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**EFFECTIVENESS OF USAGE OF CAKE OBTAINED FROM GRAPE SEEDS
IN THE FOOD OF PIGS FOR FATTENING**

A.DANILOV, I.DONICA, S.KOSHMAN, D. SAVCA

Scientific-Practical Institute of Biotechnology in Zootechny and Veterinary Medicine of the Republic of Moldova

Abstract. In the work are presented the results of research on the study of the productivity and quality of carcasses of pigs when using in the diet the grape seed flour. The best results for the payment of feed (3,94 units), the average daily gain for the experiment 716 g, the protein content in meat 19,78%, fat 1,82%, the area of the muscular eye 41,8 cm², well-developed hams with an average weight of 10.96 kg, as well as an economic effect per head for the period of the experiment (154, lei 04 bani) were obtained from pigs which received as a part of the compound feed grape seed flour in the amount of 4% of the main diet. The introduction into the composition of mixed fodders 4% of grape seed flour contributed to a decrease in the cost of 1 kg of mixed fodder by 10 bani, and when was introduced 6% - by 19 bani. We believe that this ingredient adds biological value to the obtained products because it acts as a very powerful natural antioxidant, and its use in food represents a nutritional perspective for swine growth.

Key words: mixed fodder, swine, grape seed cake, chemical composition, specific consumption.

INTRODUCTION

The pig breeding branch in the Republic of Moldova in the last 10 years provides up to 55% of the total meat production produced in the country. Food has the largest share in production costs, accounting for about 60-80% of the total of these costs.

The experience of pig breeding has shown that, the used nutritional systems are constantly evolving, and in order to ensure high productivity, pig rations must be controlled separately after 30 nutrients, for over 500 kinds of feeds and nutritional supplements.

Of particular importance is the raising of feed quality and the use of new feed sources that would satisfy the requirements of pigs in nutrients at the same time being cheap.

Taking into consideration that the main cereal production in the country is represented by wheat varieties and corn used for food purposes, the diversification of fodder sources for the

livestock sector is a constant problem in Moldova. In our country, the viticulture branch occupies an important place in the agricultural sector and annually as a result of processing of grapes are obtained new and less studied waste such as: grape marc partially separated from seeds, cake or oilcake from grape seed, grape grain peel and other.

The importance of using these residues increases with the reduction of the feed diet, the uniformity of nutrition and the lack of nutrients.

Grape seeds until recently were considered less useful. Also, grape seeds contain procyanidins, an agent about 50 times more powerful than vitamin E and with an effect of 20 times higher towards vitamin C.

Zinc, copper and selenium are three of the most important minerals contained in grape seeds, which helps to ensure good and balanced functioning of the body [4, 6]. Grape stones contain an increased amount of antioxidants, linoleic acid and polyphenols.

Grape seed cake is considered not only a potential source of nutrients, but also a powerful natural antioxidant, which entered to the viewfinder of researchers of animal nutrition relatively recently [2,3].

We consider that the use in recipes of mixed fodder of cake obtained from grape seed is an important way to increase feed productivity and forage conversion, as well as the prophylaxis of many diseases at swine.

The purpose of the research is the determination the effectiveness of the use in the recipe of mixed fodder, intended for the fatten of young swine, of the cake obtained from grape seed.

MATERIAL AND METHODS

The researches were carried out at the pig farm of Petreshti FPC „Comfort” JSC, in which were used as biological material triserial gilts (Landrace x Yorkshire x Pietrain).

The experiment was carried out according to the existing methods [7] on a number of 33 gilts, having the same level of development, constitution and state of health, distributed in three lots of 11 heads, the control lot and 2 experimental lots.

For feeding the animals, taken under study, in the mixed fodder preparation department of FPS „Comfort” JSC, were prepared in sacks and stored experimentally combined feed parties for each lot.

Table 1. Scheme of experience

Lot	The number of animals (n)	Average weight of 1 pig at the beginning of the experiment (kg)	Feeding particularities
Control	11	42,18	BCF - (recipe 1) *
I experimental	11	42,91	ECF - (recipe 2) **
II experimental	11	43,00	ECF - (recipe 3) **

Note: *BCF - basic compound feed, **ECF - experimental combined feed

Combined feed recipes have been elaborated according to food standards [5], using the program "HYBRIMIN", swot intended for the calculation of the mixed fodder recipes.

In the experimental period, were used mixed fodder prepared according to three recipes, consisting of autochthonous fodder, based on barley, wheat, corn, soybean meal, grape seed cake, fish meal, chalk, premix.

