Original paper

THE INFLUENCE OF FATTENERS DRY AND LIQUID DIET ON SLAUGHTER TRAITS OF CARCASS SIDES

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Abstract

The study was conducted on 700 fattening pigs, three breed half blood with Duroc as a terminal breed ((Large White x Landrace) x Duroc). The pigs were divided into the two groups according to diet: dry and liquid nutrition. Each group consisted of 350 fattening pigs and used the same feed mixtures in prefattening (CP-3) and fattening (ST). During the period from 24.8 to 60kg they were fed with a CP-3, a crude protein content of 16.37%. During the period from 60kg until the end they were fed with ST, a crude protein content of 15.3%. Muscle tissue processed half-carcasses in slaughterhouses were determined by a device that determines the value of S (fat thickness) and M (muscle thickness) using "method one point." Fat thickness skin in mm, measured 7 cm lateral to the central (median) cutting, in the amount between the second and third ribs of the tail. The thickness of the muscle in mm was measured at the same place as the thickness of the bacon. The results show that the fatling fed dry food had significantly higher carcass weight (80.41: 78.51 kg, $p<0.05$), backfat thickness (16.55: 15.31 mm, $p<0.05$), weight (muscle 55.80: 53.82, $p<0.05$), but a lower percentage of meat (56.6: 57.3, $p<0.05$) as compared to pigs fed liquid food. In finishing pigs fed dry food, between carcass weight and backfat thickness and muscle thickness a positive and significant correlation (0.4267 and 0.4290, $p<0.05$) was found and between carcass weight and lean meat a significant negative correlation (-0. 4236 and $p<0.05$). Between backfat thickness and lean meat in the carcass a negative and significant correlation (-0.8534, $p<0.05$) was found and between muscle thickness and lean meat a positive and significant correlation (0.2857, $p<0.05$). In finishing pigs fed liquid food, between carcass weight and backfat thickness and muscle thickness a positive and significant correlation (0.1800 and 0.3705, $p<0.05$) was found and between carcass weight and lean meat a significant negative correlation (-0. 2178; $p <0.05$). Between backfat thickness and percentage of meat in the carcass negative and significant correlation (-0.8692, $p<0.05$) was found and between muscle thickness and lean meat a positive and significant correlation (0.3168, $p<0.05$).

Keywords: *carcass quality, dry diet, fattened, fat thickness, liquid diet, meat percentage*

Introduction

The importance of pig production in the Republic of Serbia is reflected in the possibility of utilization the existing capacities to produce pigs that in the previous period, due to fluctuations in market prices have remained empty. The potential is reflected in a shorter time period for renewal of livestock (Radović, 2010), using high-quality genetic material, breeding for leanness, modern technology and nutrition (Radović et al., 2012).

In the past, customer requirements were much more different than today's demands. Sometimes, great importance was given to lard and fatty parts of pork, unlike today, when more and more people look for the pure meat of superior quality. Of the total amount of meat produced in Serbia, the share of pork amounted to 57% or 269,000 tones (Statistical Yearbook of the Republic of Serbia, 2011), or 36.9 kg of pork per capita. According to Christensen et al. (2012), carcass leanness directly affects the market value of the meat, as well as NaSkO cost of fattening pigs (Flutura et al., 2010). Carcass quality traits vary influenced by genetic factors, the impact of race (Petrović et al., 2004; Pusic and Petrović, 2004; Petrović et al., 2006), the influence of fathers (Radović et al., 2007) and paragenetic environment factors (Kosovac et al., 2008), methods of breeding, age and weight of fattening pigs at slaughter (Radović et al., 2007; Kušec et al., 2008; Kuželov et al., 2011) castration, diet, season, EUA before, during or after slaughter (Karabasil et al., 2013).

