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THE USE OF ZEOLITE IN THE FEEDING OF RABBITS

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THE USE OF ZEOLITE IN THE FEEDING OF RABBITS

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ABSTRACT

Zeolite is intended to balance the ration for mineral substances, macro- and microelements. Research of the influence of zeolite from Shivyrtuiskiy deposit, situated in Zabaikalskiy district, Chitinskiy region, Russia, on rabbit production was conducted on young Soviet Chinchilla and Viennese Blue rabbits (n = 400).

Introduction of zeolite up to 3 % from combined feed gave the best effect in both breeds because of better nutrient assimilation. It promoted increased live weight with less expenses of feed and increased the percent of surviving livestock. Results of the research showed that zeolite introduction into rabbit ration up to 3 % did not influence the gustatory meat qualities. Output of I and II sort pelts after slaughter of Viennese Blue rabbits at 150 days of age, was higher by 25 % in the experimental group in comparison with the control group.

INTRODUCTION

Zeolite - is a substance of crystal structure, containing kations of alkaline and alkaline earth metals, molecules of water, Cu (1-20 mg/kg), Zn (50-60), Co (5-6), Se (2-3) and Mo (0-10 mg/kg).

Natural zeolite possesses unique adsorptive, ion-exchangeable characteristics that condition its positive influence on physiological state of animals. Zeolite is able to adsorb CO₂, NH₃, H₂S, CH₄ and some nitrogen combinations. Passing through digestive tract zeolite removes surpluses of liquids, detrimental gases and endotoxines.

It was established, that total acidity, proteolytic and aminolytic activity of pancreas juice, Ca and P absorption in intestine increased in a week after the beginning of zeolite introduction.

MATERIAL AND METHODS

In the first experiment our research was conducted on 4 groups of Soviet Chinchilla rabbits between 50-100 d of age at "Rodniki" farm, situated in Moscow region. Each group consisted of 50 meat rabbits.

The second experiment was conducted on 2 groups of Viennese Blue rabbits between 90-150 d of age at "Raifsky" farm, situated in Tatarstan. Each group consisted of 100 rabbits, grown for their pelt.

Zeolite was given into the ration of Soviet Chinchilla and Viennese Blue rabbits in quantity of 3 and 5 %; 2 % from combined feed mass, respectively. Dimension of the zeolite fraction did not exceed 1 mm.

Animals from the control group received the diet without zeolite.

Meat rabbits were housed in groups of four per cage. Rabbits, grown for pelt, were caged per 2. Feeding was ad libitum; residues and losses of feed were taken into consideration. Rabbits could drink from automatic drinking bowls during the experiments.

The following measurements were taken into account:

- Live weight of rabbits (kg);
- Slaughter yield (%);
- Slaughter weight of carcass without head and internal organs (kg);

results were analysed by statistical methods (Plohinskiy, 1980).

RESULTS AND DISCUSSION

It was established that optimum zeolite introduction was up to 1-3 % from combined feed weight for Soviet Chinchilla rabbits, grown on meat, at 50 to 100 d age. By the end of fattening, this supplement provided trustworthy ($P < 0,001$) increase of live mass on 9,4 - 8,1 %, pelt output, slaughter yield on 2,2 - 2,9 %, percent alive young animals on 2-5 % and reduced the expenses of feed on 1 kg of increase on 13 and 6,3 % in comparison with the control group (Table 1).

Table 1. Effect of dietary zeolite supplementation for growing meat rabbits between 50 and 100 days of age.

Item	Experimental groups			
	I control	II (1 %)	III (3 %)	IV (5 %)
Quantity of rabbits	50	50	50	50
Alive young rabbits, %	88	90	93	91
Average live weight, kg - by the beginning of the experiment	1,62±0,03	1,62±0,03	1,66±0,04	1,64±0,03
- by the end of the experiment	2,34±0,03	2,56±0,04	2,53±0,04	2,42±0,04
Gross gain, g,	720	940	870	780
Average daily gain, g,	16	20,9	19,3	17,3
As % of controls	100	130,6	120,6	108,1
Feed conversion ratio	4,0	3,48	3,75	4,0
As % of controls	100	87	93,7	100

Inclusion of 3 % zeolite into the diet of meat rabbits increased digestibility of organic matter with 4,3 %, crude protein with 3,2 %, lipids with 20,7 %, crude fibre with 7,5 % and nitrogen free extract (NFE) with 3,6 % (Table 2).

Table 2. Coefficients of nutrient digestibility (%).

Items	Experimental groups			
	I Control	II (1 %)	III (3 %)	IV (5 %)
Organic matter	72,4	72,1	76,7	70,4
Protein	67,9	67,3	71,1	67,7
Lipids	63,0	76,9	83,7	75,1
Fibre	35,0	34,4	42,5	22,8
NFE	78,2	77,5	81,8	76,2

Introduction into the ration of small (1 %) and big (5 %) doses of zeolite did not influence the nutrient digestion of young rabbits.

