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GLYCOLYTIC POTENTIAL AND MEAT QUALITY IN CROSSBREED PIGS OF DIFFERENT GENETIC GROUPS *

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SUMMARY

The aim of the present study was to investigate of possibility evaluations of meat quality in live crossbred pigs with HAL^n and RN^- genes by using biopsy technique with glycolytic potential and lacate aplication. Twenty four crossbreed pigs were used in this study: 6 pure breed large white (LW); 6 crossbred LW with polish landrace (PL) and hampshire (H); 6 crossbred LW*PL with pietrain (P); 6 crossbred LW*PL*P-76. In biopsy samples taken from Longissimus lumborum muscle the glycolytic potential (GP) and lactate were evaluated. Meat quality after slaughter were estimated on the basis of pH_1, pH_{24}, R_1 (IMP/ATP), muscle lightness, WHC and RTN in the LD muscle. The LW pigs shown better meat quality, lower GP and lactate level. The crossbreed LW*PL*P shown the meat characterised for stress susceptible pigs and crossbred with Hampshire blood the meat as RN^- gene carriers. The lactate content is significantly correalted (pH_1 r=-0.48*; R_1, r=0.62**, WHC r=0.46*) with traits affected by halothane susceptibility gene and glycolytic potential with the others (pH_{24} r=-0.40*, meat lightness r=0.39*, RTN r=-0.55*) influenced by RN^- gene.

INTRODUCTION

Actualy two major genes (HAL^n and RN^-) have ben recognized as influencing meat quality in pigs but in different way. The recessive gene of halothane sensitivity HAL^n showed the prominent role in determining PSE meat, characterized by a fast post mortem pH fall (SELLIER and MONIN 1994). Whereas a dominant unfavourable for meat quality RN^- gene , that does "acid meat", influenced post mortem pH extend, increased muscle glycogen and decreased technological yield of meat during cured cooked ham processing (NAVEAU 1986, LE ROY et al. 1990, MONIN 1994). SELLIER and MONIN (1994) noted that moreover a large part of the variation in meat quality can be attributed to a polygenic determination. Therefore, though for both genes are elaborated methods of identification the animals that can be of their carriers, are continuous investigations for evaluation meat quality in the live animals by using the biopsy technique. LE ROY et al. (1994) showed, that glycolytic potential was a good selection criterium in the population when the RN^- gene was obserwed and others autors showed that many parameters measured in biopsy samples can be used for evaluation of meat quality in populations with HAL^n gene (LENGERKEN et al. 1991, CHEAH et al. 1993, KOĆWIN-PODSIADŁA et al. 1994, LAHUCKY et al. 1994a, 1994b).

The aim of the present study was to investigate of possibility evaluations of meat quality in live crossbred pigs with HAL^n and RN^- genes by using biopsy technique with glycolytic potential and lacate aplication.

