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IMPROVING PORK QUALITY THROUGH GENETICS AND NUTRITION*

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Abstract

Meat quality is a complex issue that encompasses several physicochemical factors. Adequate levels of quality parameters determine meat palatability, appearance and processing suitability, i.e. attractiveness for the consumer. In addition, traits such as cholesterol content, composition and proportions of fatty acids, and vitamin and mineral content determine the health value of meat. In Poland, pork is the most popular meat. Improvement of the national pig population for increased lean content has negatively affected many parameters of meat quality. This problem is common to most pig producers in the world. It is therefore increasingly important to pay attention to improving meat quality, especially through breeding work. Considering the relationships between carcass meat quantity and quality, the importance of pork quality examination and monitoring should be stressed. Breeding programmes should be carefully formulated based on monitoring results to improve and consolidate the desired levels of quality parameters in the active population of pigs. The application of the results obtained using population genetics, coupled with efficient feeding and high health status of the farm should produce expected results in terms of good quality of pork.

Key words: pork, genetic, nutrition, physicochemical traits, quality improvement

As a species of food-producing animals, pigs continue to play a major role in Poland's food economy. Poland has a long tradition of pig husbandry and breeding, with purposeful breeding work dating back to the 1930s, when first pig testing stations were established based on Scandinavian methods of evaluation. It is notable that Poland had a large population of pigs (around 7 million) during that time. The well-developed sector of pig husbandry and breeding is associated with the tradition of Polish pork consumption. Pig meat is the most popular type of meat in Poland, where per capita pork consumption has been traditionally high (around 40 kg) and continues to grow despite a considerable expansion of poultry meat production (Urban, 2006). Due to the high share of pork in total meat consumption, pig breeders face a challenge

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in finding ways to obtain pork characterized by good taste, culinary, technological and dietetic properties while retaining the high percentage of lean meat. These objectives can be accomplished mainly through efficient breeding work.

Selection indices that have been used in pig breeding since the 1970s to implement breeding programmes relied only on fattening traits (daily gains) and slaughter traits (backfat thickness), on lean meat percentage in later years, and on ham weight and loin eye area in the case of slaughter analysis (Stan Hodowli…, 2005). The current breeding programme is based on genetic values estimated by BLUP Animal Model. However, the models used to evaluate the breeding value of Polish pigs still account for no meat quality traits (Żak and Różycki, 2008). This kind of selection and breeding work may and often does have a negative effect on both the quality traits of most valuable pork cuts and meat quality traits as a result of a negative relationship between slaughter and quality traits (Moller and Iversen, 1993; Blicharski et al., 2003; Blicharski et al., 2004). The meat quality was also affected to some extent by the use of high-lean Pietrain pigs in the breeding programmes. In addition, a number of genetically conditioned meat defects also emerged (Koćwin-Podsiadła and Krzęcio, 2004; Koćwin-Podsiadła et al., 2006). These factors resulted in lower meat acidity, increased electrical conductivity, higher drip loss, poorer meat colour and reduced content of intramuscular fat (Sonesson et al., 1998). In addition to genetic tests for presence of undesirable genes, these adverse phenomena can be avoided by introducing meat quality parameters into modern systems of breeding value estimation (Lonergan et al., 2001). In discussing meat quality it is necessary to note characteristics that are important to the consumer, namely the visual appeal and taste of meat. The former includes colour, purge loss and, indirectly, ratio of fat to muscle tissue (Lonergan et al., 2007). The latter group encompasses sensory parameters such as hardness, chewiness and elasticity, which are controlled by biochemical processes taking place in muscle tissue postmortem (Huff-Lonergan and Lonergan, 2007). Another important parameter is thermal drip of meat (Westphalen et al., 2006). Because many of the quality traits mentioned above are correlated (either negatively or positively), meat quality should be viewed comprehensively when improving the pig population so as to benefit both consumers and the meat industry (Barbut et al., 2008).

