

INFLUENCE OF PELVIC SUSPENSION AND RN⁻ GENOTYPE ON SHEAR FORCE AND SENSORY QUALITY IN PORK LOIN

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Introduction

Meat quality is complex and consists of several attributes, depending on where in the production line one is: producer, processor, retailer or consumer. Whereas carcass composition and weight are important traits for the producer, meat tenderness and juiciness are the most important for the consumer. Several treatments along the whole production chain also influence the different quality attributes. The dominant RN⁻ allele observed in Hampshire and Hampshire crosses influences several quality traits, resulting in more lean meat and higher glycogen content and lower protein content in the live animal. In meat, the RN⁻ allele gives lower ultimate pH, water holding capacity, processing yield and higher internal reflectance (Lundström & Andersson, 2001). The effect of the RN⁻ allele on sensory evaluated tenderness has been shown to be positive (Jonsäll *et al.*, 2000), negative (Le Roy *et al.*, 2000) and of low importance (Josell *et al.*, 2003a), whereas the juiciness is mostly reported to be higher in meat from RN⁻ carriers (Jonsäll *et al.*, 2000; Josell *et al.*, 2003a). Along the slaughter line, various treatments can be used to influence the final meat quality, such as electrical stimulation, pelvic suspension and chilling conditions. Pelvic suspension has been shown to give lower shear force values in pork (Møller & Vestergaard, 1986) and higher tenderness with sensory evaluation (Tyler *et al.*, 1995). Josell *et al.* (2003b) studied the combined effects of RN genotype, chilling rate and suspension method and found interactions between all three effects for tenderness. Highest tenderness was found in pelvic-suspended and slowly chilled RN⁻ carriers, whereas lowest tenderness was found in rapid chilled non-carriers. Greatest effect of the post-slaughter treatments was found in the non-carriers. The aim of this study was to further evaluate the effect of pelvic suspension on shear force and sensory quality in pork loins from carriers and non-carriers of the RN⁻ allele.

Materials and Methods

Female pigs (n=36) with a carcass weight between 80 to 90 kg were used in this study. pH (pH-meter WTW pH 340, Germany) was registered in *M. longissimus dorsi* (LD) at 45 min *pm*, to avoid carcasses with PSE (pH₄₅ < 5.8). At 1 h *pm*, left carcass side was rehanged in the pelvic bone (*obturator foramen*), while the right side was kept hanging in the Achilles tendon. At 24 h *pm*, pH was measured to avoid carcasses with DFD (pH₂₄ > 5.8) and samples were taken from the LD muscle on both sides of each carcass. Samples for both shear force and sensory analysis were weighed, vacuum packed, and aged for another 4 days and then stored in -20°C until analysis. Samples for shear force measurements were thawed overnight (+4°C) and cooked at 70°C for 90 min. Maximal shear force value was registered on 12 strips per animal 10 x 10 x 40 mm cut parallel with the fibre direction, using a Stable Micro Systems Texture Analyzer HD 100 (Godalming, UK), equipped with a Warner-Bratzler metal blade (1mm thick; speed 50 mm/min). Samples for sensory analysis were thawed overnight (+4 °C) and prepared wrapped in foil (Al) in an oven (150°C) to a final internal temperature of 70°C. The meat was served room tempered in 4-mm slices to 6 panellists, who judged tenderness, juiciness, meat taste, acidity and crumbliness on a scale from 0 (low intensity) to 100 (high intensity). RN genotypes were identified according to Milan *et al.* (2000). The model used for the statistical analysis (version 8e, SAS Institute Inc., Cary, NC, USA) contained the fixed effects of RN genotype, suspension method and their interaction, and the random effect of animal within RN genotype. For the sensory traits, the random effect of assessor was also included in the model.

Results and Discussion

Pelvic suspension gave lower shear force values within both RN genotypes (p-value for hanging= 0.001). RN genotypes differed significantly (p=0.031), with lower values for the RN⁻ carriers. Both the Achilles- and pelvic-suspended m⁺rn⁺ loins reached similar shear force values as the Achilles-suspended loins from RN⁻ carriers. Lowest shear force values were observed in the pelvic-suspended RN⁻ carriers (Figure 1). This positive effect of pelvic suspension on shear force agrees with results by Møller & Vestergaard (1986), but differs with other studies, which found no significant differences (Tyler *et al.*, 1995; Josell *et al.*, 2003). Meat from RN⁻ carriers had significantly higher tenderness, juiciness, meat taste and acidity, and lower crumbliness (Table 1). Pelvic suspension gave higher tenderness, juiciness and meat taste, and lower crumbliness. Pelvic-suspended RN⁻ carriers had highest tenderness and Achilles-suspended non-carriers had lowest tenderness. In between these groups, pelvic-suspended non-carriers achieved the same tenderness as Achilles-suspended RN⁻ carriers. Juiciness was most affected by RN genotype, whereas meat taste and crumbliness were affected by pelvic suspension only within RN⁻ carriers. Tyler *et al.* (1995) also found higher tenderness in pelvic-suspended loins, but no effect on juiciness in contrast to our results. We found larger effects on both shear force and sensory attributes within both RN genotypes compared with Josell *et al.* (2003), who found the

largest effect of suspension method within the non-carriers, and also an interaction between RN genotype and chilling system.

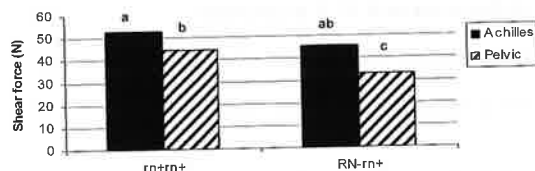


Figure 1: Shear force values (LSM) in LD from pelvic and Achilles suspended carcasses from non-carriers (rn^+rn^+) and carriers (RN^-rn^+) of the RN^- allele. Bars with the same letter do not differ significantly ($p>0.05$).

Table 1: Sensory quality in pelvic and Achilles suspended LD from non-carriers and carriers of the RN^- allele (LSM).

Sensory trait	Genotype/ hanging		Levels of significance		Genotype (G)	Suspension (S)	GxS
	rn^+rn^+	RN^-rn^+	Achilles	Pelvic			
Tenderness	44.2 ^a	52.7 ^b	57.6 ^b	67.7 ^c	0.002	0.001	0.496
Juiciness	46.6 ^a	48.6 ^a	56.0 ^b	58.9 ^b	0.001	0.040	0.707
Meat taste	50.2 ^a	51.0 ^a	53.4 ^b	56.1 ^c	0.001	0.019	0.180
Acidity	54.5 ^a	55.7 ^{ab}	58.0 ^b	57.4 ^b	0.014	0.738	0.242
Crumbliness	43.6 ^a	40.2 ^a	32.3 ^b	25.6 ^c	0.001	0.001	0.252

Conclusion

Pelvic suspension of pork carcasses improved tenderness in loins of both non-carriers and carriers of the RN^- allele. RN^- carriers had higher tenderness than non-carriers, but with pelvic suspension it is possible to achieve the same tenderness for non-carriers as for Achilles suspended RN^- carriers.

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