PE1.47 The Influence Of Carcass Chilling On Glycolytic Changes And Pork Meat Quality 301.00

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Index Terms—chilling, glycogen changes, meat quality.

I. INTRODUCTION

In order to optimise pork quality, various modifications in the slaughter procedure of the carcasses have been attempted. The chilling regime applied is a factor in the slaughter procedure that is known to affect pork quality. In some studies, the improvements in pH, drip loss and meat colour have been shown when applying a faster carcass chilling instead of slower chilling [8, 10, 14]. The aim of the present experiment was to compare the effect of two commercial chilling methods (conventional vs. rapid) on meat quality of (LxY)xH fatteners.

II. MATERIALS AND METHODS

The investigations covered 40 stress resistant (Landrace x Yorkshire)x Hampshire fatteners. The animals were kept under the same environmental conditions and fed a full bath feed. The animals were slaughtered 2-4 hours after transportation using electrical stunning method and recumbent bleeding out (Midas system, Inarco). The carcasses were chilled conventionally (4 ºC 24h)-40 right half-carcasses and fast (in three-phase chilling tunnel: -10 ºC - 15 min, -15 ºC - 25 min and -5 ºC - 40 min. with air velocity 3m/s)-40 left half-carcasses. The temperature of half-carcasses was monitored to 24h postmortem using Smart Button Data Logger produced by ACR Systems in 60 min intervals. The following meat quality characteristics were determined: pH of meat measured directly in Longissimus lumborum (LL) muscle (45 minutes, 2, 3, 24, 48, 96 and 144 hours after the slaughter) using pH-Master apparatus produced by Draminski (Poland), electrical conductivity (EC) evaluated in 45 minutes, 2, 3, 24, 48, 96 and 144 hours post mortem using LF-Star apparatus (Matthaus - Germany), meat lightness (L*) measured in 24, 48, 96 and 144 hours after the slaughter using Minolta CR-310 Chroma Meter in CIE L*a*b* system, water holding capacity (WHC) according to [5] with [13] modification, drip loss determined in 48, 96 and 144 hours post mortem according to [12] and liquid loss from chops packed in modified atmosphere (MAP) and vaccum (VAC). The RYR1 genotypes were established according to [4]. At 45 minutes, 24 and 48 hours post mortem, samples from LL muscle were collected into the tubes with 0.5M PCA for determination of glycogen [3] and lactate [2]. On the basis of them the glycolytic potential (GP) was calculated according to formula proposed by [11]. The data were analysed using one-way analysis of variance in orthogonal scheme. The significance of differences between means was calculated using Duncan's test.

III. RESULTS AND DISCUSSION

Muscle glycogen concentration at the time of slaughter and the rate of postmortem glycogenolysis regulate lactate accumulation, thereby affecting meat quality traits [1]. The average glycolytic potential at 45 min postmortem of investigated (Landrace x Yorkshire)x Hampshire fatteners was 169.29±45,30µmol/g tissue. The influence of chilling method (conventional vs. three-phase chilling tunnel) on glycogen changes and lactate accumulation at the time was shown on Fig. 2 and 3. In contrary to data reported in ours previous investigations [15] conducted on (LxY)xD fatteners with lower then in this group glycolytic potential (about 130µmol/g tissue) and glycogen content (45.18µmol/g tissue), we shown that fast chilling not inhibit the glycogen breakdown and lactate accumulation in (Landrace x Yorkshire)x Hampshire fatteners but bring forward the ultimate pH from 24 to 48h post-mortem (Fig. 2, 3 and 4). The influence of chilling method (conventional vs fast) on temperatures of half-carcasses in measured periods, was not statistically confirmed (Fig. 1). In this work, we also noted that meat from fast chilled half-carcasses at 24h after the slaughter (with about 7.81 µmol/g lower lactate content) had the same pH as meat from conventional chilled half-carcasses (Fig. 4). The fast chilled half-carcasses showed a higher pH at 48 and 96h after the slaughter (statistically confirmed at $p \leq 0.01$ and $p \leq 0.05$) as that of conventionally chilled. Additionally, the

average pH at 48h after the slaughter for fast and slow chilled half-carcasses was low and typical for acid meat (Fig.4). The slower rate of pH fall in fast vs. slow chilled carcasses in the investigations of [7, 9] was noted. In that work, the influence of chilling method on R1 indicator, electrical conductivity and meat lightness was not stated. Also, the effect of chilling method on drip loss and fluid loss from vacuum and MAP packed chops, was not statistically confirmed. Independently from chilling method, drip loss was high and amounted from 6.20 to 12.43%. [6, 7, 10] showed no effect of accelerated or conventional chilling on drip loss. We only statistically confirm the slightly better (but generally low) water holding capacity in meat from fast chilled half-carcasses compared with conventionally chilled.

