PE1.50 The Correlations Between The Level Of PKM2 And CAST Genes Expression And Quality And Technological Usefulness Of Pork Meat 306.00

Katarzyna Antosik (1) ekrzecio@wp.pl, Halina Sieczkowska(1), Andrzej Zybert 1, El¿bieta Krzêcio 1 Mariusz Pierzcha³a 2 Pawe³ Urbañski 2 Maria Koœwin-Podsiad³a 1
(1)University of Podlasie
(2)Institute of Genetics and Animal Breeding PAN

Abstract— The studies aimed at the dependencies between expression level of PKM2 and CAST genes and chemical composition, physicochemical properties and technological usefulness of pork meat. The studies covered a total of 65 porkers: 20 purebred Danish Landrace [L], 22 crossbreeds Landrace x Yorkshire - [LxY] and 23 three-breed crosses (Landrace x Yorkshire)xDuroc [(LxY)xD]. Significant correlation (r=0,69) between expression level of PKM2 gene and intramuscular fat content noted in Landrace group, and in consequence almost 10 time higher expression level of PKM2 gene among Landrace fatteners with IMF>2% (in comparison to groups with IMF≤2%) suggests the possibility of selection animals with preferred by consumers IMF content (2-3%) in breeding work in Landrace breed.**

Key words: Pigs, expression, meat quality, intramuscular fat

I. INTRODUCTION

Pyruvate kinase, which catalyses the metabolism of phospho-enolo pyruvate to pyruvate acid, in anaerobic conditions reduced to lactic [11]. Pyruvate kinase appears in four form [5, 14]. Forms M1 and M2 are coded by gene PKM2 [9]. The relation between the polymorphism of gene PKM2 and glycogen content in LL muscle at 45 min was reported by Fontanesi el al. [2] and Sieczkowska el at. [13]. Calpastatin (CAST) gene is an endogenous inhibitor of calpain, and its proteolytic activity depends on the level of calcium. The relation between the polymorphism of calpastatin gene and qualitative and technological properties of pork are also emphasized [6, 7]. The studies aimed at the dependencies between expression level of PKM2 and CAST genes and chemical composition, physicochemical properties and technological usefulness of pork meat.

II. MATERIALS AND METHODS

The studies covered a total of 65 porkers: 20 purebred Danish Landrace [L], 22 crossbreeds Landrace x Yorkshire - [LxY] and 23 three-breed crosses (Landrace x Yorkshire)xDuroc [(LxY)xD]. The animals were slaughtered using electric (INARCO line, STORK) and bleeding lying down, 2-4h after transportation. The quality of meat was evaluated after slaughter on the musculus Longissimus lumborum (LL), on the basis: pH of the muscle tissue measured directly in the LL muscle 35 min, 2h, 24h, 48h, 96h and 144h post mortem, electric conductivity (EC), 2h and 24h post mortem, colour lightness (L*, Minolta CR310), rate of ATP breakdown expressed by R1 =IMP/ATP indicator at 45 min post mortem [4], water holding capacity (WHC) [3 as modified by 10], drip loss at 48h, 96h and 144h [12], technological yield in the curing and thermal processing (TY). The samples cut from the LL muscle at 45 min post mortem were analysed for the glycolytic potential (PG) and content of glycogen and lactate using enzymatic methods. The GP was calculated according to Monin & Sellier [8]. The chemical composition of muscle tissue was also analysed. The total RNA was isolated of muscle probes (LL) according to Chomczyñski and Sacchi [1]. Quantitative analyses of mRNA transcript were performed by real-time PCR methods apparatus was used for analysis of PKM2 and CAST expression. The PCR amplification was performed in a 7500 ABI PRISM apparatus (Applied Biosystems, USA). As reference gene ß-actin gene was used. The results obtained were elaborated statistically using Statistica PL. 6,0. Dependencies between expression level of PKM2 and CAST genes and analysed meat quality traits were estimated as correlation (r) and regression (b) coefficients.

III. RESULTS AND DISCUSSION

The genetic group was influenced on expression level of PKM2 and CAST genes. The highest expression of PKM2 gene in (LxY)xD group was noted, whereas the highest expression of CAST gene was noted in Landrace group (the detail results are presented in paper prepared to publish in Meat Sci.).

In Landrace group the statistically confirmed correlations between PKM2 gene expression level and IMF (intramuscular fat) and water content, R1 and TY indicators values were noted. In LxY group the PKM2 gene expression was statistically correlated with R1 and pH24 (Table 1). The correlation of PKM2 gene with WHC and drip loss during storage from 48 to 144 h post mortem was statistically confirmed in (LxY)xD genetic group (Table 1). The expression level of CAST gene among Landrace fatteners was correlated with pH2 and IMF content. In (LxY)xD group CAST expression was significantly correlated with protein and lactate content, and pH96. In LxY genetic group the correlations between CAST gene expression level and meat quality and its technological usefulness weren't noted (Table 2).

From practical point of view it should be stressed the correlation (r=0,69**) between PKM2 gene expression level and IMF content (in LL muscle) confirmed in Landrace breed because of IMF association with sensory properties of meat, as tenderness, juiciness, taste. Above mentioned dependency induced the analysis of PKM2 gene expression level in Landrace breed, in groups of fatteners differentiated by IMF content in LL muscle: I – up to 1%; II-1-2%; III > 2% IMF (Fig. 1). It was state that in group with IMF>2% (preferred by consumers) the expression level of PKM2 gene is significantly higher than in groups of animals with lower IMF content: from 1 to 2% and below 1% (13,01 vs. 1,99 and 1,41 respectively) (Fig.1)

IV. CONCLUSION

Noted significant correlation (r=0,69**) between expression level of PKM2 gene and intramuscular fat content, and in consequence above 9 time higher expression level of PKM2 gene among Landrace fatteners with IMF>2% (in comparison to groups with IMF<1%) suggests the possibility of selection in Landrace breed animals with preferred by consumers IMF content (>2%). The obtained results should be confirmed on more numerous group of animals.

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