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PRODUCTIVE PERFORMANCE AND HEMATOLOGICAL PARAMETERS OF PIGLETS’ BLOOD AFTER USING DIETARY NATURAL ZEOLITE OF THE CHANKANAY DEPOSIT (KAZAKHSTAN)

Annotation

The objective of the present study was to determine the effects of dietary natural zeolites of the Chankanay Deposit to daily gain, health status and feeding performance of piglets. 45 days aged Male White Breed piglets (n=60) were allocated to a four dietary groups: a control group with a basal diet (BR) without any supplementation and three groups receiving the zeolite with BR at levels of 2%, 3% and 5% for 60 days The results were compared with the parameters determined in control pigs. There was established that the supplementation of zeolites have positive effect on daily gain and productive performances of pigs and increase the hematological parameters in blood. Results of this study suggest that dietary supplement of zeolite can be used as a feed additive for pigs and it can affect some parameters of hematological indicators of pigs.

Key words: piglets, zeolites, diet, productive performance, productivity.

Introduction

According to the modern concept of balanced science-based nutrition for normal life and to maximize the productivity of the animals it is necessary to observe the proportion between the numerous nutritional factors. The system measures to increase pork production the organizing overall balanced feed are playing a leading role. It is important for young pigs for caused by the high tension of metabolic processes in their organisms [1, 2]. Growing of weaned piglets, especially in the early weaning, is one of the most difficult elements of a technological pork production process. Piglets of this age, in contrast to adult pigs are imperfect organs and body systems, making them more sensitive to the emergence of various diseases [3]. Feed additives of mineral origin as zeolites are widely used in pig farming practice for improving of digestion processes [3].

The main interest in the biological effects of zeolites concerns one or more of their physical and chemical properties, such as ion exchange capacity, absorption and related molecular sieve properties. Zeolites are used for various applications including adsorbents, ion exchangers and catalysts in industry, agriculture, veterinary medicine, sanitation and environmental protection [4].

Beneficial effects of natural zeolite may be related to the species and the geographical source of the involved zeolite, its’ purity and physical and chemical properties, as well as the supplemental level used in the diets. Furthermore, dietary and environmental conditions under which consistent positive responses to zeolite administration are expected should also be considered. Different dietary levels of zeolite were tested in various animal species by many researchers. In veterinary medicine, there is evidence in the literature that the use of natural zeolites have favorable effects on growth and performance of ruminant animals. Besides, dietary zeolites improved weight gain of fattening pigs, improved feed efficiency and egg production in laying hens [5].

The aim of the present study was to determine the effects of different levels of dietary zeolite of the Chankanay Deposit (Kazakhstan) on the feeding performance and blood characteristics of weaned piglets.

Material and methods

n this study, zeolite used as the porous template medium was obtained from Chankanay minds, Kazakhstan. Zeolite was the predominant mineral (95%) in the natural zeolite (manufacturer's specifications).

All animals accepted and tolerated the zeolite-supplemented diets devoid of problems.

Feeds and feeding: Animal feeds were purchased from usual ration. Experimental diets were prepared as powder and some feed ingredients were added in order to increase and balance nutritive values of feeds. At the feed unit of the farm grounded mixed feeds were turned into pellet form with a special apparatus. Pelleted feed was kept in a drying cabin at 70°C for 12 h. In order to keep dry matter contents of all group feeds, water capacity of feeds were lowered to normal levels. When water percentages of feeds were decreased enough, feeds taken out from machine and put back into bags according to their groups after they were cooled and shortened to 2 cm long. Each experimental group received its specific diet throughout the experimental period.

Animals and treatments: 1.5 months old, average 13,6±0,21 kg initial weight, 60 healthy Male White Breed piglets were used in the experiment which were obtained from pig farm, located in Ghambyl Oblast. Then, within 10 days, piglets habituated to the conditions of contained in the methodology experiment (animal keeping, feeding conditions). At the same time adhere strictly to the day schedule and zoohygienic standards for the piglets. The indoor microclimate monitored every day (air temperature, humidity, air velocity, concentration of CO_2 and NH_3, 8-h light/16-h dark, 18±3°C). Feed and water were provided as *ad libitum*. The number of piglets per group as well as the levels of zeolite (% of concentrates) added in the concentrate feed of each group were as follows: Group I (control) as standard diet did not contain natural zeolites as feed additive; Group II, III and IV were treatment groups, which contain 2%, 3% and 5% zeolite rates, respectively. Each group comprised of 15 piglets.