Given that in recent years the cost of food has been constantly increasing and that for many years, preparing a meal for pigs was mainly guided towards meeting the needs of animals for energy and protein to improve daily gain of fattening pigs, there is an increasing interest in improving the quality of pork in recent years and growing need for harmonization of food technology, which would have a positive impact on the quality traits of carcass and meat (Kušec et al., 2010). The aim of this study was to assess the phenotypic variability of traits of carcass quality compared to dry and liquid feeding.

Materials and method

The study was conducted on 700 fattening pigs, genotype with Duroc as a terminal breed ((Large White x Landrace) x Duroc). The pigs were divided into two groups according to diet: dry and liquid nutrition. Each group consisted of 350 fattening pigs and used the same feed mixtures in pre-fattening (CP-3) and in fattening (ST). During the period from 24.8 to 60kg they were fed with a CP-3, a crude protein content of 16.37%. During the period from 60kg until the end they were fed with a ST, a crude protein content of 15.3%. The group liquid diet consumed CP-3 and ST mixed with water in 1:3.5. The average initial weight of fattening pigs was 24.8 kg and 100.5 kg of final. The average age at the beginning of fattening was 69 days. Total duration of fattening was 86 days. The average weight of finishing pigs fed dry food in the end was 100.5 kg and those fed with liquid food 99.9 kg.

The study included following traits: carcass weight, backfat thickness, thickness of muscle and meat content in carcass.

Share of muscles of the carcass processed in slaughterhouse was found by means of a device that determines the value of S (fat thickness) and M (muscle thickness) using "one point method". Fat thickness skin in mm was measured 7 cm lateral to the central (median)

plane cutting, in the amount between the second and third ribs of the tail. The thickness of the muscle in mm was measured at the same place as the thickness of the bacon. Descriptive statistics, analysis of variance and the association of these characteristics were performed in the statistical program Statistics 12 (StatSoft, Inc. 2005).

Results and discussion

Average values and variability in quality of carcass traits are shown in Table 1, where we can see that the fatteners fed dry food had higher carcass weight at the end of trial compared to pigs fed liquid food (80.4:78.5 kg). Analysis of variance was statistically significant at $P<0.05$. According to Sencic et al., 2005, final body weight in fattening is a genetically determined trait which in certain genotypes exists at a lower final weight, increasing the share of adipose tissue as a result of less efficient use of food. The same authors state that with very fleshy fatling, the limiting factor shifted to higher final body weight. In the same table we can see that the fatteners fed dry feed had a greater thickness of back fat (16.5: 15.3 mm) and the thickness of the muscle (55.8: 53.8 mm) as compared to the pigs fed liquid diet. Analysis of variance was statistically significant at $P<0.05$. According to Flutura et al. (2010), a difference that occurs in the thickness of the back fat and muscle is in a different efficiency of the use of food, which is prepared and distributed according to the application of certain diet technologies. Vincek et al. (2008) in their results highlight that the impact of the food treatment of fattening pigs greatly affects fat thickness and muscle. Kušec (2008) points out that feeding regimen represents a major biotic factor that directly affects the increase in appropriate circumstances which can fully exhibit genetic potential. The same author Kušec et al. (2010) states that a restrictive diet and installments positively increase carcass leanness.

In the same table it can be seen that the fattening swine fed liquid diet had a higher percentage of meat than fattening pigs fed dry diet, although they had a lower final weight and less thickness of the muscle (56.6: 57.3%). Analysis of variance was statistically significant at $P<0.05$. This research partly corresponds with the study of M. Petrović et al. (2006) in which a very weak negative correlation between the total mass and share of "France" processing of carcasses was considered, as well as research by Doeschl-Wilson et al. (2005) that highlights the impact of the final mass of the content of some parts of the hemisphere.