Genes controlling carcass and meat quality in pigs

Carcass quality (lean and fat content) and meat quality are quantitative traits whose values result from the simultaneous influence of a gene or many genes known as quantitative trait loci (QTLs) and the environment. Genes vary in their contribution to production traits. The influence of some genes on a given trait can be particularly prominent compared to other genes and the environmental impact. These genes are known as major genes. Major genes in pigs include the stress-sensitivity gene $RYR1^{T}$ (Hal^{n}) that has a positive effect on carcass lean content and a negative effect on meat quality, and the *PRKAG3* (RN^{-}) gene that controls Hampshire-type acid meat. The location in the porcine genome and the identification of genes with a large effect on quantitative traits have been the subject of intensive studies in Polish and foreign research centres over the last fifteen years (Kurył and Korwin-Kossakowska, 1993; Yerle et al., 1995; Milan et al., 2000; Miller et al., 2000; De Vries et al., 2000).

Another important gene affecting pork quality is the *PKM2* (pyruvate kinase muscle) gene, which is responsible for the glycogen content of muscle tissue (Fontanesi et al., 2003). The research projects underway are designed to create the pig genome map, i.e. to assign the largest possible number of class I (erythrocyte antigens, polymorphic blood proteins, allotypes) and class II genetic markers (microsatellite DNA sequences) to all chromosomes, such that the genetic distance between markers localized on a chromosome is less than 20cM. This will provide the conditions needed to identify (using appropriate analyses) the linkages of those genes which affect the level of certain quantitative traits. Malek et al. (2001) published a pig genome map which indicated the localization of QTLS potentially affecting the parameters of meat quality. Of the genetic markers that have been identified to date, microsatellite DNA sequences have proved extremely useful in localizing and detecting QTLs (Rotschild and Ruvinsky, 1998). Currently there are two basic methods for identification of QTLs. The first method is to map putative QTLs in the pig genome based on analysis of linkages between productive traits and genetic markers (Meadus, 1998; Rejduch et al., 2005). The second method evaluates the effect of the polymorphism of candidate genes (with known base sequence) on QTL value (Óvilo et al., 2002; Brym and Kamiński, 2006). QTL mapping in the pig genome requires consideration of more than ten factors that make the analysis successful. At least two breeds should provide the initial material, one characterized by a high value of a given trait and the other by a low value of this trait. The analysis should also account for the proper number of genetic markers with known location in the pig genome. Animal material should be characterized by appropriate polymorphism of genetic markers and alleles characteristic of every pig breed or line analysed should be present. Putative QTL linkages with genetic markers are analysed for the F_2 generation (or beyond) using statistical tests by localizing genes affecting the level of a quantitative trait to certain regions of respective chromosomes. To date, a number of important relationships between genotypes of different genetic markers and production traits have been described. A classical example for identification of a QTL using genetic markers is the pig stress-sensitivity gene *RYR1*^{T} (Fujii et al., 1991).

The most important traits improved in pigs include carcass quality and meat quality. The first pig genome mapping project (PiGMaP) in Western Europe, one of whose objectives was to identify QTLs for carcass lean content, carcass fat and meat quality was started in 1991 by more than ten laboratories from European Union countries. The second Scandinavian project, derived from the first, is carried out by Swedish, Danish and Norwegian laboratories (Yerle et al., 1995). US research centres joined the PiGMaP later on (Hu et al., 2005). The pig breeds used as the initial material (Large White, Meishan, wild boar) showed a large genetic distance. The first QTLs in the pig genome for carcass quality were mapped at a laboratory of the Swedish University of Agricultural Sciences in Uppsala. Genes that affect carcass fat percentage and backfat thickness were located on chromosome 4. Swedish researchers also identified genes located on chromosome 3 that control loin eye area. As part of the German project, QTLs were identified for carcass quality traits on chromosomes 1, 3, 4, 6, 7, 8 and 12, and for meat quality on chromosomes 3, 6 and 13. The Dutch project revealed that the regions of chromosomes 2 and 7 and those of chromosomes 1 and