MATERIAL AND METHODS

Twenty four crossbred pigs were used in this study: 6 pure breed large white (LW); 6 crossbred LW with polish landrace (PL) and hampshire (H); 6 crossbred LW*PL with pietrain Nn boar (P); 6 crossbred LW*PL*P-76 (crossboar from PEN AR LAN French company where were founded two lines with breds: hampshire, duroc, pietrain, large white; where RN^- gene was obserwed NAVEAU 1986, LE ROY et al. 1990). The biopsies were made at a liveweight of 70 to 80 kg. The biopsy samples were taken using "Spring biopsy" aparatus produced by "Biotech" Slovak firm, from the *Longissimus lumborum* muscle according to procedure described by TALMANT et al. (1989). Immediately after taking, the biopsy samples were weighed and then homogenized in 10 ml of 0.5 M perchloric acid. Aliquots of homogenate were taken for determination of glycogen, glucose and glucose-6-phosphate following the procedure of DALRYMPLE and HAMM (1973). Lactate was determined in the supernate resulting from the centrifugation of the homogenate (BERGMEYER 1974). Glycolytic potential (GP) was calculated according to MONIN and SELLIER (1985): Glycolytic potential=2x([glycogen]+[glucose-6-phosphate]+[glucose])+[lactate].
The animals were slaughtered in one series at slaughter weight about 100 kg in the same slaughterhouse by electrical stunning (180-220 V; 0.5-0.8 A; 8 s). Meat quality was evaluated on the *Longissimus dorsi(LD)* muscle at the level of the last rib. In the longissimus dorsi muscle were evaluated pH_1 and R_1 (IMP/ATP) value at 45 min. after slaughter. In 24 hours after slaughter the pH_{24}, muscle lightness and WHC were evaluated. Muscle lightness were determined using an apparatus Momcolor-D3098 with white standard. The R value was determined according to the method of HONIKEL and FISCHER (1977) as ATP breakdown indicator. WHC was evaluated according GRAU and HAMM (1952) in POHJA and NINIVAARA (1957) modification. The pH values was recorded using microcomputer pH meter with a combined glass electrode in muscle homogenates. The technological yield in the cured cooked ham processing (RTN) was evaluated according to NAVEAU et al. (1985) but on the LD muscle. Data were analyzed using classical procedures of one-way analyzis of variance and simple correlations were calculated on the whole material.

RESULTS AND DISCUSSION

The results of the present study shown that LW pigs have the better meat quality (table 1) than other investigated genetic groups and also low GP agree with results of TALMANT et al. (1989) and lactate level in muscle samples obtained by biopsy technique. This results concerning that this breed is free from HAL^n and RN^- genes. In the group LW*PL*P (containing 75% of blood stress sensitive breeds) is obtained the higher lactate level and meat quality parameters indicated a possibility of PSE meat existence that is agree with many research studies. The group with Hampshire breed shown higher GP, lower ultimate pH and also technological yield of meat (table 1) charcteristics for animals with RN^- gene that induces "acid meat". Similar results were obtained by different authors for crossbred pigs with Hampshire blood and for RN^- gene carriers as has been described by MONIN (1994).

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Table 1
The results of biopsy and meat quality parameters measured in different genetic group of pigs

Traits	Genetic groups			
	LW	LW*PL*H	LW*PL*P	LW*PL*P-76
Biopsy:				
lactate (μmol/g)	a 8.0(1.52)	a 6.68(0.58)	b 13.71(1.90)	a 6.95(0.58)
GP (μmol/g)	a 162.48(1.26)	b 206.81(20.94)	a 167.11(13.28)	c 258.55(20.65)
Post mortem:				
pH_1	a 6.32(0.12)	a 6.23(0.14)	b 6.03(0.20)	a 6.28(0.11)
pH_{24}	ab 5.71(0.41)	a 5.48(0.05)	b 5.72(0.10)	ab 5.52(0.03)
R_1	0.91(0.02)	0.95(0.05)	1.05(0.07)	0.95(0.04)
meat lightness	a 15.14(0.66)	ab 16.77(0.63)	ab 17.85(1.92)	b 19.05(1.32)
WHC(cm^2)	4.02(0.25)	4.96(0.46)	5.50(0.45)	4.96(0.76)
RTN(%)	a 95.40(0.91)	b 89.03(0.89)	b 90.08(1.70)	b 89.33(2.15)

Results are given as means and standard error of mean; means signed by different letter are different at the P<0.05 level.

Table 2
The correlations between biopsy studied parameters and meat quality measured post mortem

biopsy	post mortem					
	pH_1	pH_{24}	R_1	meat lightness	WHC	RTN
lactate	-0.48*	0.09	0.62**	0.25	0.46*	-0.17
GP	0.01	-0.40*	-0.15	0.39*	-0.15	-0.55*

-P<0.05;-P<0.01*

Obtained correlations coefficients shown in table 2, between glycolytic potential and lactate level in biopsy samples with meat quality traits measured post mortem confirm the interest of the biopsy technique to predict the potential meat quality of live pigs. The lactate content is significantly correalted with traits affected by halothane susceptibility gene and glycolytic potential with the others influenced by RN^- gene.

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