The difference between the structure of the mixed fodder recipes in the experimental lots consists in the use in the recipe 2 of 4% grape seed cake and 6% in the recipe 3. At the same time in the combined feeds of the experimental lots, in the same proportions, the content of barley was reduced.

Lots of pigs were selected using classical methods [7], the average daily gain and specific consumption for 1 kg of increase were calculated according to existing techniques [1].

The quality of the meat was assessed after the water content, fat, protein and collagen using the Scanlab NIT 98 computerized program. The experimental data obtained and the appreciation of differences was made using modern research methods [8].

RESULTS AND DISCUSSIONS

Grape seed cake is a relatively new technological product with a humidity of 8.24%, and in the absolute dry substance are contained: 11.52% crude protein, 4.64% crude fat, 53.28% crude cellulose, 19.28% non-added extractive substances, has an increased content of minerals and amino acids.

In the structure of the mixed fodder recipe for the swine in the control lot was used (BCF) where were included: corn – 26,7%; barley – 24,5%; wheat – 27,0%; soybean – 17,5%; fish meal-1,0%; chalk-0,8%; premix-2,5%.

The nutritional value of one kilogram of mixed fodder used to feed the pigs in the control lot during the experimental period was: 1,21 nutrition units; 13,15Mj metabolisable energy; 144,4g/kg crude protein; 26,6g/kg fat; 44,6g/kg crude cellulose. For the experimental lots these indices were of: 1,18-1,17 nutritional units; 12,89-12,75 Mj metabolisable energy; 143,7-141,7g/kg crude protein; 26,2-26,0g/kg fat; 59,8 -65,6g/kg crude cellulose.

During the growing and fattening period, the combined fodder was administered according to the daily consumption of each lot of animals, which was within the limits of the existing daily nutrition rules (9). During the research, the consumption of fodder for all lots taken under the study did not vary greatly between lots.

Based on the observations and calculations made, it was found that the ingestion of a piglet in the experimental period was 238 kg in the control lot and 214-226 kg in the experimental lots.

The specific consumption of mixed fodder spent for producing a kg of smaller growth and a good conversion of feed was recorded in the experimental lot II 3,65 UN, followed by gilts from lot I experimental with 3,83 UN (table 2).

Based on the individual weighing of the animals, the growth of energy was appreciated and, as a result, it was observed that the dynamics of the body mass manifested itself differently.

Table 2. Growth performance realized in the experience

Specification		Lot		
		Control	I-experimental	II-experimental
Average weight of a gilt, kg	at the beginning of the experience	42,18±0,28	42,91±0,49	43,00±0,24
	at the end of the first growth period	64,36±1,84	68,27±1,78	69,36±1,76
	at the end of the second growth period	107,18±1,41	108,82±1,28	109,18±1,46
Average daily gain, g	in I period of growth	633,18±49,61	724,55±45,38	753,27±50,84
	in the second growth period	752,50±32,96	710,00±31,14	698,55±27,00
	during the experimental period	707,35±16,89	716,09±13,12	719,18±15,86
Specific consumption at 1kg increase, U.N.		4,42	3,83	3,65

During the first two months, there was a more intense increase and development of piglets in lots I and II that exceeded in weight the control lot.

In the first period of fattening, the pigs in experimental lot II achieved an increase of 26,36 kg, followed by the young swine from the experimental lot I, the increase of which constituted 25,36 kg, being higher than in the control lot. Significant differences between lots according to the average weight of a gilt during this period were of 3,91kg between the control lot and experimental lot I and 5,0 kg between the control lot and the experimental lot II.

Regarding the absolute growth rate, good results were recorded in the experimental lots, where 4% and 6% of the barley were substituted with the same amount of grape seed cake (recipe 2 and 3 tab.1).

Lot I and II had a higher growth rate compared to the control lot, being of 716 g and 719 g respectively, with a difference from the control lot of 9 g and 12 g (Fig. 1).

The total weight gain of gilts in the experimental period was 65,00 kg in the control lot,

followed by the young swine in the experimental lot I with 65,91 kg, and in the experimental lot II this index had values of 66,18 kg. In order to determine the intensity of the metabolic processes, which occur in the body of the swine, as well as the effect of the use in rations of different doses of grape seed cake at three gilts of each lot, blood samples were taken.

