

Research Journal of Pharmaceutical, Biological and Chemical Sciences

The Quality and Safety of Meat Raw Materials for the Production of Healthy Food.

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ABSTRACT

This article presents the results of research quality and safety of meat for growing and fattening pigs and calves meat direction. Explore the possibility of a biological correction of environmental influences on the growth and development of animals. The possibility of the production of safe, high-quality and in vivo enriched with biologically active nutrients meat for the production of meat products for general and special purpose. Research aimed at ecologization the food market, the justification requirements for the production of high-quality environmentally friendly raw meat for healthy food.

Keywords: feeding technology, environmentally friendly food, fattening cattle and pigs, meat products for child nutrition.

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INTRODUCTION

Russia's population is in dire need of an environmentally safe food production, which is closely linked with the technology of cultivation of farm animals.

The raw meat from the feed gets a fairly wide range of hazardous substances of chemical, biological and physical nature. Food Safety on the basis of the meat should be ensured throughout the production cycle chain, from the selection of environmentally friendly areas for vegetable feed raw materials, to the production of safe meat quality [1, 2].

Pork meat compared to other types of meats, it has several advantages. It has a greater biological value than beef and mutton, and it has the highest protein digestibility (coefficient pork protein utilization -90, veal - 80, beef - 75, lamb - 70) [1, 3, 4]. The growth rate of the animals and their ability to fat deposition is crucial when using them for meat. Economically profitable to grow precocious animal, which give a complete carcass weight in less time. With the growth of not only changing the ratio of individual tissues in carcass, but also in the tissues there are significant physical and chemical changes that contribute to the quality of the products. The water content in the muscle tissue decreases, and intramuscular fat and nitrogen - increased; increases the amount of myoglobin, and an iodine value of fat is reduced, ie, fat becomes harder and less oxidized. With age, the animals pork becomes darker, harder and becomes more water holding capacity [5, 6, 15].

As is known, different pig breeds differ greatly in growth rate. For the production of organic pork is used mostly large white breed, which occupies over 80% of the species composition, Landrace and other breeds - zonal values. Modern requirements demonstrate the demand for lean pork, which led to the creation of fast and slowly accumulate fat pig breeds. These include the SM-1 ham-type, which is the intensity of growth, feed efficiency and meat quality is superior as a large white breed and Landrace pigs breed. Pigs SM-1 differ markedly from the large white on the body type and meat productivity. In animals, the SM-1 is much slower the accumulation of fat in the carcass fattening up to the higher weight classes. This makes it possible to obtain from this breed pork bacon fattening to a final weight of 130 kg [8, 16].

MATERIALS AND METHODS

The research was based on the results of monitoring the safety of the environment, feed and meat obtained by fattening pigs. The object of the present study were bacon pig breeds, meat raw material suitable for the production of organic food. Research subjects: technological methods of growing and fattening pigs; morphological and biological features of animals for slaughter; quality and safety of meat and offal; safety and quality of pork for suitable organic feed [1, 6, 7].

RESULTS AND DISCUSSION

Table 1: Formulation of feed for pigs, %

Components	Age, months		
	0-2	2-3	4-6
Wheat	30,0	30,0	23,4
Barley	44,8	47,5	54,7
Fish meal DP-64	1,0	1,55	-
Sunflower oil	2,3	1,2	2,0
Monocalcium phosphate	0,65	0,7	1,0
Chalk	0,95	1,05	-
Soybean meal	12,8	11,0	10,4
Sunflower meal	-	2,0	6,0
SK -4 0-2 months 8954 7,5%	-	-	7,5
SK-5 888-5%	-	5,0	-
Premix 9813 2,5% for fattening	-	-	2,5

Table 2: Ration feeding hybrid pig meat direction fattening

The composition and nutritional value	Amount
Barley, %	30,50
Corn, %	2,20
Triticale, %	10,00
Wheat, %	27,30
Bran, %	13,50
Oilcake of soybeans, %	11,86
Sunflower meal, %	2,50
Vitamin-mineral premix (KS-4; KS-5), %	1,00
Chalk, %	0,60
Salt, %	0,40
Lysine Crystal, %	0,14
Exchange energy, MJ / kg	12,6
Crude protein, g / kg	137,0
Calcium, g / kg	6,8
Phosphorus, g / kg	6,2
Lysine, g / kg	6,8
Methionine, g / kg	4,5
Threonine, g / kg	4,7

In the Krasnodar region formed broodstock pig bacon productive direction for youngsters with high fattening and meat qualities. Particular impact on meat productivity by using technology intensive fattening provides energy and protein level of feeding hybrid pigs (Tables 1 and 2).