Table 1. *Average values and variability characteristics of carcass weight, backfat thickness, muscle thickness and carcass leanness*

Performance	Mean		Std.Dev.		Var.Coef.		Standard	
	dry food	liquid food	dry food	liquid food	dry food	liquid food	dry food	liquid food
Mass carcass, kg	80.4	78.5	8.44	7.49	10.50	9.54	0.451	0.400
Backfat thickness, mm	16.5	15.3	2.53	3.22	15.29	21.06	0.135	0.172
Muscle thickness, mm	55.8	53.8	6.66	6.96	11.94	12.93	0.356	0.372
Meatiness, %	56.6	57.3	2.56	2.78	4.52	4.85	0.137	0.149

The phenomenon of growth in pigs was intensively studied for a long time as the material basis of pig production. Given the complexity of the problem of growth the research was carried out with different approaches. According to Vincek et al. (2008) the most common is a temporal increase in the size which implies an increase in the body per time unit and the algometric approach which involves an increase in carcass parts (tissues or organs) in relation to the increase in weight of mercury. Therefore, according to the same authors, in this case, we often speak of the differential or relative growth.

Table 2. *Phenotypic correlation carcass weight, backfat thickness, muscle thickness and carcass leanness in finishing pigs fed dry food*

Performance	Mass carcass, kg	Mass carcass, kg	Muscle thickness, mm	Meatiness, %
Mass carcass, kg	1.0000			
Backfat thickness, mm	0.4627*	1.0000		
Muscle thickness, mm	0.4290*	0.0983	1.0000	
Meatiness, %	-0.4236*	-0.8534**	0.2857*	1.0000

*correlations are significant at p<0.05
**correlations are significant at p<0.01

Phenotypic correlation of carcass traits were different strengths (from very weak to complete) and signs (tables 2 and 3). In both groups of fattening pigs the positive correlation was demonstrated between carcass weight and backfat thickness and muscle (0.4627 and 0.4290, 0.1800 and 0.3705) at a significance level of p<0.05. This is consistent with the research of M. Petrović et al. (2006) which states that between net daily gain and hot carcass fat thickness a positive, weak to very weak correlation was determined. Between the thickness of the muscle and leanness, in both groups of fattening pigs positive correlation at a significance level of p<0.05 (0.2857 and 0.3168) is manifested.

Table 3. *Phenotypic correlation carcass weight, backfat thickness, muscle thickness and carcass leanness in finishing pigs fed liquid food*

Performance	Mass carcass, kg	Mass carcass, kg	Muscle thickness, mm	Meatiness, %
Mass carcass, kg	1.0000			
Backfat thickness, mm	0.1800*	1.0000		
Muscle thickness, mm	0.3705*	0.0672	1.0000	
Meatiness, %	-0.2178*	-0.8692**	0.3168*	1.0000

*correlations are significant at p<0.05
**correlations are significant at p< 0.01

The research of Petrović et al. (2006) states that the phenotypic correlation between fat thickness and meat content in carcass was complete, the negative and statistically

significant (-0.904 and -0.911) which is consistent with our results, where we found a negative phenotypic correlation, a complete and highly statistically significant (-0.8534 and -0.8692). The author also expressed phenotypic negative and significant correlation between carcass weight and leanness, in both groups of fattening pigs (-0.4236 and -0.2178, $p<0.05$). These results suggest that the application of certain diet technologies can influence the expression of genetic predisposition and finishing pigs as stated in the research by Kušec et al. (2010). Wrong diet technologies can cause greater deposition of fat rather than muscle tissue deposition. Vincek et al. (2012) states that according to the results obtained by monitoring the biological maximum and coefficient of asymmetry, during this period in dissected fatteners, they represent the basis for the definition of efficient mathematical model for predicting the growth of live weight and muscle tissue. This is why tests are aimed at testing the temporal and differential growth in order to obtain mathematical models for testing the impact on growth and development of carcass, where special emphasis is placed on the impact of technology of the diet (Vincek et al., 2008; Kušec et al., 2008).

Conclusion

The use of appropriate diet technology for fattening pigs, using the dry or liquid diet greatly affects achievement of greater leanness and thus of more effective expression of genetic predisposition in porkers by which the efficiency of production can be achieved.

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