PE1.49 The accordance of RN- phenotype with polymorphism of PRKAG3 gene of (Landrace x Yorkshire) x Hampshire fatteners 305.00

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Abstract—The aim of investigations was to analyse the accordance of RN- phenotype with polymorphism of PRKAG3 gene and their relationship with intensity of glycogenolysis and meat quality values of (Landrace x Yorkshire) x Hampshire fatteners. The work was conducted on 60 fatteners. The faster decomposition of glycogen (to 48 hours after slaughter) among fatteners with GP>190mol/g was obtained, where almost 4 time intensive glycogen changes at the 24-48h and almost 2 time at all the time 45-48h were stated. In this groups of fatteners meat ripening (meat tenderization) is extended to 30 h post mortem. Until in this time the pH to attain typical acid meat value, in spite using of fast chilling. From among the analysed porkers, genotype PRKAG3 is not near to phenotype RN-. The low agreement (almost 6%) of phenotype RN- with genotypes PRKAG3 was found.

Index Terms—PRKAG 3, phenotype RN-, pigs, meat quality

I. INTRODUCTION

Many studies have been shown to influence the RN gene on muscle glycolytic potential, glycogen content, pH measured 24 hours after slaughter, colour, water holding capacity and technological yield in pigs [2,6,7,8]. In 2000 year Milan et al. [9] found PRKAG3 200Q mutation responsible for the RN- allele but the Rendement Napole locus has been identified only in the Hampshire breed or in pig lines with Hampshire blood. Other mutations of the PRKAG3 gene (V199I, T30N, G52S) affecting glycogen content, ultimate pH and colour, has been found in breeds other than Hampshire [1,3,12]. The objective of investigations was assessment the accordance of RN- phenotype with polymorphism of PRKAG3 gene and their relationship with intensity of glycogenolysis and meat quality values of (Landrace x Yorkshire) x Hampshire fatteners.

II. MATERIALS AND METHODS

The investigations covered 60 fatteners (Landrace x Yorkshire)xHampshire. The animals were fed a full bath feed. The animals were slaughtered 2-4 hours after transportation using electrical stunning method and recumbent bleeding out (Inarco system). The carcasses were chilled in three-phase chilling tunnel (-10 ºC - 15 min, -15 ºC - 25 min and -5 ºC - 40 min. with air velocity 3m/s). The following meat quality characteristics were determined: pH of meat measured directly in longissimus lumborum (LL) muscle (45 minutes, 2, 3, 24, 30, 48, 96, 144 hours after slaughter) using pH-Master apparatus produced by Draminski., electrical conductivity (EC) evaluated in 35 minutes, 120 minutes and 24 hours post mortem using LF-Star apparatus (Matthaus -Germany), R1 indicator expressed as IMP/ATP ratio at 45 minutes post mortem according to Honikel and Fischer [5], meat lightness (L*) measured Minolta CR-310 Chroma Meter in CIE L*a*b* system, water holding capacity (WHC) according to Grau and Hamm [4] with Pohja and Niniivaara [13] modification, technological yield in cured and cooked meat (24 hours after slaughter) according to Naveau et al. [11] with a modification of temperature in geometric centre of the probe (72°C), drip loss determined in 48, 96 and 144 hours post mortem according to Prange et al. [14] and shear force of cooked meat (in 48 hours after slaughter) using the TA.TX Expresse Analyzer with Warner-Bratzler device. Besides, analysis of protein, fat, water and dry matter content in LL muscle, was performed. At 45 minutes post mortem, samples from LL muscle were collected into the tubes with 0.5M PCA for later determination of the glycolytic potential (GP) according to formula proposed by Monin and Sellier [10]. The phenotype of RN gene was identified on the basis of glycolytic potential (GP) and its threemodal distribution: rn+rn+ (GP□130□mol/g),RN-/rn+ (GP 130,1-190□mol/g),RN-/RN- (GP>190□mol/g) (Fig.1). The polymorphism of PRKAG3 gene was identified

according to Milan et al. [9]. The data were analysed using one-way analysis of variance in non-orthogonal scheme. The significance of differences between means was calculated using Duncan's test.

III. RESULTS AND DISCUSSION

In animals with phenotype RN-/RN- (GP>190mol/g) in comparison to rn+/rn+ (GP□130□mol/g) and RN-/rn+ (GP 130,1-190mol/g) most intensive glycolytic changes, expressed by higher acidification of muscle longissimus lumborum from 2 to 144 h after slaughtered was found (Tab. 1). It was confirmed by highest water content, lowest protein content, highest drip loss measured since 24 to 144 h post mortem, lowest water holding capacity and technological usefulness of meat (TY). The faster decomposition of glycogen (to 48 hours after slaughter) among fatteners with GP>190mol/g was obtained too, where almost 2 time at all the time 45-48h were stated (Fig.2). It should be stressed that the intensity of glycogen decomposition in 45 min – 24h period in RN-/rn+ and RN-/RN- was similar and above 1,5 time faster that rn+/rn+. In period 24-48h 4 time higher intensity of glycogen decomposition was noted only in RN-/RN- group of fatteners. Probably it may be explain by higher energetic resources in vivo in the form of phosphocreatine which is a phosphorus source for ATP resynthesis in RN-/RN- fatteners. Obtained results was shown that in this groups of fatteners meat ripening (meat tenderization) is extended to 30 h post mortem (Tab.1). Until in this time the pH to attain typical acid meat value, in spite using of fast chilling. In ours investigation, the influence of PRKAG3 gene and RN- phenotype on pH45, electrical conductivity, R1, meat lightness, shear force and fat content was not stated. In this investigations, the analysis of polymorphism of PRKAG3 gene was not shown described above the porkers with genotype AA (RN-/RN-). The GG (rn+/rn+) animals as compared to AG (RN-/rn+) fatteners has a lower glycolytic potential and glycogen content from 45 min. to 48 h post mortem, higher protein content, pH144 (only) and technological yield (TY) and lower drip loss measured since 24 to 144 h after slaughter (Tab.1). Obtained for GG animals high values of glycolytic potential and glycogen content, non typical for rn+/rn+ phenotype (and high Sd for GP in this group), and non statistically significant differences between AG and GG genotype for pH value (from 2 to 96 h) suggested that genotype PRKAG3 is not near to phenotype RN-. In addition, from among the analysed porkers, the low almost 6 % agreement of phenotype RN- with genotype PRKAG3 was noted.

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