

## THE EAST BALKAN PIG – POSSIBILITY FOR PRODUCTION OF HEALTHY FOOD

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**Abstract:** The article presents the opportunities and perspectives for the production of healthy food from East Balkan pig. A description of the breed has been made and important aspects of the technology for his breeding have been considered. This process is fully in line with the requirements for animal welfare and sustainable development of the environment and meets the consumers' demand for healthy food. His essential characteristics have been indicated in terms of the fattening and slaughtering qualities. Special attention is paid to the quality of the meat. A review of the regulations for the production of healthy products has been made. A brief flashback has been made of established delicacy high quality products that could satisfy the most refined tastes of consumers in respect of healthy foods.

**Key words:** East Balkan pig; healthy food; organic farming; meat

## ИСТОЧНОБАЛКАНСКА СВИЊА – МОЖНОСТ ЗА ПРОИЗВОДСТВО НА ЗДРАВА ХРАНА

**Апстракт:** Во статијата се прикажани можностите и перспективите за производство на здрава храна од источнобалканската свиња. Даден е опис на расата и се разгледани важните аспекти на технологијата применета при нејзиното одгледување. Овој процес е целосно во согласност со барањата за благосостојба на животните и одржливиот развој на животната средина и притоа ги задоволува потребите на потрошувачите од здрава храна. Неговите суштински карактеристики се покажани во однос на квалитетот на гоеење и колење. Посебно внимание е посветено на квалитетот на месото. Направен е преглед на прописите за производство на здрави производи. Направена е една кратка ретроспектива на добиените деликатесни производи со висок квалитет, кои би можеле да ги задоволат најрафинираните вкусови на потрошувачите во однос на здравата храна.

**Клучни зборови:** источнобалканска свиња; здрава храна; органско сточарство; месо

The balanced and healthy food is the leading trend in the modern way of life and determines the benefits of consumption of environmentally friendly and organic food. The universal desire for healthy eating and increasing demand for high quality food products, determine the interest in applying attractive technological solutions to satisfy the most discerning tastes of consumers.

One of the great challenges of the 21st century, which humanity is facing is the organic farming – the production of ecological products is paramount. Today, organic farming fits not only in the sustainable development strategy being a global model for development of agriculture but it has been developed as well as a response to the need to produce high quality and safe agricultural products meeting

the needs and desires of consumers (Gaydarska and Yovchevska, 2003). Organic farming is a production method that aims to protect natural resources using environmentally friendly methods. The sustainable development of the agricultural sector implies unity between economy, ecology and social impact. This balance provides significant environmental effects in the production of animal products, which are sold at higher market price. Recently worldwide the interest in products produced by animals in a manner as close as possible to natural conditions has been increased. The trend for the use of meat products from indigenous breeds fattened by traditional technologies that are adapted to local conditions and are resistant to diseases is growing. An important aspect of pig breeding worldwide now

is to seek solutions for the most economical use of natural resources (land, water) and environmental protection (Dragoev et al., 1998). It is imperative to pay greater attention to the technology for growing of all categories of pigs in an environmentally friendly way – a practice well established in almost all advanced countries regarding pig growing (Slanev et al., 2001). The animals should be organized so that they are able to move freely according to their natural resources, the maximum productivity for a short period of time should not be pursued at any cost. Nutrition should be based on the available farm resources (Foundation "The Green Burgas", 2003). According to Hinkovski and Stoykov (2001), the main problems that must be solved in livestock breeding involve also the organizing of the production of ecological products under storage of biogenocenosis, upgrading and expanding production of specific agricultural products having good domestic and international market. In this context and taking into consideration the particularities of European agriculture production, the authors state that scientific development must ensure the production of safe healthy food products with high competitiveness at the international markets.

Livestock production in Bulgaria is a traditional industry with major benefits arising from favorable natural conditions, the farming culture and ancient traditions. Bulgaria is among the countries in Europe with rich biodiversity with many rare and valuable species, and that is of international significance. The East Balkan pig is part of this wealth. This is the only preserved in original condition aboriginal breed of pigs in Bulgaria and one of the few indigenous breeds of pigs in Europe. The animals of this breed have a high vitality expressed by absolute adaptability to local climatic conditions, strong constitution, low morbidity and stable reproductive abilities. Dark skin pigmentation prevents them from sunburning in summer and bristles and fat – from freezing during the winter. This breed is grown environmentally friendly and uses year-round grazing. However, the use of different technologies or parts thereof (grazing camp complexes, herd breeding in primitive premises) is desirable in terms of mountain conditions.

