THE INFLUENCE OF CARCASS WEIGHT OF FATTENERS WITH DIFFERENT HAL GENOTYPE ON CARCASS LEANNES AND SELECTED TRAITS

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BACKGROUND

In attainable literature is not many scientific elaboration concerned main topic of this paper. Researches realised for first time by Canadian scientists in 1991 (Sather et al.) and concerned influence of hot carcass weight (HCW) on meat quality of heterozygous fatteners raised huge interest of investigators from this range. French investigations of Larzul et al. (1997) in analogous methodical scheme (fatteners NN, Nn and nn - diagnosed in contrary to mentioned above results, not halothane test but DNA analysis) didn't confirm Canadian researches concerned intensification of unfavourable effect of HAL^n allele for quality traits of raw meat with increase of slaughter weight heterozygous fatteners (90 and 125kg).

OBJECTIVES

Published and mentioned above controversial results make a base to analysis the influence of carcass weight of fatteners with different HAL^n genotype on carcass leanness and selected traits of meat quality.

MATERIAL AND METHODS

The investigations were carried out on 267 animals - with different HAL^n genotype (NN-104, Nn-126,nn-37) - originated from experimental herd of University of Podlasie in Siedlce at Farm in Zawady. The HAL^n genotypes were identified by PCR/RFLP method (Fuji et al. 1991, Kurył and Korwin-Kossakowska 1993). The animals were slaughtered over 2 years (10-15 animals in month), in 2-4 hours after transportation in morning hours. The day after slaughter the chilled (in temperature 4°C) half carcasses of all animals were subjected to partial dissection according to method using in polish Pig Testing Stations for estimation of the carcass quality. Analysed material in each genetic group was after slaughter classified according to hot carcass weight as follows: I class - HCW≤ 74,9 kg, II class - HCW 75 - 84,9 kg , III class HCW≥85 kg. In the muscle *Longissimus lumborum* meat quality traits such as pH_{45}, pH_{24}, R_1 (IMP/ATP) and muscle lightness were evaluated. The pH values were recorded using a microcomputer pH-meter with combined glass electrode in muscle homogenates. The R-value was determined according to method of Honikel and Fischer (1977) as ATP breakdown indicator. Muscle lightness was determined using an apparatus Momcolor-D3098 with white standard. Frequency of PSE meat estimated according to pH_{45} and R_1 values (pH_{45}≤ 5,8 and R_1≥ 1,05)(Honikel and Fischer 1977).

Data were analysed using classical procedures of two-way analysis of variance (Ruszczyc 1981). The differences between means for groups were calculated using Turkeys' test (Oktaba 1980). The analysis of results is concentrate only on recommended in breeding programs (both national and foreign) genetic type, i.e. on resistant on stress fatteners and heterozygous animals. Lack of detailed analysis of results for class HCW - stress susceptibility fatteners was dictated small number of animals in this group, what make impossible for correct conclusions. Coefficients of phenotypic simple correlation between meatiness and estimated parameters of meat quality calculated for all material and for each HAL^n group.

RESULTS AND DISCUSSION

Analysis of variance showed significant influence HAL^n genotype on meatiness, acidification of muscle *Longissimus lumborum* in 45 minutes post mortem and R_1 value. Hot carcass weight influenced only on meatiness. Interaction both investigating factors noted for pH_{45} value (tab.1).

Obtained in this work coefficients of phenotypic simple correlations between hot carcass weight and investigating factors i.e. meatiness, pH_{45}, pH_{24}, R_1 and meat lightness, and calculated for all population were significant only between HCW and meatiness (r= - 0,27**). Correlation between HCW and selected meat quality traits were low and statistically not significant (tab.2). Interesting appears fact, that correlation between HCW and pH_{24} wasn't confirmed statistically, nor for all population nor in each group diverse HAL^n genotype. Reason of this, is signalled by many authors lack of influence HAL^n gene on final acidifying muscular tissue.

