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THE TOMATO SHOOTS IN PIG BREEDING

Karunskyi Alexey,
Doctor of Agricultural Sciences, Professor
Odessa State Agrarian University

Voietska Olena,
Ph.D., Associate Professor
Odessa National Academy of Food Technologies

Makarynska Alla,
Ph.D., Associate Professor
Odessa National Academy of Food Technologies

The widespread use of recyclable canning production in diets of farm animals is one of the important resources for strengthening and developing the feed base. Efforts aimed at the practical solution of the problem of the use of secondary raw materials of the food industry are rightly considered at the same level as the implementation of measures to increase the yield of fodder crops.

Feeding efficiency of canning secondary raw materials depends to a large extent on its composition, availability of biologically active substances, functional state of digestive organs and animal feeding system, [1, 2].

Therefore, research on the use of secondary raw materials for canning production in pigs in order to increase their productivity is important scientific and economic value and is relevant.

According to a number of authors, the use of tomato shoots in feeding pigs leads to a more complete use of feed by increasing their digestibility and nutrient absorption.

Tomato shoots have a wide range of biological activity, and therefore using them as a feed additive can normalize the metabolic processes of the animal body, improve the function of the digestive system, [3, 4].

A number of papers provide information on the successful use of tomato shoots as a rational substitute for grain feed in the diets of young pigs, but there are no clear recommendations for the inclusion of tomato bovine feed in pigs for today. In addition, there is still no consensus among researchers on the relatively optimal way of harvesting, preserving and storing these unconventional feeds, [5-7].

In this regard, the study of the effectiveness of the use of tomato shoots in pig diets is of great scientific and practical importance.

The purpose of this work is to substantiate the optimal levels of tomato shoots pigs in feed for young pigs for fattening.

The studies were conducted in production conditions on pigs of large white breed. Four pig groups were formed using the analogue group at 4 months of age with 4 heads on which the experiments were conducted. Animals were selected homogeneous by

sex and live weight. The diet of the animals was prepared according to the current norms, taking into account the age and live weight of the experimental animals. Based on the analyzes of the composition and nutrition of the diets, their balancing was performed according to 28 indicators. According to the scheme of the experiment, animals of each group received standard compound feed. In the diet of the experimental groups, instead of concentrated feed, tomato washes were administered in the following amount (by weight): group 2…10 %; 3rd group – 15 %; group 4…20 %. Sampling of the average samples of forages, faeces (feces, urine) and their zoochemical analysis was carried out according to conventional methods.

In the first phase of the study, tomato shoots were analyzed for nutrient content. Table 1 presents the main indicators of the chemical composition of fresh and dried tomato shoots in comparison with barley grain.

Table 1.

Chemical composition and nutritional value of feed

Chemical composition, %			
Indicators	Tomato shoots		Barley grain
	moist	is dry	
Moisture	73,4	13,0	12,8
Crude protein	6,7	22,6	11,2
Crude fat	4,0	12,6	2,2
Crude fiber	8,1	17,8	4,9
Non-nitrogenous extractives	6,5	28,2	63,8
Cinder	1,1	2,9	2,8
Energy and nutrient content in 1 kg of feed			
Indicators	Tomato shoots		Barley grain
	moist	is dry	
Feed units	0,2	0,7	1,15
Ca, г	3,1	34,1	2,0
P, г	3,8	36,3	3,9

In the presence of protein and fat, tomato shoots exceed the content of these nutrients in barley grain by several times. There are 34.1 g of calcium and 36.3 g of phosphorus in 1 kg of tomato shoots. Accordingly, calcium is 17 times higher than in barley grain, which is the basis of the diet for pigs. Summarizing the material presented, we can conclude that tomato shoots are characterized by a relatively high forage potential, characterized by a diverse composition of biologically active substances.

At present, rising prices for compound feed and significant transportation costs for transportation of raw materials and finished products have led to the need to produce compound feed directly in farms. Approximation of compound feed production to the place of consumption raised the question of developing district compound feed recipes. Recipes of compound feeds for pigs in farms are made taking into account the zonal characteristics of feeding and the conditions of agricultural production.

For the sake of cheaper diets for pigs' repair young animals, compound feed recipes have been developed which provide for the partial replacement of expensive grain

feeds with an equivalent amount of tomato meal flour. Combined feed recipes were developed based on the nutrient content of the main feeds (Table 2).

Table 2.