Pigs of this breed have the ability to utilize natural trophic sources with low nutritional value. This is an important advantage since obtaining more meat with high dietary qualities can be done at the expense of vegetable proteins from the pasture. They feed also on acorns, roots, mushrooms (sometimes truffles), berries, herbal grass, snails, worms.

Our research (Palova et al., 2010) show that pastures in Strandzha mountain used by the East Balkan pig are not highly productive (from 550 kg/da to 840 kg/da yield of green mass). The crude protein content ranges from 8.60% to 13.76%. Nedeva et al., (2009) confirm these results and determine the beechnuts as extremely valuable feed containing 15.5% protein, 17.99% fat and 3.18% minerals.

The East Balkan pig is common in the Eastern Balkan Mountains and the northern slopes of Strandzha. It is a prototype of the Mediterranean turf pig and comes from the wild *Sus scrofa scrofa*. The East Balkan pig is formed mainly under the influence of natural selection under low human intervention. Because of this it can survive in the wild without special protection. He has a highly developed herd instinct, a sense of self-preservation and protection and greater durability for long trekking through rugged terrain. Animals of other species or from other herds are not admitted to their herd. They can protect themselves from enemies – mainly from jackals and wolves. Due to the highly developed maternal instinct mother pigs when exasperated can be aggressive and dangerous to humans. Its reproduction is secure and survivability of the offspring – high.

The East Balkan pig is similar to wild erect ears boar, with a head, which is not very large, long muzzle and slightly broken skull-nose line. He is of medium height, with not very long, concise body with well-developed front, short neck and brought down croup, roach back, short and strong legs. The whole body with the exception of the abdomen is covered with smooth hair, which at the back are long and straight and form a continuous, bristly comb from the head to the sacrum. The predominant color of East Balkan pig is black (Figure 1). The average length of life is about 15 years and the pig finishes its growth to 3 years of age. The pig reaches sexual maturity around the ninth month after birth. Sows in breeding condition weigh 60–70 kg and hogs – about 80–90 kg. The average number of pigs born is 4–7, in some cases to 10. Their productivity is not as in cultural breeds, but it is compensated somewhat by lower costs for breeding and feeding of the pigs. The growing of a fattened pig takes about 10 da forest area and 250 kg feed. It has been found that depending on the food resource of the habitat, a rate of 5 pigs/ha is sufficient and meets the requirements for organic farming in accordance with Directive 1804/99 of the European Union (Ivanova-Peneva et al., 2007). The development of this issue will find practical application in the organization of organic farms.



**Fig. 1.** Pigs from the East Balkan pig breed

Animals of East Balkan breed have satisfactory fattening ability. Under fattened state the pigs reach 100–130 kg. live weight. When grown environmentally they reach optimal live weight of about 100 kg. for about 16–18 months depending on the amount of available pasture and weather conditions. In a wet fall, when it is easier for pigs to dig and obtain the roots of plants for food, they gain weight faster and it is easier to accumulate fat. In a dry autumn or mainly under acorns grazing the weight gain is delayed and the so-called "dryness" of animals is observed – they build mostly muscle mass.

The first attempts to assess the fattening and slaughtering qualities of pigs from 75 to 115.2 kg conducted by Hlebarov (1934) showed that the average daily rate for the entire trial period was 414 g at feed consumption per 1 kg gain of 7.18 starch units, or 8.88 kg of maize. The research of Georgiev et al. (1959) shows that during the fattening from 60 to 90.5 kg body weight, the pigs of East Balkan breed have realized 333 g average daily gain, but their fattening with concentrated feed only is unprofitable. In a similar study Slanev et al. (1992) reported that pasture grown pigs from East Balkan breed reach 88 – 89 kg live weight average at 276 days of age, at 5.4 kg feed consumption per 1 kg growth. In studies conducted by Stefanova et al. (1991), in intensive fattening from 65 to 90 kg in

three groups (mixed, male only and female only), it was found that the highest average daily gain had the group of male – 417 g, followed by the mixed group (380 g) and the lowest growth had female pigs – 371 g. The use of natural food sources through grazing to 88–89 leads to satisfactory fattening and slaughtering results (Slanev et al., 1992). Upon assessment of the main fattening qualities Palova (2006) concluded that the low level of protein in the mixture does not negatively affect its utilization and for 273 days fattened pigs reach 87.90 and 85.15 kg. respectively

