ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

The productivity of piglets with addition of carotene-containing drugs "Betatcinol" and "Betaviton" in the diets.

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ABSTRACT

We have studied the productive action of the water-dispersed carotene-containing preparations "Betaviton" and "Betatcinol" on young pigs of large white breed. It has been found that feeding with vitamin preparations "Betaviton" and "Betatcinol" of weaned pig in the amount of 0.5-0.8 ml and feeding of livestock in amount of 1.0-1.4 ml per head per day has increased the absolute rate of live weight, respectively 12.8 - 20.2 and 18.8 - 19.6%, reduce the cost of feed for production in 13.1 - 19.4 and 14,7-17,3% increase slaughter yield of fattening in 3,6 - 4.2%, weight of the ham - in 7.6 and 9.4%, the area of "muscle eye" - in 17,13-21,47%.
Keywords: medications "Betatcinol" and "Betaviton", weaned pigs, live weight, the cost of feed, slaughter and meat quality

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ISSN: 0975-8585

INTRODUCTION

Intensification of animal husbandry provides a varied and balanced feeding of farm animals with the main organic, mineral and biologically active substances. A special role among biologically active substances for pigs belongs to vitamin A and its provitamin - carotene.

Carotenoids and vitamin A play an important role in the life of the organism. They normalize the metabolism, and involved in redox processes that regulate the growth of new cells, cellular and subcellular membranes, metabolism of proteins and fats. They play an important role in the formation and functioning of bone and mucous membranes [2, 3].

Recently, experts prefer carotene-containing medications. Unlike vitamin A, carotene overdose never causes a toxic effect. Beta-carotene has an impact on the commodity characteristics of livestock products, stimulates nonspecific factors of natural resistance, it protects the body from cancer-causing effects of aggressive pro-oxidants. In addition, it participates in metabolic processes with cholesterol, from which synthesized steroid hormones [3, 5, 12].

Particular interest are water-dispersible carotenoid formulations "Betatcinol" and "Betaviton" developed by scientists of the Belgorod State Agrarian Academy and employees of "Polisintez", Russia.

"Betatcinol" is a carotene-containing preparation, which ensures high safety bioefficacy and beta-carotene in combination with an organic zinc compound. Preparation "Betatcinol" in 1 ml contains of 20 mg of beta-carotene, 6.5 mg / g of alpha-tocopherol acetate and 25 mg / g of ascorbate zinc (zinc content - 6 mg). "Betatcinol" is a carotene-containing preparation, which ensures high safety bioefficacy and beta-carotene in combination with an organic zinc compound. Preparation "Betatcinol" in 1 ml contains of 20 mg of beta-carotene, 6.5 mg / g of alpha-tocopherol acetate and 25 mg / g of ascorbate zinc (zinc content - 6 mg). Beta-carotene, vitamin E and zinc Included in the "Betatcinol" have associative action: hinder the development of the body's free radical processes and their pathological effects on organs and tissues, have a beneficial effect on the organs of reproduction, and the immune status of the animal [4, 14]. 1 ml of preparation "Betaviton" contains 20 mg of beta-carotene, alpha-tocopherol acetate, 5 mg and 2.5 mg of ascorbic acid, which can enhance the antioxidant protection and to ensure better absorption of beta-carotene. The color of these preparations are from orange to dark red. Dignity of preparations are readily soluble in water. Solubility is achieved by the introduction into their structure of food emulsifiers which not only enhance the use of fat-soluble vitamins, but also of the feed [1, 13].

METHODS

To study the effect of water-dispersed carotene-containing preparations "Betaviton" and "Betatcinol" on energy growth of young pigs, the payment of feed production, slaughter and meat quality in APC named after "Voroshilov" in Stavropol Territory there was held two researches and production experience in young pigs of large white breed for the study of the productive action of preparations "Betaviton" and "Betatcinol".

Zoo technical analysis of the feed, their debris, feces and urine, tissue was performed on modern laboratory equipment and devices of the department of feeding farm animals. The total nitrogen ("raw" protein) was determined on the protein analyzer (nitrogen) «UDK - 142", crude fat on fat analyzer «SER- 148", the content of macro- and micronutrients on the universal analyzer "Spectroscan MAX GV», content vitamins - in the liquid chromatograph LCMS - 10 EV, crude fiber on fiber analyzer «FIVE», a total moisture content of feed on the moisture analyzer "AD - 4714 A". The amino acid composition of feed, blood serum, the length of the back muscles were examined by ion exchange column chromatography on an automatic amino acid analyzer AAA 400 according to the instructions according to AUSS 13496.21-87.