16 may contain genes affecting backfat thickness, and the regions of chromosomes 2, 4, 6 and 7 may contain genes that influence the intramuscular fat content. As part of the American project, genes affecting carcass fatness were identified on chromosomes 1, 7 and X, and genes influencing loin eye area on chromosomes 1, 8, 11 and 14. A programme for mapping of genes that affect growth rate, carcass lean content and carcass fat content was also started in Poland in 1994 at the Institute of Genetics and Animal Breeding of the Polish Academy of Sciences in Jastrzębiec, in cooperation with the National Research Institute of Animal Production in Balice and the Department of Genetics and Animal Breeding at the Poznań University of Life Sciences. In this programme, Złotnicka Spotted boars and Polish Large White sows were chosen as the parental generation. These breeds differ not only in growth rate and parameters of carcass quality, but also in the variants of the genetic markers studied. QTLs were mapped and identified using the polymorphism of the following class I and II genetic markers: 10 blood group systems, 10 polymorphic blood proteins, Lpb and Lpr lipoprotein allotypes, *RYR1* gene, 20 microsatellite DNA sequences and 3 chromosome markers. The researchers identified a region of chromosome 12 that may contain genes affecting carcass fat weight and carcass lean percentage, as well as regions of chromosomes 2, 4, 6, 7, 9 and 13 affecting some fatness traits (mean backfat thickness from 5 measurements) or weight of meat in carcass cuts such as ham and loin. The results of further studies on this subject in different research centres have confirmed earlier suggestions that genes with a major effect on carcass quality (lean content, fat content) and meat quality are located on numerous chromosomes. Regions of chromosome pairs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18 and X have been most often implicated in carcass and meat quality (Kurył et al., 1998).

The second method of QTL identification evaluates the effect of the polymorphism of genes with known base sequences (known as candidate genes) on the level of certain quantitative traits in different breeds and lines of pigs. This analysis mainly involves those genes whose product (protein) is known to be involved in physiological processes associated with a given production trait. The genes regarded as potentially affecting carcass lean content include growth hormone (*GH*) (Pierzchała et al., 2004), insulin-like growth factor (*IGF1* and *IGF2*) (Kolaríková et al., 2003) and transcription factor (*PIT1*) genes (Brunsch et al., 2002). A potential QTL gene that affects carcass fat content is the leptin (*LEP*) gene (Stachowiak et al., 2007). The genes that may determine intramuscular fat content include the hormone-sensitive lipase (*LIPE*) gene (Jankowiak, 2005) and the heart fatty acid-binding protein (*H-FABP*) gene (Gerbens et al., 1997). Recently, much attention has been given to the *MyoD* family of genes (*MyoG*, *MYF3*, *MYF5*, *MYF6*), whose products condition and regulate muscle tissue growth during the fetal period (Te Pas and Vissacher, 1994).

Modifying tissue composition in pigs through nutrition

The level of feeding and the composition of feed mixtures influence pigs' growth rate, the body's hormone metabolism and the quantity and quality of fat deposited in the gain. The composition of fatty acids in pigs can be modified by changing the composition of dietary fatty acids. Several studies have confirmed that dietary fatty acids can be incorporated into body tissues, which has an effect on the quantitative and qualitative characteristics of meat. One way to enrich meat with *n-3* polyunsaturated fatty acids (PUFA) and monounsaturated fatty acids (MUFA) is to use vegetable oils in pig diets as a source of these acids (López-Bote et al., 2002; Daza et al., 2005). Rations for pigs raised in Poland are most often based on cereal grains, mainly barley and triticale, which have a high content of *n-6* linoleic acid (C18:2). As a result, *n-6* PUFA in meat lipids increase while *n-3* PUFA decrease, which is unfavourable from a consumer health perspective. Another way to change the fatty acid composition of pig meat lipids is to supplement conjugated linoleic acid (CLA) isomers in feed. CLA has been implicated as a dietary factor which improves feed conversion in rats and pigs (Chin et al., 1994; Dugan et al., 1997). CLA fed at 0.5–2% of pig diets is most effective in changing fatty acid metabolism, which leads to reduced carcass fatness. However, increased CLA content of tissues may adversely affect physicochemical traits of meat. CLA increases the saturation of fatty acids in pig lipids. In many studies, CLA preparation caused an increase in the level of saturated acids, mainly C18:0, which is positively correlated with meat palatability and tenderness (Wood et al., 2004). The use of CLA supplement in pig diets increased the level of *n-3* acids and decreased the level of *n-6* acids. In addition, increased supply of dietary CLA increased CLA deposition in the muscular and fatty tissue. Oils and oilseeds supplied in diets increase the PUFA content of tissue lipids (Flachowsky et al., 1997; Barowicz and Pieszka, 2001; Kouba et al., 2003). Recent research has shown that polyunsaturated fatty acids (PUFA), appropriate type of dietary fibre, optimum levels of lysine, methionine and cystine, or dietary supplements of chromium and copper used in pig nutrition may be one of the ways to limit the total cholesterol content of muscles and depot fat (Dove and Haydon, 1992; Atwal et al., 1997; Fernandez, 1995; Barowicz, 2000; Matthews et al., 2001). Research has demonstrated that pig fat and meat quality can be modified in different ways to obtain products with very good health-promoting, technological and taste properties. The level of feeding affects not only the pigs' growth rate (Gondret and Lebret, 2002; Oksbjerg et al., 2002; Mason et al., 2005; Raj et al., 2005; Więcek et al., 2008), but also the amount of fat deposited in the gain (Čandek-Potokar et al., 1998; Więcek et al., 2008), the fatty acid profile and palatability of meat (Cameron et al., 2000). However, research findings are not consistent (Čandek-Potokar et al., 1998; Correa et al., 2006). The carcasses of animals fed semi-*ad libitum* compared to those fed restrictively were characterized by greater total fatness and greater proportion of intramuscular fat in the *longissimus dorsi* muscle. A review by Skiba (2005) suggests that nutritional restrictions in the form of reduced protein level of feed increase carcass fatness, while limited amounts of feed reduce deposition of fat. Nutrients consumed in the diet are first of all used by animals for meeting their maintenance requirement, for protein deposition, and later for fat deposition. For this reason, poorly fed pigs accumulate less fat (Čandek-Potokar et al., 1998; Gondret and Lebret, 2002; Oksbjerg et al., 2002; Mason et al., 2005). Many authors (Čandek-Potokar et al., 1998; Gondret and Lebret, 2002; Mason et al., 2005) reported reduced amounts of intramuscular fat (IMF) when total carcass fatness was lower. Daszkiewicz et al. (2005) report that IMF content above 3% improves the palatability, juiciness and tenderness of pork. The meat of restrictively fed animals that contains less IMF compared to the meat of *ad* *libitum* fed pigs was characterized by slightly poorer taste (Cameron et al., 2000) and lower tenderness and juiciness (Bartkowiak, 2003).