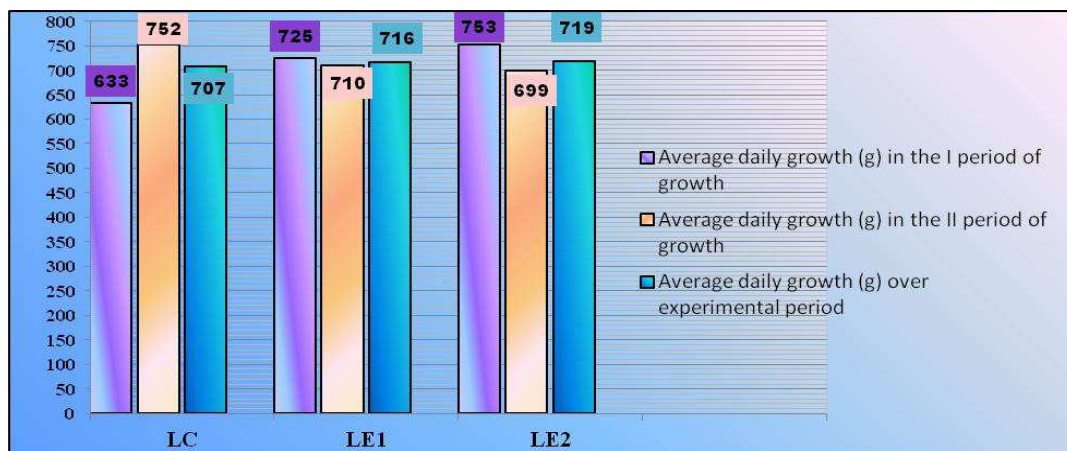


Fig.1. Dynamics of average daily growth

The morphological and biochemical indexes of blood at the beginning of the experimental period had no significant differences compared to the limits of physiological norms for these age groups. Following the analysis of biochemical constants in the blood serum there are very small and insignificant variations at almost all the observed indices.

Thus, the average amount of albumin at the start of the experiment is between 35,7g/l in the control lot and 37,6g/l in the experimental lot II. The results of the biochemical investigations obtained at the end of the experiment show an insignificant increase in the hemoglobin content from 101,70g/l in the control group to 106,67g/l experimental lot I.

The average amount of total protein at the end of the experiment ranges between 38,3g/l in the control lot, 40,2g/l experimental lot I and 46.1g/l experimental lot II.

The results of control slaughter research have shown that under identical conditions of maintenance but different nutrition the quality of carcasses of meat hybrids has manifested itself differently. Determination of carcass weight by individual weights recorded close values, being closely related to body weight at slaughter, the differences between lots being insignificant (tab 3).

The data obtained from the experimental researches show a tendency of increase of the yield at slaughter in experimental lots (table 3).

After this index were established differences between the control lot and the experimental lot I of 2,41% and between the control lot and experimental lot II of 1,30%.

An important indicator is used in assessing the pigs' slaughtering qualities is the carcass mass. A higher weight of half-carcasses was obtained at hybrids in lot I with a value of 77,13 kg, followed by lot II with 75,80 kg. A lower weight of the half-carcass was marked at the young swine in the control lot with an average value of 74,77 kg.

The data obtained from the research shows that the hybrids from all the studied lots achieved good carcasses with a length of 98,7-99,0 cm.

There was observed a tendency of decrease the thickness of the bacon layer on the top of the carcasses at the swine in the experimental lots where recipes were supplemented with grape seed cake in different proportions. Thus, a thinner bacon layer was established in the carcasses of the meat hybrids in experimental lot II which was 23,3 mm in the region of the 6-7 thoracic vertebrae. Several researchers have shown that the commercial appearance and carcass quality is significantly influenced by the layer of bacon on the lower carcass line, which should be as thin as possible in this region.

Table 3. Developmental performance of swine carcasses slaughtered

Lot	Average weight of a gilt when slaughtered, kg	Average weight after slaughter, kg	Yield at slaughter, %	The weight of the right half-carcass, kg	The weight of the left half-carcass, kg
Control	105,33±0,50	93,03±1,20	76,79±1,18	37,40±0,95	37,37±0,72
I-experimental	107,00 ±0,71	98,06±1,41	79,20±0,91	38,73±0,60	38,40±1,00
II-experimental	105,67±1,50	96,13±2,67	78,09±1,14	37,50±1,04	38,30±0,79

The average thickness of the bacon layer on the lower line in the swine carcasses ranged between 17,67 mm in the control lot and 17,00 mm-17,66 mm in the experimental lots.

As a result of the investigations and analysis of the obtained data, a good development of the muscle eye surface was found in all the studied groups.

The results of the Longissimus dorsi muscle measurements showed that the largest muscle eye area was obtained in the experimental lot 42,7 cm², being with 3,6% higher than that of the control lot (Fig. 2).

The yield of meat in the carcass is also influenced by the development of hams. Determination of the weight of the ham with individual weights recorded close values in all lots, the differences between lots being insignificant.

Their weight ranged from 10,92 kg in the control lot to 11,06 kg in experimental lot II, fact which is explained by the formation of globular hams (Fig. 3).