Upon reaching the carcass weighing about 100–120 kg pigs are transferred to authorized slaughterhouses that specialize in this breed, after testing for trichinosis. The type of breed is fatty. The slaughter qualities are characterized mainly with hard, grainy structure of the fat which in case of abundant acorns pasture yields a pale yellowish hue. Unlike the abdominal fats having a low melting point, the dorsal fat remains grainy at higher temperatures and can be used without additional preservatives and emulsifiers in the manufacture of environmentally pure sausages. The meat is dry, red, with a high content of intramuscular fat, with good technological qualities for the preparation of delicacies. The most favorable ratios of meat: bones, fat in the body as well as the highest carcass yield when

grown on grazing of the pigs from East Balkan breed was found at 90 kg body weight (Stefanova, St., Y. Stefanova, 2005). The research work of several authors has shown that slaughter yield of East Balkan pig ranges from 50.15 to 64.67% depending on the live weight at slaughter (Palova, 2007; Nakev et al., 2010, 2012, 2013). Upon slaughter analysis it has been found that meat with bones is from 72.95 to 76.40 % and fat from 23.60 to 27.05 %. The morphology of the body and its parts has been studied as well as data has been submitted on the weight of its components in kg, in terms of consumer interest. The weights of the actual ham and steak vary between 3.98 and 8,300 kg and 3.64 and 5,872 kg. The weight of the thoracic part is between 2.69 and 5,184 kg, respectively. The front leg weighs from 2.54 to 4.32 kg. The abdominal part for the preparation of bacon amounts to 4.33 to 7.38 kg. The weight of the shanks is between 0.84 and 1.13 kg. Slanev et al. (1992, 1993), Stefanova et al. (1993) reached the conclusion that the East Balkan pig has a lower weight of the steak, thoracic and lumbar parts, front and rear leg and higher of the abdomen compared to cultural breeds. The results of the evaluation of carcasses in different weight classes show that with the increase of the slaughter weight from 91,14kg to 101,10kg there is no significant difference based on carcass yield indicator. The percentage of meat with bones in pigs in the lower weight class is 5.52% ( $P \leq 0.01$ ) higher than those in the highest weight class. The equalized values of carcass yield are due to the fact that more fat is layered in the highest weight class (Nakev et al., 2009). Palova (2006) concluded that the reduced level of protein had no negative impact on carcass quality and meat quality. The East Balkan pig exhibits very good fattening and slaughtering qualities upon feeding with mixtures with low levels of protein and lysine. The author establishes content of the meat, bones and fat in the body, respectively, 54.7 – 56.8 %; 11.8 – 12.2% and 31.0 – 33.4%. It has been found that during the period of fattening pigs of East Balkan breed fed with a mixture containing 10.3% crude protein, lysine 0.50% and 12.61 MJ metabolizable energy have had higher growth with 23% percent compared to those receiving only unprocessed barley grain, but the cost of 1 kg increment formed by the direct costs for feed were lower (Palova et al., 2010). The slaughter indicators of the body in both types of diet showed no significant differences (Nakev et al., 2009).

Because of valuable biological and economic qualities – high adaptability, strong constitution, re-

sistance to diseases and excellent quality characteristics of meat and fat, the breed is of particular interest for pig breeding mainly in two directions – as gene pool and production of certified organic products from it (Stoykov et al., 2006). In this regard, according to the authors the future research should be directed towards preserving the beneficial economic qualities of morphological features (body size, color of bristles etc.), of physiological effects and potential for the creation of organic farms for production of ecological production, in line with the requirements of Ordinance №1/2013 in the Bulgarian legislation. Preservation of local indigenous breeds and biodiversity is one of the priorities of the European Union. As a member of the European Union Bulgaria harmonizes its legislation, reflecting the European requirements in its regulations. Directive 92/43 / EEC on the conservation of natural habitats and of wild fauna and flora, referred to as Habitats Directive is reflected in the Bulgarian legislation through the Biodiversity Act. In this regard, animals must belong to well-adapted local breeds because they are exposed to extreme influences in terms of free range, reflected in EU Regulation N 1804/1999 (CEC, 1999).

