of provision of life conditions with due consideration for the basic aspects of the farm animals' innate behaviour; use of livestock breeds well-suited for local conditions, and creation of a harmonious balance between crop production and animal husbandry (IFOAM, 2000).

The overall objective of this study is to identify strategies for a diversified organic pork production with high credibility and superior eating quality based on pigs foraging in

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the cropping system, use of a traditional breed and no castration. Specific objectives to be studied are how breed affects the performance and pork quality of different "types" of slaughter pigs. Three categories of slaughter pigs are investigated: 1) Entire male pigs slaughtered before sexual maturity, 2) Female pigs slaughtered at more than 100 kg live weight and 3) Sows slaughtered after weaning of the first litter. Three different breed combinations will be compared: The modern crossbred (LandraceYorkshire) x Duroc (LYD), the traditional breed Danish Black-Spotted (BS) and the crossbred Danish Black-spotted x Duroc (BSD). In this paper preliminary results will be presented from the first year of the project.

Materials and methods

The experimental set-up was based on outdoor seasonal production of pigs with farrowings in the spring. 17 gilts (6 LY mated with D, 6 BS mated with BS and 5 BS mated with D) farrowed in April in individual paddocks with clover grass. The piglets were weaned at 10-11 weeks of age in June/July. The piglets stayed in the paddocks with access to the farrowing hut. The first parity sows were slaughtered shortly after weaning and six BS and five LY first parity sows were selected for meat quality assessments. The entire male pigs were slaughtered in July at approximately 40 kg live weight. Seventeen male pigs (one pig from each litter) were selected for meat quality assessments. After removal of the male pigs, three female pigs per litter were chosen to remain in the paddock. These pigs were slaughtered in the beginning of November. Back fat and meat thickness were measured at two points on the carcass with an optical probe (MK equipment). Surface colour with the parameters L* (lightness), a* (redness) and b* (yellowness) was measured on slices of the M. longissimus dorsi using a Minolta Croma Meter CR-300 colorimeter.

Results

In the following, preliminary results will be presented as numerical differences between breed combinations. The first parity sows' litter sizes, number of weaned piglets and piglet mortalities are presented in Table 1. One BS sow was excluded from the material due to an unusual low litter size of two piglets. In average the BS sows gave birth to 2.2 fewer piglets per litter than LY sows, but weaned only 1.1 less piglets per litter due to a markedly lower piglet mortality rate (21% lower).

Table 1. The litter performance of the first parity sows (BS: Danish Black-Spotted, LY: Landrace x Yorkshire)

	BS (n = 10)		LY (n = 6)	
	Mean	SD	Mean	SD
Litter size (dead and live born)	9.8	1.1	12.0	2.9
Weaned piglets per litter	8.2	1.8	9.3	1.6
Total piglet mortality, % of born piglets	16.5	15.0	20.8	8.8
Weaning age, days	74	9	72	9

Danish Black-Spotted piglets grew in average 21% slower than LYD piglets (316 g vs. 399 g per day) in the period from a few days after birth to weaning at 10-11 weeks of

age. There was a negative effect of castration on daily gain for all three breed combinations and in particular for LYD pigs. Across breed, the daily gain was - in average - 15 % lower for castrated pigs compared to entire male pigs (332 g vs. 390 g per day). For LYD pigs, castrated pigs grew 24% slower than entire males (351 g vs. 459 g per day). The mean weight at weaning was 25 kg, 24 kg and 28 kg for BS, BSD and LYD pigs, respectively.

The first parity sows were slaughtered shortly after weaning at a mean live weight of 115 kg and 173 kg for BS and LY, respectively. The dressing percentage was 69 % for both breeds. The LY sows were leaner than the BS sows (e.g. 14 mm vs. 19 mm back fat and 57 mm vs. 41 mm meat thickness in one of the measuring points). The BS sows scored lower in L* (48.2 vs. 50.5) and higher in a* (11.8 vs. 9.6) and b* (5.2 vs. 4.5), indicating darker meat compared to LY sows.

The entire male pigs were slaughtered at a mean age of 102, 87 and 87 days and a live weight of 39, 38 and 43 kg for BS, BSD and LYD, respectively. The dressing percentages did not differ markedly between breeds (71%, 73% and 73% for BS, BSD and LYD, respectively). There were no big differences in the thickness of the back fat and the meat of the three breed combinations (e.g. 11, 9 and 9 mm back fat and 58, 51 and 55 mm meat thickness in one of the measuring points for BS, BSD and LYD, respectively). Also for entire male pigs, the surface colour differed markedly between the breed combinations as shown in Table 2. The BS scored lower in L* than BSD and LYD and both BS and BSD scored higher in a* than LYD. BSD scored higher in b* than BS and LYD.