Quality and technological properties of pork

In addition to chemical composition and nutritive value, pork quality is determined by animal's health and by sensory and technological characteristics resulting from the direction and intensity of biochemical autolytic changes that take place after slaughter. These factors determine the final culinary, technological and sensory properties of the raw meat and the end product. The main factors that determine the technological and eating suitability of meat are the degree of acidification, colour, colour homogeneity and stability, water holding and water binding capacity, gel-forming and emulsifying properties, storage life, processing yield, external appearance (colour and marbling level – content of intramuscular fat), texture (delicate texture and juiciness), and palatability (flavour and aroma). Variations in pork quality result mainly from the intensity and extent of glycolytic and proteolytic changes that take place postmortem and strongly influence the above meat characteristics (Melody et al., 2004). There are many reasons for a growing interest in pork quality traits and their genetic background.

When discussing the quality parameters of pork, one cannot omit intramuscular fat (IMF), which is a very significant parameter from the consumer's point of view. Being one of the most important determinants of meat quality from the culinary point of view, IMF is commonly used in breeding programmes in most EU countries. It is positively correlated with the other meat quality traits (Wood et al., 1994). It is necessary to stress that IMF, whose optimum level is most often considered to be around 2.5–3%, largely determines the taste of meat (Florkowski et al., 2007). In addition to IMF content of pork, which has been given high economic weight in breeding programmes used in many countries, there are several quality traits that determine the technological suitability of raw material and are therefore important for the meat industry. These include acidity (pH), water holding capacity, colour, electrical conductivity (EC), and drip loss (Melody et al., 2004; Bee et al., 2007). Pig breeding programmes implemented in many Western European countries account for these parameters when designing models for estimating the breeding value of animals. They occur as independent parameters or in the form of pork quality indices.

Analysis of pork quality includes a group of traits characterizing the physical properties (texture) and technological suitability of this meat. These include hardness, cohesion, elasticity, resilience and chewiness. The mean values of pork texture for cooked ham are 43.9–49.8 N for hardness; 0.24–0.28 for cohesion; 0.4–0.6 cm for elasticity; 0.14–0.20 cm for resilience; 22.7–36.7 N × cm for chewiness; and 17.4–21.7 N/cm^2 for shear force (Grześkowiak et al., 2008). In a study by Florowski et al. (2006), shear force parameters for cooked loin from domestic pig breeds ranged from 23.3 N/cm^2 for line 990 to 32.4 N/cm^2 for the Pietrain breed. To date, these traits were not accounted for in breeding programmes implemented in Poland, but their inclusion is important mainly for the consumer, because all breeding work conducted in the active population of pigs should be aimed at meeting the requirements and expectations of meat buyers.

