A40

INFLUENCE OF SCALDING AND SKINNING COMBINED WITH HOT AND COLD BONING ON SOME QUALITY CHARACTERISTICS OF PORK MEAT

E.T. FACCO SILVEIRA, N.F.A. SILVEIRA, M.S. CORREA and I. SHIROSE

Instituto de Tecnologia de Alimentos, 2880 N. Brasil Ave., Campinas, SP. 13073-001, Brazil.

Key words: scalding, skinning, WHC, protein solubility, drip loss, boiling loss

INTRODUCTION

The rate of post mortem glycolysis and temperature decline in the muscle are two important determinants of the degree of protein denaturation. A high post mortem glycolytic rate at a high temperature (> 34°C) will result in severe protein denaturation and consequently in a low water-holding capacity (OFFER and KNIGHT, 1989). Post mortem metabolism of porcine muscle is relatively fast, meaning that the water-holding capacity (WHC) is reading affected, often leading to high drip losses (vAN LAACK and SMULDERS, 1991).

Current pig slaughtering techniques include scalding and singeing which results in carcass exposure to temperatures that are about 1°C above those aplyied during dehiding. This results in a quicker pH drop post mortem and may be expected to negatively influence WHC (TROEGER and WOLTERSDORF, 1986). Skinned carcasses rendered better WHC as compared with scalded pig carcases, however, skinning may have a marked effect on meat quality in hot boning operations.

The aim of this work was to investigate the influence of scalding (vat or tunnel) and skinning combined with hot and cold boning on protein solubity, WHC of myofibrillar proteins, drip loss, boiling loss and firmness in porcine muscles.

MATERIAL AND METHODS

Two experiments were performed in a industrial abattoir located in the west part of Santa Catarina (Brazil).

Thirty-two unstressed Large White/Landrace male cross-bred pigs with an approximate 95kg from the same farm and similar pre-slaughter conditions were slaughtered in each experiment. In the first experiment sixteen pigs were skinned manually and the other sixteen pigs were vat scalded. Carcasses from both treatment groups were split (ca. 30 min post mortem) and the sides were randomly assigned to either hot boning (HB) or cold boning (CB, after 21h at 2 ± 1°C). After boning, *M. longíssimus dorsi* (LD) and *M. semimembranosus* (SM) were immediately vacuum packaged and chilled at 0 ± 1°C. Myofibrils were prepared essentially according to EISELE and BREKKE (1981), and all preparations steps were carried out at 2-4°C. Protein solubility and WHC for SM myofibrils suspensions were determined following the method suggested by XIONG and BREKKE (1989). Drip loss (HONIKEL, 1986), boiling loss and firmness (WOLTERSDORF and TROEGER, 1987) in LD were also evaluated. The datas were subjected to analysis of variance and tretament differences were tested with Tukey test for significance at the 5% level.

Procedures identical to first experiment were used to the second, except that the scalding type, which was moved to the tunnel.

RESULTS AND DISCUSSIONS

In Figure 1, protein solubility and WHC for SM miofibrils suspensions are presented. There are no standard conditions for determining these two functional properties by centrifugations, and mild conditions were used in this study based on preliminary experiments involving different protein concentrations and centrifugal forces. Statistical results showed a significant reduction of protein solubility for scalding, except to the treatment B. The solubility of SM muscle myofibrils did not reach (100%), probably due to contamination from insoluble proteins during suspension preparation. It could also have resulted from denaturing the proteins by the precipitation and resolubilization process (XIONG and BREKKE, 1989). Skinning in general, increased WHC values significatively and this fact can be mainly attributed to the total amount of myosin solubilized, because myosin is largely responsible for WHC in meat systems (NAKAYAMA and SATO,1971).

Figure 1. Protein solubility and WHC for SM myofibrils suspensions: I (vat scalding) II (tunnel scalding), A (Scalding and HB), B (scalding and CB); C (Skinning and HB); D (Skinning and CB).

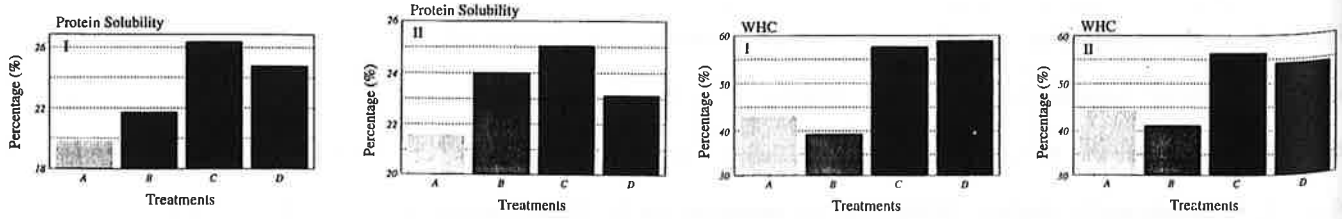
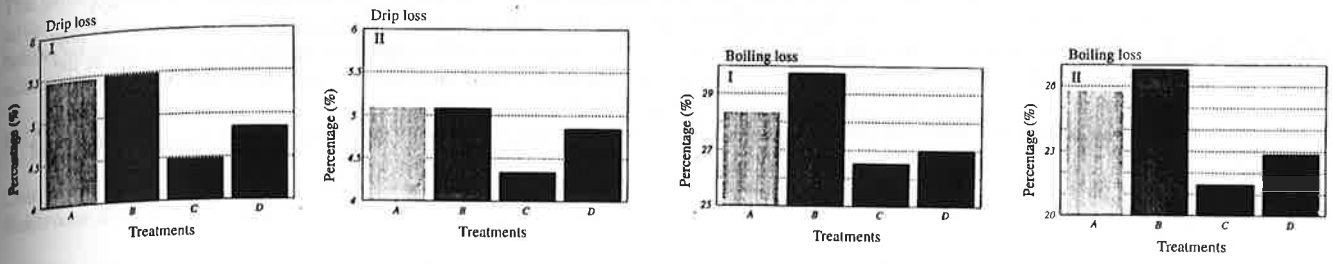