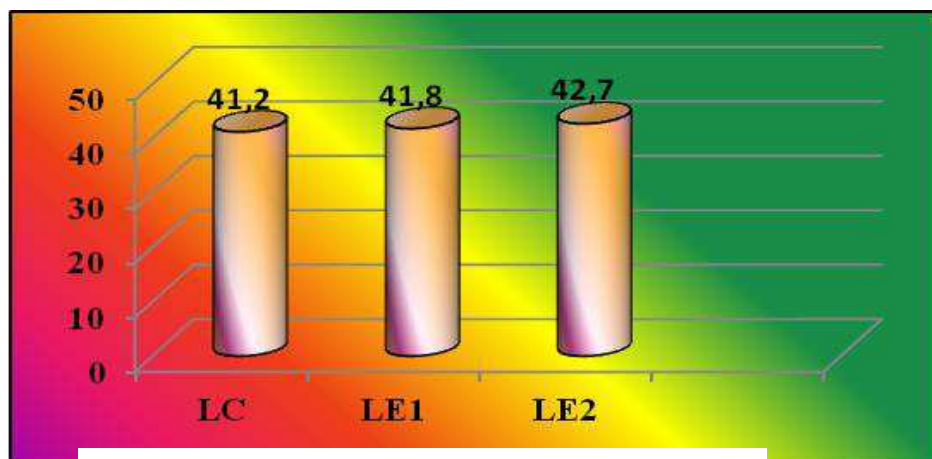


Fig 2. Surface of the eye muscle area, cm²

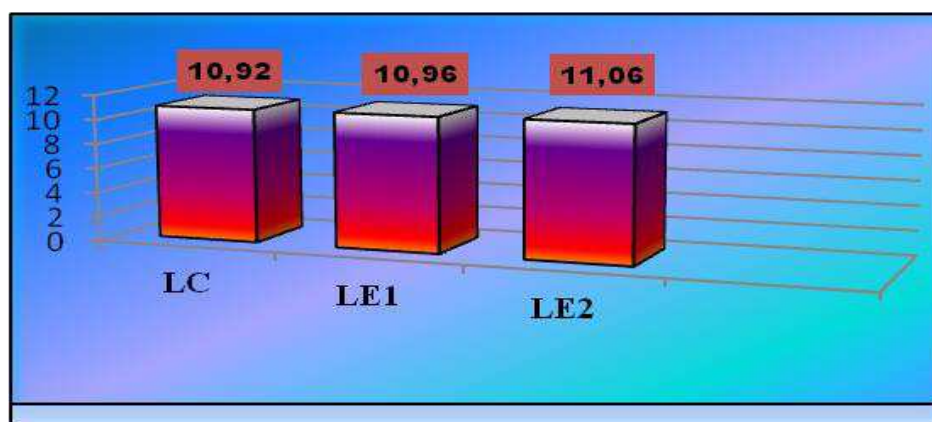


Fig 3. The weight of the ham of slaughtered gilts, kg

Cake obtained from grape seed incorporated in mixed fodder had positive effects on fat and protein content of meat from Longissimus dorsi muscle.

A higher amount of protein was obtained in the hybrids muscles of meat of experimental lot II, in the amount of 20,16% , followed by 19,97% experimental lot I and 19,62% in the young swine in the control lot.

The intramuscular fat content of the Longissimus dorsi muscle varied between 2,19% in the control lot and 1,82-1,77% in the experimental lots. The upper value being at gilts from experimental lot II with a difference of 0,42%.

On the basis gained in the experience, it has been found that the use of mixed fodder with the inclusion in the basic recipe of oilcake obtained from grape seeds in various proportions reduces the cost of pig feed and is economically advantageous and justified.

Taking into account the difference between the cost of the mixed fodder consumed by a piglet in the experimental lot I which was lower by 131,08 lei compared to the one in the control lot and the difference between the cost of the additional body mass of 22,96 lei, a net profit of 154,04 lei was obtained for each piglet.

CONCLUSIONS

As a result of the research were obtained new results of the carcass productivity and quality at swine using in the recipe the cake obtained from grape seeds in the amount of 4-6% / tone of mixed fodder.

A more effective variant of the recipe was that of experimental lot I that achieved a daily average growth rate in the experimental period of 716 g, well-developed hams with an average weight of 10,96 kg muscle area of 41,8 cm², with a protein content of 19,87% in Longissimus dorsi muscle, fat of 1,82%, and a net profit per each sold pig at 154,04 lei.

We believe that this ingredient adds biological value to the obtained products because it is a very powerful natural antioxidant, and use in food represents a perspective nutritional solution for the growth of swine.

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