When considering the quality of meat obtained from pigs slaughtered in Poland and analysing a whole array of associated parameters, it is also necessary to note the ratios between traits responsible for sensory and technological properties of meat (Cameron, 1990; Kortz et al., 2001), because they determine the optimum properties of pork that are most desired by consumers. Therefore it is important to identify the interrelationships between meat quality traits so as to avoid increasing or decreasing one trait while improving another during selection, and to ensure that these traits are in optimum balance, which guarantees desirable quality of meat (Cameron, 1990).

In light of current knowledge, it is necessary to include the most important parameters of meat quality in the evaluation of the genetic value of pigs raised in Poland. Due to considerable health-promoting, culinary and technological importance, it is appropriate to investigate the content and composition of fat and the keeping quality of lipid oxidation products in pork to determine the risk of their consumption and to improve the taste of this type of meat. Finding the relationships between different quality traits of pork and between these traits and slaughter performance of pigs will make it possible to undertake or modify breeding work aimed at improving the quality of meat obtained from pigs. Identification of these relationships will enable meat quality traits to be included during the improvement of the active population of pigs (maternal and paternal components) by incorporating selected quality parameters into breeding value estimation models in the future. The improvement of pork quality parameters will be helped by using the achievements of molecular genetics, in particular the rapidly developing field of genomics. Information that can be obtained in this way will facilitate the achievement of desirable meat quality through genetics. This is important in so far as the level of quality traits obtained can be transmitted to next generations. These activities coincide with breeding practices undertaken in many countries, in which pork production plays a considerable role. Linking the results obtained through population genetics and molecular genetics with well-balanced feeding of animals should give expected results in production of quality pork provided that a high health status is maintained on the farms.

Pork and human health

Consumption of meat and meat products, especially pork, generates different opinions in favour or against it. These opinions concern many aspects. Meat consumption is often associated with increased risk of disease. Since the 1950s in the industrialized countries, there has been an increased incidence of lifestyle diseases (atherosclerotic cardiovascular diseases) that reached epidemic proportions over the years. The incidence of cancer, insulin-resistant diabetes and obesity has also increased. It is estimated that in the developed countries, fats contribute 35–40% of the energy requirement with the *n-3* to *n-6* PUFA ratio of 1:25. A dramatic increase in fat consumption and a decline in *n-3* to *n-6* PUFA ratio are paralleled by a reduced consumption of dietary fibre and antioxidant vitamins (Karpiński et al., 1997). The increased incidence of these diseases was significantly contributed by lifestyle changes and consumption of diets high in animal fat (NRC, 1989). Products of animal origin are usually characterized by a high content of fats that are mainly constituted by saturated fatty acids. Overconsumption of energy beyond the body's energy requirement disturbs the lipid balance leading to hyperlipidemia while being the primary cause of obesity, which is the main risk factor for insulin-resistant diabetes. By contrast, a diet with normal energy supply or a diet with less than the body's requirement prevents and rectifies existing carbohydrate and lipid imbalances. Furthermore, the incidence of all cancer types is significantly higher in people whose body weight is 40% higher than normal compared to people with normal body weight (NRC, 1989). According to FAO/WHO recommendations, the *n-6/n-3* fatty acid ratio in the human diet should be 5:1. In terms of fatty acids, the optimum composition of pig fat is at least 12% of stearic acid (C18:0) with total content of linoleic (C18:2) and linolenic acids (C18:3) not exceeding 15% (Warnants et al., 1999). The level of stearic (C18:0) and linoleic acids (C18:2) is strictly related to meat tenderness, firmness and juiciness. The above acids differ in melting temperature (69.6 and –5°C, respectively), which has a significant effect on meat cohesion and firmness (Enser, 2004). It was also found that stearic acid (C18:0) plays a greater role in shaping the above meat characteristics. Extensive research on the effect of fatty acid composition on meat taste has shown a positive correlation between this trait and saturated and monounsaturated acids, and a negative correlation for unsaturated acids (Wood et al., 1994). It is therefore concluded that polyunsaturated acids are highly desired by consumers because they improve the dietetic value of meat, although their excess in animal fat is detrimental to sensory properties (taste, aroma) and storage life of meat (Lauridsen and Jakobsen, 1997). This meat is less desirable for technological reasons, because processed products have shorter shelf life and are more susceptible to oxidation. Polyunsaturated fatty acids are particularly sensitive to oxidation processes, even after the meat has been frozen. Meat colour changes for the worse as a result of conversion of myoglobin into metmyoglobin (Faustman and Cassenas, 1990). Meanwhile, fat cover (backfat) and, importantly, intermuscular fat in some valuable cuts such as belly or neck become softer and acquire undesirable sensory properties, including lower storage stability, rapid rancidity development, and change in colour. This is objected to by consumers, who are sensitive to meat sensory properties (Faustman et al., 1989).