Recipes and nutrition of feed for pigs, %

Components and nutrients	Recipes			
	1	2	3	4
Maize	40,0	40,0	40,0	40,0
Pea	26,0	26,0	26,0	26,0
Barley	20,0	10,0	5,0	–
Meat-bone meal	7,5	7,5	7,5	7,5
Herbal meal	5,0	5,0	5,0	5,0
Tomato shoots	–	10,0	15,0	20,0
Salt	0,5	0,5	0,5	0,5
Premix	1,0	1,0	1,0	1,0
1 kg of compound feed contains:				
Feed units	1,15	1,08	1,05	1,03
Exchange energy, MJ	12,70	12,08	11,79	11,46
Dry matter, g	838	840	841	842
Crude protein, g	155,5	154,5	154,1	153,5
Digestible protein, g	125,1	118,6	115,3	112,0
Crude fiber, g	51,9	69,8	78,7	87,7
Lysine, g	7,4	7,1	7,0	6,8
Methionine + cystine, g	4,3	4,2	4,2	4,1
Salts, g	5,0	5,0	5,0	5,0
Calcium, g	11,7	12,5	12,9	13,3
Phosphorus, g	9,5	9,0	8,9	8,9
Iron, g	164,6	259,6	307,5	355,1
Midi, mg	11,5	10,8	10,5	10,3
Zinc, mg	54,7	51,4	51,5	57,1
Manganese, mg	44,2	41,5	40,4	39,6
Cobalt, mg	1,15	1,10	1,06	1,04
Iodine, mg	0,2	0,2	0,2	0,2
Carotene, mg	9,2	9,5	9,7	9,9
Vitamins: D, thousand IU	0,336	0,316	0,307	0,301
E, mg	38,5	36,2	35,2	34,5
B_1, mg	4,4	4,1	4,0	3,8
B_2, mg	6,7	6,3	6,1	6,0
B_3, mg	21,7	20,4	19,8	19,5
B_4, g	1,11	1,04	1,01	0,99
B_5, mg	66,1	62,2	60,6	59,3
B_{12}, mcg	5,3	5,0	4,9	4,8

The fiber content in the diets of the study groups increased in proportion to the amount of tomato waste input. Given the changes in the amount of fiber in the diets of

animals, it was important to determine the effect of this factor on the digestibility of basic nutrients (Table 3).

Table 3.

Nutrient digestibility of rations in experimental pigs, %

Nutrients	Group			
	Control	Experienced		
	1	2	3	4
Dry matter	80,9±0,93	74,7±1,48	77,2±1,92	72,8±0,81
Organic matter	85,5±2,09	84,4±1,26	83,0±2,41	79,6±1,09
Crude protein	79,0±1,53	78,1±1,64	77,9±2,25	76,8±2,61
Crude fat	63,7±2,83	60,9±3,40	57,3±3,11	52,2±4,84
Crude fiber	46,1±4,58	45,8±2,76	39,4±4,27	39,6±3,33
Non-nitrogenous extractives	93,7±3,16	93,4±0,95	93,0±1,20	93,2±1,75

Analysis of the data in Table. 3, shows that the nutrient digestibility of the diets was quite high.

So, the solubility of dry matter was 80.9…72.8 %, organic matter – 85.5…79.6 %, protein – 79.0…76.8 %, fat – 63.7…52.2 %, fiber – 46.1…39.4 %, non-nitrogenous extractives – 93.7…93.0 %. It should be noted that the digestibility of nutrients by animals fed by tomato shoots decreased depending on their number.

Thus, in contrast to the 1st control group, the solubility of the dry matter of the 2nd experimental group was 74.7 %, 3rd – 77.2 %, 4th – 72.8 %. The difference in favor of the control group was 6.2; 3.7 and 8.1 absolute percentages. The digestibility of organic matter in the study groups was also inferior to the control, by 1.1; 2.5 and 5.9 %, in which this indicator was 85.5 %.

Analysis of the digestibility of the crude protein showed that the animals of the control group digested it by 79.0 %. In pigs of the 2nd and 3rd experimental groups this indicator decreased slightly – to the level of 78.1 and 77.9 % respectively. The lowest protein digestibility ratio of 76.8 % was found in young animals of the 4th experimental group, fed by 20 % of tomato extracts (by weight) of the diet.

It was proved that the fat digestibility ratio of pigs treated with tomato extracts was 60.9; 57.3 and 52.2 %. In pigs from the control group, the fat digestibility was higher and was 63.7 %.

With regard to the digestibility of fiber, it is easy to see that with increasing its amount in the diet, this figure decreases from 46.1 % in the control group to 45.8 % in the 2nd; 39.4 % - in the 3rd; 39.6 % - in the 4 study groups.

The increase in tomato feces in pigs' diets did not affect the digestibility of nitrogen-free extracts by the organism of young animals of 1 – 4 groups (93.0…93.7 %). However, despite some reduction in the digestibility of nutrients in the animals of the experimental groups, the level of their absorption was quite high.

The results of the experiment indicate the feasibility of replacing in the feed for the repair of young pigs part of the raw material of tomatoes. As a result of the research found that feeding young pigs tomato shoots leads to a slight decrease in the digestion of nutrients.

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