In recent years, worldwide interest has been increased to products produced by animals, grown in a manner as close as possible to natural conditions. The standards of the European Union to regulate human health recommend increasing the content of polyunsaturated fatty acids and decreasing the ratio of Omega-6/Omega-3 fatty acids in the final products of animal origin to 5/1. These are polyunsaturated fatty acids, which are beneficial for the cardiovascular system, as they help to lower triglycerides and increase levels of "good" HDL cholesterol. Pigs, as monogastric animals are very suitable for the preparation of meat and meat products enriched in Omega-3 fatty acids, since in contrast to ruminants, the fatty acids, which are taken with the feed, are included directly in the process of lipid synthesis, without any change. The polyunsaturated and Omega-3 fatty acids, determining the dietary qualities of meat are contained in a larger share in the vegetative part of the plants than the seeds. Therefore, their content is higher in the lipid tissues both in the wild, as well as grazing domestic animals, compared with the contemporary cultural breeds of pigs reared in intensive conditions. This feature increases the tendency for the use of meat products from animals of indigenous breeds, fattened by traditional technologies because their dietary qualities are superior to those of pigs reared in industrial conditions.

In a study of the quality and fatty acid composition of meat of pigs from East Balkan breed reared traditionally, conclusions have been made that the values characterizing the physico-chemical composition of the carcass of pigs of East Balkan breed are within the optimal range and for some of them they excel the highly selected modern breeds and hybrids. The ratio of Omega-6 and Omega-3 fatty acids in their meat is similar to the norms recommended by nutritionists 5 : 1. When using barley for feeding in fattening, meat is obtained with the best dietary qualities – 4.0% – 6.0%, higher content of polyunsaturated fatty acids, compared with the same pigs fed with complete compound feed and optimum n-6/n-3 ratio of 4.71/1 according to European standards for healthy eating (Marchev et al., 2010). Increased intramuscular fat in pigs biologically grown without addition of synthetic amino acids (2.9%) as compared to traditionally grown

(1.2%) ( $P < 0.01$ ) was found in the study of Sundrum et al. (2000).

The meat of these grazing animals, the received offal (liver, tongue, heart, kidney, lung), fat (unsalted, without skin) and pork melted lard are offered with great success in the market because they are cleaner in terms of artificially added hormones and drugs. Last but not least is the fact that the pigs are not vaccinated. The environmentally friendly conditions in which they are grown largely define them as "happy animals". Special techniques are not required for the preparation of their meat at home. More prolonged cooking at a lower temperature or a strong grill is recommended. Cook slowly and at low temperature (sous vide) – because of the valuable intramuscular fat it remains juicy, maintains its structure, taste and aroma. On Figure 2 is shown a homemade roast pig of East Balkan breed.



**Fig. 2.** Roasted pig of the East Balkan breed

According to EU regulation (EU legislation 2081/92 and 2082/92), which came into force in 1992, continuing the Stresa Convention (the first international convention on the names of the cheeses), there are three types of classifications of local products: with a protected designation of origin (PDO), protected geographical indication (PGI) and traditional specialty guaranteed (TSG). Currently in Bulgaria, according to this classification, as well as passing through all necessary defenses before the relevant international certification bodies, in September 2010, the Gornooryahovski Sudzhuk sausage has been registered in the European Register.

Also according to the Association of Meat Processors in Bulgaria, the product with the name Smyadovska lukanka – ordinary and special (BDS 2589-83) is under the jurisdiction of a product with traditional specific character, described in detail by Angelov in 1978. "Smyadovska lukanka" has won the gold medal at the world exhibition of meat products in 1928 in Bari, Italy.

There are good future prospects for the certification of products of East Balkan pigs, as such with a protected geographical designation. The palette of delicacy Elena ham, Banski staretz or Yambolski

starets, Smyadovska lukanka, Strandzhanski sudzhuk, Strandzhanski starets, Strandzhanski salted ham, Strandzhansko fillet, Strandzhanska lukanka, Kaiser, raw dried fillet, highest quality natural bacon with natural flavor, for which it is believed to have medicinal properties can take a worthy place in the European and international market.

## CONCLUSION

The above review shows that conducting research to improve the effectiveness of the breed in its area and production of standard animals with guaranteed production quality is essential. The innovations in the field of healthy foods, with a significant contribution to public health must be supported by scientific results and clinical studies in accordance with existing legislation. Thus the beneficial economic qualities of the East Balkan pig will serve as a resource economic production of pork meat and geographical delicacy products with proven taste qualities.

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