Changes induced by oxidation of fat in muscle tissue are the principal cause of undesirable chemical and sensory changes of both the raw material and the end product. Autooxidation of meat lipids is an exceptionally complex process. This results from the high susceptibility of primary, intermediate and final oxidation products to degradation and reaction with other meat components; the complex effect of catalysts and natural antioxidants; and photooxidation that takes place simultaneously with autooxidation (Buckley et al., 1995). One of the secondary products of meat lipid oxidation, which is commonly found in decomposing fat, is malondialdehyde (MDA). It is one of the main oxidation products of meat lipids that react with thiobarbituric acid (TBA), and MDA determination is regarded as one of the most sensitive and characteristic methods for evaluating the rate and extent of meat lipid oxidation (Salih et al., 1987).

As noted above, there are many opinions and misconceptions regarding the harmful and health-promoting properties of meat from different livestock species, including pigs. Research findings on the use of pork in the human diet indicate that due to its properties, pork has or should have its place in a healthy diet. Being the main type of meat consumed in many countries, pork is a food product of high nutritive and health-promoting value (USDA, 2006). Pig meat is an important source of protein, fat and minerals, including trace elements such as selenium, iron and zinc. A diet of pork, which contains zinc, was shown to have a positive effect on the human body, with a significant increase (by 4.81%) in the level of this element in blood (Mayringer, 2006). In addition to high amounts of readily available iron, pork has a considerable content of selenium and is rich in many vitamins. Analysis of vitamins B1 and B6 showed a high (13.86%) increase of vitamin B1 in human bodies as a result of the diet. Few food products contain so much vitamin B1 as pork. One serving of lean pork covers the daily B1 vitamin requirement of human adults. Significantly, pork contains considerable amounts of vitamin B6, which plays a key role in metabolism (especially in protein synthesis) and in haemoglobin formation (Mayringer, 2006).

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Doskonalenie jakości mięsa wieprzowego na drodze genetycznej i żywieniowej

STRESZCZENIE

Jakość mięsa jest zagadnieniem bardzo złożonym. Składa się na nią szereg czynników fizyko-chemicznych. Odpowiedni poziom poszczególnych parametrów jakościowych decyduje o smakowitości mięsa, jego wyglądzie, przydatności do przetwarzania, czyli o jego atrakcyjności dla konsumenta. Takie cechy, jak zawartość cholesterolu, skład kwasów tłuszczowych i ich wzajemne proporcje, zawartość witamin i związków mineralnych decydują ponadto o walorach prozdrowotnych mięsa. W Polsce pod względem ilości najwięcej spożywa się mięsa wieprzowego. Doskonalenie krajowego pogłowia świń w kierunku zwiększenia mięsności spowodowało zaburzenia wielu parametrów jakości mięsa. Jest to problem obserwowany obecnie u większości światowych producentów świń. Dlatego też zwrócenie uwagi na zagadnienie poprawy jakości mięsa, w szczególności na drodze pracy hodowlanej nabiera ogromnego znaczenia. Biorąc pod uwagę zależności występujące między ilością mięsa w tuszy a jego jakością należy podkreślać znaczenie badania i monitoringu jakości mięsa wieprzowego. Na podstawie wyników monitoringu należy z dużą starannością i wyczuciem konstruować programy hodowlane służące poprawie i utrwaleniu pożądanych poziomów parametrów jakościowych w populacji aktywnej świń. Powiązanie wyników uzyskanych z wykorzystaniem genetyki populacji z racjonalnym żywieniem zwierząt, przy zachowaniu wysokiego statusu zdrowotnego w fermie powinno dać oczekiwane efekty w zakresie produkcji dobrej jakości mięsa wieprzowego.