Table 2. Surface colour of slices of *M. longissimus dorsi* for entire male pigs (BS: Black-Spotted, BSD: Black-Spotted x Duroc, LYD: (Landrace x Yorkshire) x Duroc)

	BS (n = 6)		BSD (n = 5)		LYD (n = 6)	
	Mean	SD	Mean	SD	Mean	SD
Minolta L*	49.4	4,8	53.7	2.3	54.0	5.1
Minolta a*	8.1	1.0	7.9	0.4	5.1	1.1
Minolta b*	3.4	1.2	4.3	0.6	2.9	0.8

Discussion

The use of traditional breeds like the Danish Black-Spotted pig might be a way to produce organic pork products, which in e.g. appearance and flavour differ from conventional products. Preliminary results of this study support this theory as pork from the BS sows and young males was darker compared to pork from the more modern crossbreeds when observing numerical differences. Coming assessments will illuminate whether a difference in sensory profile also exists. In a previous pilot study, the pork from BS pigs was considered as tastier compared to modern crossbreeds (Christiansen, 2005).

Traditional breeds are generally considered as more suited for outdoor production because of their hardiness, less exposure to extreme weather situations and good mother abilities (Edwards, 2004). The results presented in this paper indicate that BS sows have lower piglet mortality, however, whether this is due to improved mother abilities is not known. Behavioural observations before and after farrowing will be

included in the second year of the present project. Furthermore, it will be evaluated whether the traditional breed is able to retrieve a larger proportion of their energy need by foraging. This would be of great value in organic pig production based on pigs integrated in the cropping system.

Slaughtering entire male pigs at 40 kg live weight may be a way to improve the animal welfare in organic farming and simultaneously producing organic pork products of a particular appearance and high eating quality. It is common procedure to castrate piglets in organic farming to reduce the production of skatole as well as androstenone and thereby the risk of boar taint. It is, however, well documented that castration is associated with pain for the animal (Prunier et al., 2006) making castration inconsistent with the aim of organic farming in terms of good animal welfare. Castration is further known to reduce the growth rate of the pigs as confirmed in the present study and to reduce feed efficiency. Thus, there are some very important advantages of entire male production. It is expected that slaughtering the pigs at 40 kg live weight as in this study will reduce the risk of boar taint. Skatole concentrations in back fat of the young male pigs will be assessed in the nearest future.

Conclusions

Danish Black-Spotted first parity sows had lower litter sizes compared to the more modern crossbred Landrace x Yorkshire. However, due to lower piglet mortality, the difference in weaned piglets per litter was only 1.1 piglets. The daily gain of the piglets from castration to weaning differed markedly between breeds. In average, the Black-Spotted piglets grew 21% slower than Landrace x Yorkshire piglets. There was a clear negative effect of castration on daily gain, especially in the Landrace x Yorkshire piglets with 24% higher daily gain in entire males compared to castrated pigs. Both the Black-Spotted sows and the Black-Spotted entire males, which were slaughtered at approximately 40 kg, had higher a* scores and lower L* scores indicating darker meat compared to Landrace x Yorkshire crossbreeds. In conclusion, preliminary results indicate that the use of a traditional breed might be a way to produce pork, which in appearance differs from conventional pork and at the same time improve the credibility of organic pig production.

References

- Beck, A., Søndergård, H. (2004). Forbrugeropfattelser af økologisk svinekød og kød fra økologisk ungsvin. Rapport fra gruppeinterview gennemført for Danmarks JordbrugsForskning og Svineudvalget i Økologisk Landsforening. 33 pp.
- Christiansen, S.C. (2005). Eating quality of pork from original breeds – studied by Focus group research and meat quality analyses. Master of Science Thesis. The Royal Veterinary and Agricultural University and the Danish Meat Research Institute. 85 pp.
- Danmarks Statistik (2007). <http://www.statistikbanken.dk> (accessed 2007-10-01).
- Edwards, S.A. (2005). Product quality attributes associated with outdoor pig production. *Livestock Production Science* 94: 5-14.
- GfK (2007). GfK ConsumerScan, www.GfK.dk.
- IFOAM, 2000. Basic standards for organic production and processing. IFOAM Basic Standards, Basel 2000, 67pp.
- Prunier, A., Bonneau, M., von Borell, E.H., Cinotti, S., Gunn, M., Frederiksen, B., Giersing, M., Morton, DB, Tuyttens, F.A.M., Velarde, A. 2006. A review of the welfare consequences of surgical castration in piglets and the evaluation of non-surgical methods. *Animal Welfare* 15, 277-289.