In the first experiment, on the basis of pairs of analog it was formed three groups of 20 piglets at the age of 60 days. The first (control) group of pigs received basic household ration (BR) without additional supplements, and the second and third expert with the BR, depending on the age, received the preparations "Betaviton" and "Betatcinol" in the amount of 0.5 - 0 8 ml per head per day, respectively. During the second experiment is similar group was formed in three groups of 20 young pigs at the age of 120 days. The first group was a control, while the second and third - experienced that in addition to BR received preparations "Betaviton" and "Betatcinol" in the

amount of 1.0-1.4 ml per head per day. The duration of the first experiment was 60, the second - 150 days. Carotenoid preparations were given to animals directly into the trough with water at morning watering cycles for 10 consecutive days with the same interruptions. The basic ration of animals, in both the first and second experiments responded animals requirements in all nutrients except carotene.

The main ration of pigs in the control group on fattening of 31-40 kg of live weight consisted of barley stock feed - 0.5 kg, 0.8 kg of wheat stock feed, 0.4 kg of wheat bran, 0.1 kg of fish meal, 6 g of salt, 20 g of chalk feed, 18 mg of mineral premix. Feeding rations of animals in the control group were balanced in all respects, except for carotene, the deficit amounted to 89.5%. Inclusion in the ration of young pigs of II and III experimental groups carotenoid preparations in amount of 0.5-0.8 ml per head a day, not only to compensate for the lack of carotene, but also exceeded the need for this provitamin to 56.4%. Furthermore, in the rations of animals in II experimental group increased vitamin E content in 7.8%, and further they were received by 2.0 mg of ascorbic acid; in III experimental group - increased zinc content by 7.4%, Vitamin E by 9.8%.

A similar situation was in the second experiment, in the fattening period. The basic ration (consisting of grain mixture - 95,4-97,3% and fishmeal - 4.6 - 2.7% of premix) of the control group was deficient in carotene in 83.6 -88.7%. Inclusion in the ration of animals of II the experimental group the preparation "Betaviton" completely eliminated the deficit of carotene and exceed the needs of the provitamin 44.7%. In addition, vitamin E content increased by 7.13%, and further, they received 2.5 mg of ascorbic acid. Adding to the ration of animals of III experimental group of the preparation "Betatcinol" allowed fully eliminate the deficit of carotene and exceed the needs of its provisions in 42,3- 55.1%, increase the zinc content in 5.1% and vitamin E in 10.5%.

RESULTS AND DISCUSSION

Feeding with the preparation "Betaviton" and "Betatcinol" had positive impact on the productive qualities of piglets in rearing and fattening periods (Table 1).

At the age of 120 days to animals of II and III experimental group were significantly superior to analog control group in live weight, respectively, in 2.8 and 3.0 kg or 7.9 and 8.5% ($P \leq 0.05$). During the period of fattening young of experimental groups had an advantage in the absolute weight gain, respectively, in 2.1 and 3.3 kg or 12.8 and 20.2% ($P \leq 0,01$ and $P \leq 0.05$), daily in 35.0 and 55.2, the cost of feed per unit gain in the experimental groups decreased in 13.1 and 19.4% ($P \leq 0.05$ and $P \leq 0,01$). The difference in the animal productivity of II and III experimental groups are not reliable.

A similar consistency was in fattening, in feeding of young pigs with carotenoid preparations. APC named after Voroshilov has a module for meat processing and production of sausages and adopted the technology of young pigs fattening with live weight up to 130 kg.

During the period of fattening the maximum body weight was obtained in young pigs of II and III experimental groups, fed with vitamin complex, and at the age of 270 days had 130.4 and 131.2 kg, which is more than in control group of animals, respectively, 14.1 and 14 9 kg or in 12.1 and 12.8% ($P \leq 0.05$).

Animals of II and III experimental groups were superior to peer of control group in absolute growth of 13.7 and 14.3 kg or 18.8 and 19.6% ($P<0,01$), average daily gain in 91 and 95 g; the cost of feed per unit of gain decreased in 14.7 ($P \leq 0.05$) and 17.3% ($P \leq 0,01$) respectively.

The productivity results of the fattening pigs are coordinated with data of O.V. Merzlenko, O.V. Babenko (2009) for use in swine rations of water-dispersed carotenoid preparation "Betaviton."

At the age 270 of days was a slaughter in control group of animals. Three animals from each group (Table 2). Meat quality was determined by animal carcasses debone of three pigs from each group.

The results of the control slaughter have shown that the best slaughter quality have animals of II and III experimental groups. Animals of these groups had preslaughter weight 129.7 and 130.0 kg, which is more than their peers in the control group in 14.4 kg and 14.7 or 12.5 and 12.7% ($P \leq 0.05$). Pigs of experimental groups had higher slaughter weight than the animals of control group in 17.8 and 18.9% ($R \leq 0,01$) respectively. Animals in the control

ISSN: 0975-8585

group fell short of experimental group peers in slaughter yield by 3.6 and 4.2%. Pigs of II and III experimental groups along the length of "bacon halves" exceeded the control animals by 5.0 and 6.0 cm or 6.3 and 7.5% (P ≤ 0.05).