Remaining dependencies are connecting with genetic load animals HAL^n gene. Highest value correlation between HCW and pH_{45} showed for stress susceptibility animals - nn (r= 0,44**) and then for heterozygous animals - Nn (r= 0,23**). Acidification muscle tissue resistant on stress animals measured in 45 minutes post mortem didn't depend statistically from hot carcass weight (r= -0,18), but in comparison to carriers of HAL^n gene, together with increase of HCW, showed different direction of changes. Observed occurrence in relation to direction of changes pH_{45} value together with increase HCW was confirmed by statistically proved dependence both investigating factors ie. HAL^n genotype and HCW (tab.1). It shows on decreasing pH muscle tissue in group of fatteners resistant on stress and improvement this trait in group of carriers HAL^n gene, when hot carcass weight is increasing. Presented above correlation coefficients, direction of changes correlated traits and dependence between them, showing on possibility to decreasing frequency oh PSE meat in group of heterozygous fatteners by them slaughtering at higher body mass (HCW>75kg.). It was confirmed by fall of frequency PSE meat for this group (from 36,36% in I class to 21,92% in II class)(fig.1). Most profitable changes in this regard, noted for stress susceptibility fatteners

(from 100% in I class to 42% in III class)(fig.1). Correlation coefficients noted between HCW x R_1 and HCW x meat lightness showing that slaughtering heterozygous fatteners at higher body mass can improve meat quality.

Summing up, for improvement meat quality of heterozygous fatteners would be propagate their slaughtering at higher body mass (even to 115kg.) but it could decrease meatiness at about 3% (r= -0,40**)(tab.1 and 2). Coefficient of correlation for mentioned above traits in population stress resistant animals was lower - -0,34** (tab.2). Loses carried from title of decrease meatiness in production heterozygous fatteners at higher body mass can be with success made up by improvement meat quality and output greater mass of meat from one fattener, what is the main object of interests meat industry.

CONCLUSION

Obtained in this work correlation coefficients, direction of changes correlated traits and dependence between HAL genotype and hot carcass weight showing on improvement quality of raw meat in group of heterozygous (Nn) fatteners through slaughtering them at higher body mass (HCW>75kg.). It was confirmed by fall of frequency PSE meat for this group (from 36,36% in I class to 21,92% in II class). Most profitable changes in this regard, noted for stress susceptibility fatteners (from 100% in I class to 42% in III class)(fig.1).

LITERATURE

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Tab. 1 Influence of genotype HAL and hot carcass weight on meatiness and analysed traits of meat quality

Trait	Class of HCW	HAL Genotype		Influence of factor			NN-Nn
	(n=230)	NN (n=104)	Nn (n=126)	Genotype HAL	Class HCW	Interaction HALxMTC	
Hot carcass weight (HCW)	I (n=74)	70,82 ± 3,44	70,93 ± 2,85		**		
	II (n=125)	78,39 ± 2,54	79,54 ± 2,90				
	III (n=31)	88,16 ± 2,77	88,48 ±2,95				
Meatiness [%]	I	52,05b ± 3,15	54,67B ± 4,13	**	**	NS	-2,62**
	II	51,26ab ± 3,11	52,37A ± 3,25				-1,11
	III	48,90a ± 2,16	51,49A ± 2,22				-2,59**
pH_{45}	I	6,18 ± 0,23	5,89 ± 0,30	**	NS	*	0,29**
	II	6,15 ± 0,25	6,03 ± 0,28				0,12**
	III	6,02 ± 0,24	5,99 ± 0,28				0,03
pH_{24}	I	5,53 ± 0,18	5,45 ± 0,21	NS	NS	NS	0,08
	II	5,48 ± 0,14	5,50 ± 0,17				-0,02
	III	5,53 ± 0,08	5,48 ± 0,15				0,05
Meat lightness	I	16,24 ± 2,70	17,38 ± 3,56	NS	NS	NS	-1,14
	II	17,30 ± 3,07	16,95 ± 3,32				0,35
	III	17,34 ± 3,29	16,92 ± 3,36				0,42
R_1	I	0,98 ± 0,13	1,11 ± 0,16	**	NS	NS	-0,13**
	II	0,97 ± 0,14	1,05 ± 0,15				-0,08**
	III	1,01 ± 0,13	1,04 ± 0,16				-0,03

Explanations: I - HCW ≤ 74,9 kg; II - HCW 75-84,9 kg; III - HCW ≥ 85 kg