IV. CONCLUSION

Fast chilling did not slow the glycolytic changes expressed by rate of pH decline to 24h postmortem and not improve physico-chemical properties of (LxY)xH meat. The next argument is, that fast chilling only slightly improving acid meat frequency (from 97 to 87% in conventional and fast respectively) but simultaneously increasing (at about 20%) the percentage of meat with TY < 90% yield.

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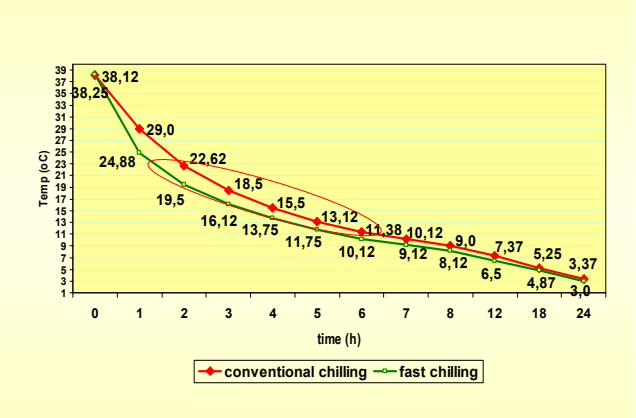

Fig1. The effect of carcass chilling on temperature of half-carcasses

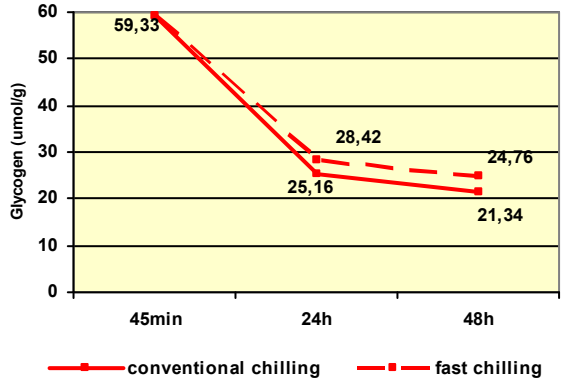

Fig.2 The influence of chilling method on glycogen content in LL muscle

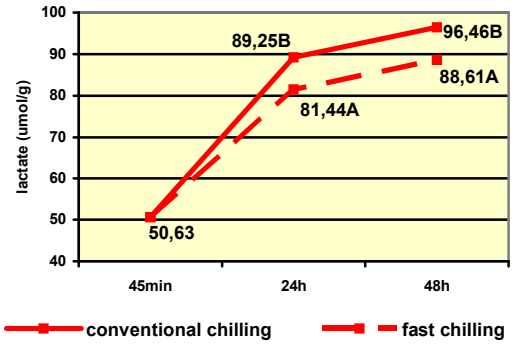

Fig.3 The influence of chilling method on lactate concentration in LL muscle

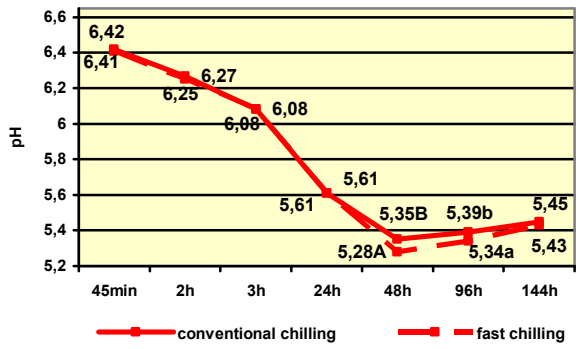

Fig.4 The pH as the function of time in LL muscle from fast and slow chilled carcasses