The efficiency of production of meat raw materials with desired quality characteristics established by the results of tests on the farm - Limited Liability Company (LLC) «Marka» Krylovskogo district of Krasnodar region.

Dosing trace elements in the diets of pigs was carried out according to the content of iodine in the feed and selenium and on the basis of the recommended standards for pigs fattening. Complex nutraceuticals have been developed on the basis of lactic acid bacteria CMH-C (SKNIIZH, isolated from swine intestinal microbiocenosis breed SM-1), KMZ-T (T Biovet- (Trofimushkin - firm «Biovet»). Iodine and selenium were picked up in the forms of potassium iodide (KI) and sodium selenite (Na₂SeO₃). Trace elements in the feed after adding them: - 0,35 mg iodine / kg; selenium - 0,2 mg / kg.

In preliminary in vitro experiments, it was found that the combined addition of sodium selenite and potassium iodide in a depressing effect on a probiotic lactobacilli. To enrich the diets of pigs probiotic preparation comprising KI and Na₂SeO₃, we have developed a way to make it in the diet alternates: one week the animals received probiotic + selenium, another - with iodine, etc. To avoid a possible overdose of selenium, pigs fed the probiotic preparation every other day. The dose of complex nutraceutical to the basic diet was 10 ml per 1 head per day. Preparation, diluted with water in an amount of 1,5 - 2 liters, moistened feed. The experiments were conducted on hybrids Large White breed (English selection), with Landrace (English selection), starting from 4-months of age in the household of LLC «Marka» on pig farm on 7,000 goals with a one-time performances in volume production test of 600 goals [1, 6, 7].

Purpose of the experiment: pork quality improvement by using lactic acid ferment (KMZ-T), enriched with micronutrients such as potassium iodide (KI), sodium selenite (Na₂SeO₃) and combinations of incorporation in the diets of swine, animal health and quality of raw meat.

Analysis of the results showed that an increase in weight gain of 10-12%, pork quality improvement for organic food (meat yield increase to 1,3-1,5%, decrease fat 8,0-10,0% decrease in back fat thickness at 1,0-1,3 cm, increase the cut area of the longissimus muscle on 4,7-5,3 cm².

Found an increase selenium and iodine content in meat by 78.0% and 184.0% (maximum value).

Levels of toxic elements cadmium and lead in the meat were significantly below the limit values and comply with sanitary regulations 2.3.2.1078-01. It was found that the addition of iodine and selenium with leaven and without her diet helped reduce levels of toxic elements in pork lead - by 50,8%; cadmium - by 77,8% and pork enriched with inorganic forms of trace elements - lead by 50,8%; cadmium - by 55,6%.

The influence of similar technical solutions for breeding and fattening of beef calves for improve the productivity of meat and beef safety [9, 10, 17, 18] were carried out in LLC «Predgorie Kubani» with use animal of Aberdeen-Angus breeds.

Bulls-calves fattened on natural lands foothill areas (grazing grasses). In addition to the diet was introduced 2 kg of crushed grain (wheat : barley = 1 : 1), the average daily weight gain was 907.0 - 930 grams, in a fastened keeping on the cattle farm company «Agrocomplex». Bulls-calves fattening for the period from 10-12 to 16-18 months contained without leash in section with 50 goal in each.

Meat breed steers, fattened for meat, require increased feeding level [4, 14].

The ration consisted of corn silage (38-40%), alfalfa haylage (32-35%), alfalfa hay (6-10%). Feedstuff administered per 4,3 kg per head per day one. The ration provides increase a 990 g weight in day.

Stalled keeping and the concentrate type (grain type) of feeding contributed to the rapid deposition of fat and thickening of the muscle fibers.

Bulls, a pasture-fed to 18 months of age better use nutrients roughage than youngsters, grown on diets with a predominance of concentrated feed. Number of green pasture forage in the summer-range was 20-25 kg per head per day (Table 3).

