THE EFFECT ON DRIP LOSS OF SHOWERING OF PIGS DURING LAIRAGE

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Background

The drip loss in pork depends on the energy metabolism during the first few hours post mortem. This is reflected in the temperature and the pH in the muscle. The drip loss is correlated to the temperature and pH early post mortem. To minimize the drip loss the maximum temperature in the muscles post mortem must be as low as possible. The most effective way of decreasing the temperature in the muscles would be before debleeding, as the blood circulation at this time would help removing the heat. A calm and non-stressed pig at stunning would be expected to result in a lower drip loss compared to a warm stressed pig. Systematic showering of the pigs during lairage could be a way to reduce the body temperature and at the same time perhaps reduce the incidence of fightings.

Objective

The objective of the study was to investigate the effect on drip loss of systematic showering of the pigs during lairage under a traditional and a low stress pre-slaughter handling.

Methods

Pre-slaughter handling - traditional: Pigs (n=360) from two producers were transferred to the abattoir in groups of 22. The average transport time was 105 min. The pigs were randomly divided into groups of 45 for lairage. Two groups were slaughtered per day. The outdoor temperature was 18-27°C and the temperature in the lairage area was 18-27°C.
One group was showered systematically for 2 min. followed by 10 min. break during 1 hour of lairage. The other group had the same lairage time without showering. The pigs were CO_2- stunned individually after a race where the use of electric goads was necessary.

Pre-slaughter handling - low stress: Pigs (n=360) from the same two producers were transferred to the abattoir in groups of 15 pigs. Average transport time was 75 min. The outdoor temperatures was 12-14°C and the temperatures in the lairage area was 18-23°C. Pigs were kept in the same groups of 15 during lairage. Each day three groups of 15 had a systematic showering during lairage like at the traditional handling, while three groups of 15 had no showering. The pigs were driven to the stunner in the groups of 15 that just before the stunner were divided into three sub-groups of five which were stunned in groups in CO_2 (Aaslyng & Barton Gade, 2001).

Registrations: Immediately after de-bleeding a meat logger (Bager Christensen, 2002) was inserted in the *m. longissimus dorsi* (LD) at the 4th lumbar vertebra and in *m. biceps femoris* (BF) for simultaneous temperature determinations. From these determinations the maximum temperature and the temperature 45 min post mortem was extracted. The degree of skin damage was assessed from 0 (no) to 3 (a lot of) before chilling. pH was determined 45 min post mortem in LD and BF and the day after slaughter in LD, BF, *m. semimembranosus* (SM), and *m. semispinalis capitis* (SC) (Knick Portamess pH-meter no 751 (Berlin, Germany) with an Ingold LOT glass electrode type 3120 (Mettler Toledo, Urdorf, Switzerland)). The drip loss was determined in LD and BF using the EZ-drip loss method (Rasmussen & Andersson, 1996).

Statistics: The meat quality data were analysed by the following model:

$$\text{Meat quality}_{ijklm} = \text{showering}_i + \text{abattoir}_j + \text{sex}_k + \text{producer}_l + (\text{showering} \times \text{abattoir})_{ij} + (\text{showering} \times \text{sex})_{ik} + (\text{showering} \times \text{producer})_{il} + (\text{showering} \times \text{sex} \times \text{abattoir})_{ijk} + (\text{showering} \times \text{producer} \times \text{abattoir})_{ijl} + \varepsilon_{ijklm}$$

The skin damage data was analysed for each abattoir by a X^2-test

Results and discussion

The effect of showering on drip loss depended on the abattoir. At the abattoir with a traditional handling the drip loss was reduced 0.4 %-units by showering in both LD and BF (Table 1). This was in LD reflected in a lower maximum temperature and a lower temperature 45 min post mortem whereas there was no temperature difference between the two groups in BF (Table 2). At the abattoir with a low stress pre-slaughter handling there was no effect of showering on drip loss. The drip loss was at this abattoir 0.9 %-units lower in LD, and 0.6 %-units lower in BF than after showering at the abattoir with the traditional handling.
The pH 45 min post mortem and the day after slaughter was not affected by showering at any of the abattoirs but also here a difference between abattoirs was seen with a higher pH 45 min. post mortem in both LD and BF at the low stress pre-slaughter handling while the ultimate pH was lower in BF but higher in LD at this handling. There were no differences between abattoirs in pH in SM and SC (Table 3).
There was no difference in skin damage between the two groups, which indicated that the showering had not decreased the incidence of fightings. The effect of showering on drip loss at the traditional handling seems therefore only to be an effect on muscle temperature. The degree of skin damage was lower at the abattoir with the low stress pre-slaughter handling than at the abattoir with the traditional handling.

Conclusion

The showering did decrease the drip loss in the muscles investigated at a traditional pre-slaughter handling but even after showering the drip loss was higher than after a low stress pre-slaughter handling. At this low stress handling there was no effect of showering on drip loss. The effect of showering seems to be due to decreased temperature and not due to decreased fightings.

Literature

Aaslyng, M. D. & Barton Gade, P. (2001). Low stress pre-slaughter handling: effect of lairage time on the meat quality of pork. *Meat Science, 57*, 87-92.
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Tables

Table 1. Drip loss in pork with and without showering during lairage at a traditional and a low stress pre-slaughter handling

	Traditional pre-slaughter handling		Low stress preslaughter handling	
	No showering	Showering	No showering	Showering
Drip loss LD, %	3.55[a]	3.12[b]	2.23[c]	2.30[c]
Drip loss BF, %	2.24[a]	1.86[b]	1.28[c]	1.23[c]

Std.err.= 0.13. Different letter in the same line shows significant differences (P at least < 0.05).

Table 2. Temperature in pork with and without showering during lairage at a traditional and a low stress pre-slaughter handling

	Traditional pre-slaughter handling		Low stress pre-slaughter handling	
	No showering	Showering	No showering	Showering
T_{max} LD, °C	40.2[a]	39.8[b]	39.0[c]	38.9[c]
T_{45} LD, °C	40.0[a]	39.5[b]	38.2[c]	38.1[c]
T_{max}BF, °C	40.7[a]	40.5[a]	29.4[b]	39.3[b]
T_{45}BF, °C	40.7[a]	40.4[a]	38.5[b]	39.0[c]

Table 3. pH in pork with and without showering during lairage at a traditional and a low stress pre-slaughter handling

	Traditional pre-slaughter handling	Low stress pre-slaughter handling
pH_{45} LD	6.45[a]	6.67[b]
pH_{45} BF	6.47[a]	6.70[b]
pH_u LD	5.45[a]	5.52[b]
pH_u BF	5.57[a*]	5.55[b]
pH_u SM	5.56	
pH_u SC	5.88	

Different letter in the same line shows significant differences (P at least < 0.05) except * where P=0.06.