Table 1: The productivity of piglets in the rearing and fattening, n = 20

Index	Age, days	Group		
		I-control	II-experimantal	III- experimantal
First experience (nursery)				
Live weight, kg	60	19,0±0,04	19,7±0,34	18,7±0,06
	120	35,4±0,35	38,20±0,55	38,41±0,35
Absolute growth,kg	61-120	16,4±0,49	18,5±0,53	19,71±0,53
Average daily gain, g	61-120	273,3±6,1	308,3±6,37	328,5±7,2
The cost of feed per 1 kg of growth, EFU	61-120	6,18	5,37	4,98
Second experience (откорм)				
Live weight, kg	120	43,4±0,10	43,8±0,68	44,0±0,10
	270	116,3±1,30	130,4±2,15	131,2±1,80
Absolute growth,kg	121-270	72,9±1,87	86,6±1,51	87,2±2,26
Average daily gain, g	121-270	486,0±22,1	577,3±10,13	581,3±23,5
The cost of feed per 1 kg of growth, EFU	121-270	6,44	5,49	5,15

Table 2: Slaughter and meat quality of fattening pigs, n = 3

Index	Group		
	I-control	II-experimantal	III- experimantal
Preslaughter weight, kg	115,3±3,11	129,7±2,46	130,0±2,86
Slaughter weight, kg	86,1±2,32	101,4±1,93	102,4±2,25
Slaughter yield, %	74,6±2,01	78,2±1,49	78,8±1,73
The length of the half-carcasses, sm	98,0±2,65	99,7±1,89	100,0±2,21
The length of the "bacon halves", sm	80,0±2,16	85,0±1,62	86,0±1,89
Ham Weight, kg	10,6±0,29	11,40±0,22	11,6±0,26
including, kg: meat	6,13±0,17	6,60±0,15	6,70±0,15
lard	3,44±0,09	3,72±0,09	3,73±0,08
bones	1,03±0,03	1,08±0,03	1,14±0,03
The morphological structure of hind quarter, %: Meat	57,83±1,56	57,86±1,10	57,91±1,27
Lard	32,45±0,88	32,66±0,59	32,24±0,71
bones	9,72±0,26	9,48±0,19	9,85±0,22
The area of "muscle eye" cm2	35,72±0,96	41,84±0,83	43,39±1,04

ISSN: 0975-8585

Table 3: Chemical composition of the rib eye,%, n = 3

Index	Group		
	I-control	II-experimantal	III- experimantal
Moisture	73,11±2,05	72,95±1,75	72,98±1,75
Dry matter	26,89±0,75	27,05±0,54	27,02±0,54
Organic matter	25,52±0,69	25,73±0,47	25,69±0,47
Protein	19,81±0,55	19,94±0,38	19,92±0,38
Tryptophan content, mg / 100g	267,0±7,21	296,7±6,56	298,3±6,56
Hydroxyproline content, mg / 100 g	63,0±1,70	56,0±1,19	54,0±1,19
Try – hydr index*	4,24±0,12	5,30±0,08	5,52±0,08
Fat	5,71±0,16	5,79±0,13	5,77±0,13
Vitamin A	0,005	0,007	0,007
Ash	1,37±0,4	1,32±0,03	1,33±0,03

* Tryptophan-hydroxyproline index

In weight of hams animals of II and III experimental groups were superior to the control group peers by 7.6 and 9.4% ($P \leq 0.05$).

The research results showed that the inclusion of carotenoid preparations in the rations of young pigs is characterized by their unequal ability to form muscle and adipose tissue.

Animals of II and III experimental group were superior in area "muscle eye" than the control group in 17.13 and 21.47% ($P \leq 0,001$) respectively.

For a number of the chemical composition indicators of rib eye (Table 3) young pigs receiving the preparations "Betatcinol" and "Betaviton" compared with the control group tended to increase in dry matter content (in 0.13 and 0.16% ($P \geq 0$, 05 respectively), organic matter (0.17 and 0.21%, $P \geq 0,05$), protein (0.11% and 0.13, $P \geq 0,05$), vitamin A (0.002% $P \geq 0,1$), although the difference is not reliable.

An essential amino acid tryptophan in the proteins of the meat is a qualitative indicator of the usefulness of the proteins, while the presence of hydroxyproline indicates the number of defective proteins. Therefore, the biological value of meat is characterized by the ratio of tryptophan to hydroxyproline (tryptophan oksiproline index). The more this index is, the more complete protein meat is [1, 2].

Tryptophan-hydroxyproline index of meat in II and III groups amounted to 5.30 and 5.52, which is higher than in control group in 1.06 and 1.28 units.

CONCLUSION

Thus, to ensure full feeding ration of young pigs, increasing their energy growth, payment of feed, improving slaughter, meat qualities and biological value of meat consider it appropriate to include integrated water-dispersible carotenoid preparations "Betaviton" and "Betatcinol" in the rations of rearing piglets in the amount of 0.5 - 0.8 ml and fattening 1.0-1.4 ml per head per day.

ISSN: 0975-8585

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