Table 3: The ration of bulls in a pasture period

Feed	Quantity, kg	Exchange energy, MJ	Digested protein, g	Ca, g	P, g	Carotene, mg
Pastures	21,3	75,2	582	41,9	32,5	208
Feed	2,0	22,1	230	18,0	9,0	4,0
Mineral premix	0,03	-	-	-	-	-
Actually	32,3	97,3	812	59,9	41,5	212
Norm	30,0	95	850	60	45	210
± to normal	+2,3	+2,3	-38	-0,1	-3,5	+2

Table 4: The ration of feeding during the final fattening (company «Agrocomplex»)

Ingredients	Quantity, kg	Dry substances, kg	Exchange energy, MJ	Digested protein, g	Ca, g	P, g	Carotene, mg
Hay	2,5	2,1	16,8	253,0	42,5	5,5	122,5
Alfalfa haylage,	4,0	1,8	16,9	284,0	43,6	4,0	160
Silage corn	10,0	2,5	23,0	140,0	14,0	4,0	200
Pressed crude	10,0	1,2	11,3	120,0	15,0	1,4	-
Molasses beet	0,7	0,1	7,0	15,0	13,0	2,5	-
Diammonium phosphate, g	50	-	-	-	-	22,5	-
Mixed fodder	4,0	3,5	38,8	460,0	36,0	16,8	8,0
In total	31,2	11,2	113,8	1272,0	164,1	56,7	490,5

Note: 1) the composition of mixed fodder: barley, 40%; wheat, 30%, corn 18%, bran 11%, premix 1%; 2) Ca: P = 2.6 :

The stall-pasture period in addition to the diet was administered hay, silage, pulp raw molasses and minerals (Table 4).

In the final period of intensive fattening calves switched to stall keeping. The ration was introduced 4 kg of mixed fodder by reducing the amount of roughage [1, 3, 12, 13].

For slaughter in the company «Agrocomplex» were selected bulls with an average live weight of 560 kg. Mass new-slaughtered carcass was 320,2 kg carcass (carcass yield – 57,2%), including boneless beef – 266,7 kg (84,9% of the chilled carcasses). In accordance with the requirements of raw materials for baby food have been sent to only 58,7% (156,6 kg) of meat; 30,6% is related to fatty beef, not approved for the production of baby food. Note the high content of adipose tissue (5,7%).

The LLC «Predgorie Kubani» also had bulls slaughtered at an average live weight of 515,0 kg. Were studied the morphological composition carcass meat yield and chemical composition (Table 5).

Table 5: Results of slaughter bulls Aberdeen-Angus breed (n=6)

Index	Unit of measurement	Company «Agrocomplex»	LLC «Predgorie Kubani»
Slaughter weight	kg	560±1,2	515±1,0
Mass new-slaughtered carcass	kg	320,2±0,9	299,2±0,8
Yield carcass	%	57,2	58,1
Chilled carcasses mass	kg	314	295
Boneless beef yield:	kg	266,7	248,3
	%	84,9	84,1
including beef suitable for child nutrition	kg	156,6	187,7
	%	58,7	75,6
including fatty beef, not suitable for child nutrition	kg	81,8	50,3
	%	30,6	20,2
Bones	kg	47,6	45,9
	%	15,2	15,7
Adipose tissue	kg	17,9	4,9
	%	5,7	1,66

Mass new-slaughtered carcass was 299,2kg (carcass yield – 58,1%); boneless beef – 84,1% of the chilled carcasses (295.0 kg). To be used for the production of child nutrition can be directed 75.6% (187,7 kg) boneless beef. Bulls on intensive fattening grew less intense, and at the age of 16-18 months at 8% inferior to the live weight steers contained in the stalls. The yield of lean meat suitable for the production of baby foods was on 6,6% higher compared to the yield of the meat of calves kept on moderately intensive fattening.

The chemical composition of beef requirements for baby food have their own characteristics: contain of fat, poorly digestible child's body should not exceed 9% raw meat.

Chemical analysis of meat bulls samples grown in company «Agrocomplex», showed that the moisture content was 70,9%; protein – 20,4%; fat – 7,7%; Ash – 1,0%. The meat of bulls LLC «Predgorie Kubani» moisture content – 72,0%; protein – 20,0%; fat – 7,0%; ash – 0,95%.

Assessment of safety performance (maximum allowable levels of safety of pesticide residues, toxic elements, antibiotics) showed that the meat of bulls from experimental groups had no significant differences and meet the requirements of sanitary regulations 2.3.2.1078-01 [1, 8, 11, 18].

CONCLUSION

Were received results of the research obtained by the study of the quality and safety of meat for growing and fattening pigs and bulls of meat purpose. It was proved the possibility of correcting the biological

effects of the environment on health, growth and development of animals to produce quality and safe meat. Studied the use of raw meat for production of meat products general and special purpose. Research carried out in the framework of the ecologization of the food market, study the requirements for the production of high-quality environmentally friendly raw meat for healthy food.

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