Data analysis of slaughter results of the meat rabbits (5 rabbits from each experimental group) revealed that zeolite supplementation of 1 and 3 % from dry matter of combined feed, increased slaughter weight by 0,28 and 0,06 kg (II and III group, respectively) and carcass fatness (Table 3).

Table 3. Slaughter characteristics

Item	Experimental groups			
	I control	II (1 %)	III (3 %)	IV (5 %)
Live weight by slaughter, kg	2,70±0,22	3,09±0,40	2,66±0,15	2,63±0,12
Slaughter weight, kg	1,49±0,13	1,77±0,06	1,55±0,10	1,45±0,08
Slaughter yield, %	55,1	57,3	58,0	55,4
Carcass fatness of :				
I category	34	100	75	60
II category	66	-	25	40

Carcass output of I category of fatness in the II and III group was 100 and 75 %, respectively, against 34 % in the control.

As a result of comparative and organoleptical analysis of carcasses, meat and fat of rabbits was judged on 7 factors (according to the GOST 20235, 0-74-20235, 2-74). No difference was established between the control and the experimental groups, which received 1, 3 and 5 % zeolite, supplement from the combined feed mass. All carcasses had a specific scent, which was character for fresh meat of rabbits. Broth was transparent, aromatic.

Thus, a diet containing combined feed and zeolite is recommended for obtaining dietary, ecologically clean meat of rabbits, grown for meat, between 50-100 d of age (table 4).

Table 4. Composition of the pelleted feed containing zeolite for young meat type rabbits (%).

Components	1	2
Grass meal	30	30
Milled oats	19	19
Milled barley	19	19
Wheat bran	14	12
Sunflower cake	13	13
Fish meal	2	2
Bone meal	0,5	0,5
Yeast fodder	1,0	1,0
Sodium chloride	0,5	0,5
Zeolite	1	3
In 100 g is kept:	-	-
Metabolic energy, MJ	0,89	0,88
dry matter, g	85,8	84,1
crude protein, g	17,9	17,6
crude fibre, g	13,6	13,4

Calcium, g	0,76	0,79
Phosphorus, g	0,58	0,56

As a result of the second experience, conducted at “Raifski” fur farm on young Viennese blue rabbit between 90-150 d of age, it was established that dietary zeolite supplementation of experimental groups of rabbits in amount of 2 % from combined feed increased daily gain by 8.6 %, percent alive young rabbits by 3 % and reduced feed conversion by 10,1 % (Table 5).

Table 5. Productivity of experimental groups of young rabbits grown for pelt.

Item	Groups	
	I (0 %) Control	II (2 %) experiment
Quantity of rabbits	100	100
Alive young rabbits, %	89	92
Live weight, kg:		
- at 90 d age (by the beginning of the experiment)	1,678±0,002	1,688±0,001
- at 150 d age (slaughter for pelt)	2,786±0,002	2,899±0,002
Weight increase, kg	1,108	1,211
Average daily gain, g	18,5	20,1
Ratio to the control, %	100	108,6
Expenses of feed/ kg of gain	7,9	7,1
Ratio to the control, %	100	89,9

Sixty males from each group were slaughtered at 150 days of age. I and II sort pelts were more frequent (+ 42,8 %) and also the large pelts (+9,5 %) in the experimental groups, that received 2% zeolite from the combined feed (Table 6).

Table 6. Pelt quality of the control and experimental groups of young rabbits.

Item	Groups	
	I (0 %) Control	II (2 %) experiment
Quantity of rabbits	60	60
Quantity of pelts, pieces:		
1 sort	7	21
2 sort	28	29
3 sort	25	10
Quality of pelts on the size, pieces:		
especially large	21	23
Large	38	36
Small	1	1

Presence of injuries from biting (in consequence of 5 rabbits in a hutch), baldhead and thinning hair were main defects of pelts in both groups. So we recommend the following composition (table 7) for

CONCLUSION

On the basis of the obtained results we recommend the introduction of native zeolite into diets for rabbits in the following percentage from combined feed mass:

- for young rabbits, grown for meat, between 50-100 days of age: 1-3 %;
- for young rabbits, grown for pelt, between 90-150 days of age : 2 %.

Such introduction improves the dietary digestibility and the feed conversion.

Our data co-operate with research on the use of zeolite in diets of other agricultural animals (1, 2, 3, and 4).

Table 7. Composition of full-ration pellet combined feed containing zeolite for young rabbits grown for pelt production (%).

Components	Quantity
Grass meal	30
Maize	15
Wheat	21
Wheat bran	11
Oats	10
Sunflower cake	10
Phosphate	0,5
Natrium chloride	0,5
Zeolite	2
In 100 g compound feeds is kept:	
Metabolic energy, MJ	0,96
Dry matter, g	84,5
Crude protein, g	16,2
Crude fat, g	3,1
Crude fibre, g	12,0
Calcium, g	0,68
Phosphorus, g	0,56

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