Figure 2 shows drip loss and boiling loss for LD muscle. Drip loss values obtained in this experiment were greater than those found in the investigations performed by and MURRAY and JONES (1992). It was verified that treatment C reduced significatively the drip loss, resulting in values lower than PSE meat (>5%). Skinning (treatments C and D) improved markedly cooking yields. Boiling loss values found in this study were lower than those obtained by TROEGER and WOLTERSDORF (1987) and showed a significant difference between scalding and skinning.

Firmness (shearing strength) evaluated in LD muscle is presented in Figure 3. Shearing estrength was affected mostly by the boning treatments investigated. HB increased significatively tenderness, and these results were expected as pH/temperature decline

Figure 2. Drip loss and boiling loss for LD muscle: I (vat scalding), II (tunnel scalding), A (scalding and HB), B (scalding and CB), C (Skinning and HB), D (Skinning and CB).

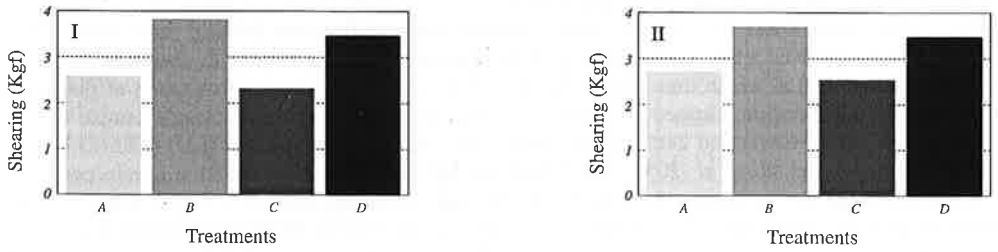


in the muscle is known to strongly affect the tenderness of meat. A rapid pH decline per se might increase shear strength of porcine muscle (EICHINGER *et al.*, 1987). Possibly this is the result of denaturation of the neutral proteolytic enzymes (MARSH *et al.*, 1988).

CONCLUSIONS

The present investigation has shown that scalding and dehairing processes accelerate post mortem biochemical reactions in the musculature as a result of thermal stress on the carcasse. Skinning combined with hot boning improved considerably the quality characteristics evaluated. In Brazil this slaughter technique, is not aplied under industrial conditions. Further investigation on optimization of tunnel scalding followed by semi-hot boning should be stressed since this process seems to show a potencial alternative for braziliam pork abattoir as fas as better meat quality requirements are concerned.

Figure 3. Firmness (Shearing strength) in porcine LD muscle: I (vat scalding); II (tunnel scalding); A (scalding and HB); B (scalding and CB); C (skinning and HB); D(skinning and CB).



REFERENCES

EICHINGER, H.M., SEEWALD, M. and HEISSWOLF, E. (1987) : Investigations on the nucleotide breakdown and sensoric and technological evaluation of normal and PSE meat during storage. Proc. 33rd Int. Congress Meat Sci. Technolo., Helsinki, p.20

EISELE, T.A. and BREKKE, C.J. (1981) : Chemical modification and functional properties of acylated beet heart myofibrillar proteins. J. Food Sci. 46: 1095.

HONIKEL, K.O. (1986) : Wasserbindungsvermögen von fleish. Kulmbacher Reike. Baundg, p. 67-88.

MARSH, B.B., RINGKOB, T.P., RUSSEL, R.L., SWARTZ, D.R. and PAGEL, L.A. (1988) : Mechanisms and strategies for improving meat tenderness. 41st Rec. Meat Conf. Proc. 41, 113.

NAKAYAMA, T. and SATO, Y. Relationship between binding quality of meat and myofibrillar proteins. II. Contribuition of native tropomyosin and actin to the binding quality of meat. **Agric. Biol. Chem.**, v. 35, p. 208, 1971.

OFFER, G. & KNIGHT, P. (1989) The structural basis of water holding in meat In: Developments in Meat Science 4. Laurie. (ed). London: Elsevier Appl. Sci., p. 173, Part II.

TROEGER, K. & WOLTERSDORF, W. (1986) Influence of scalding and dehairing during pig slaughter on meat quality. **Fleischwirtschaft** v. 66, n. 5, p. 893-7.

VAN LAACK, R.L.J.M. & SMULDERS, F.J.M. (1991) The combined effects of skinning and hot boning on meat quality Fleichwertschaft. **71**(3): 303-308.