Blood samples for the experiment were taken on the 30th and 60th days. Hematological blood tests carried out by standard methods or (The number of erythrocytes, leukocytes, trombocytes, levels of haemoglobin and haematocrit were established using the Symex SF-3000 automatic counter. Blood smears were prepared and stained by standard method and investigated under a microscope in order to arrive at the differential blood count. The relative ratio of individual cells of leukocytes is given in percentages in relation to their total number).

The obtained data were processed using MS EXCEL tables. The significance of differences by the study group was determined in ANOVA, which were considered significant at $p < 0.05$.

The scheme of scientific experience is shown on the Table1.

Table 1 – Scheme of scientific experience

Groups	Number of animals	Average live weight, kg	Reference period (days)	Conditions of feeding
Control	15	13,6±0,19	60	BR (basic ration)
I - treatment group	15	13,6±0,21	60	BR + 2% zeolites
II - treatment group	15	13,5±0,16	60	BR + 3% zeolites
III - treatment group	15	13,8±0,25	60	BR + 5% zeolites

Results and discussions

During the experiment on the effectiveness study of different feeding doses of zeolite for completion of growing period piglets the productivity has been determined among experimental pigs, on the basis of the results of control weighing - absolute and relative gains of live weight. Animal productivity indicators of the experience were shown in the Table 2.

Table 2 – Growth performance and productivity of piglets

№	Indicators	Groups			
		Control	I - treatment group BR + 2% zeolites	II - treatment group BR + 3% zeolites	III - treatment group BR + 5% zeolites
1	The average live weight at the beginning of the experiment	13,6±0,19	13,6±0,21	13,5±0,16	13,8±0,25
2	The average live weight at the end of the experiment	49,38±0.34	49,78±0.38	51,3±0,41	51,66±0,4
3	Daily gain, g	595±4,35	603±5,57	631±4,65	631,5±4,23

There was no significant (P >0.05) difference in the initial body weights of pigs fed at different levels. This implied that the experimental pigs were equalized before the commencement of the experiment. The final body weight, daily weight gain and daily feed intake increased significantly (P <0.05) with increase in feed quantity offered. Pigs fed 3 and 5% zeolites + BR daily had higher final body weight of 51,3±0,41kg and 51,66±0,4 respectively, compared to 49,38±0.34 and 49,78±0.38 kg obtained for those fed 0 and 2 % zeolites + BR to feed daily.

Daily weight gain followed the same trend with the highest mean value of 631±4,65 g and 631,5±4,23 g found among pigs with 3 and 5% zeolites to basic ration, while the least value of 595±4,35g was recorded for pigs fed with 0 % zeolites to basic ration daily.

Dynamics of changes in morphological and biochemical indices of blood showed that feeding pigs with the zeolite in an amount of 2% of the diet has a positive effect on the general condition of the animals by stimulating hematopoiesis (see. Tab. 3)

Table 3 – Hematological parameters of piglets

Groups	Indicators	Periods of experiement		
		the initial	30 days	60 days
Control	red blood cells, $x10^{12}$/l	5,74±0,32	5,84±0,32	5,87±0,29
	leukocytes, x109 / l	13,1±0,23	14,0 ±0,42	14,95±0,25
	Hemaglobin, g / l	104,6±3,1	106,3±3,1	108,8±2,60
	Total protein, g / l	61,2±1,9	64,0±2,65	63,2±2,01
I - treatment group	red blood cells, $x10^{12}$/l	5,87±0,46	6,08±0,29	6,19±0,24*
	leukocytes, x109 / l	12,5±0,42	13,3±0,19	14,1±0,24*
	Hemaglobin, g / l	107,1±2,09	109,7±1,98	112,9±1,95*
	Total protein, g / l	63,1±1,95	64,9±1,03	64,1±0,96*
II - treatment group	red blood cells, $x10^{12}$/l	5,93±0,28	6,06±0,35	6,16±0,26
	leukocytes, x109 / l	12,1±0,38	12,9±0,21	13,8±0,28
	Hemaglobin, g / l	108,1±2,1	108,7±1,68	110,9±1,86

	Total protein, g / l	63,6±1,95	63,8±0,96	64,4±1,21
III - treatment group	red blood cells, $x10^{12}$/l	5,89±0,46	6,1±0,29	6,23±0,24
	leukocytes, x109 / l	12,3±0,42	13,1±0,19	14,0±1,24
	Hemaglobin, g / l	107,1±2,09	109,7±1,98	112,9±1,95
	Total protein, g / l	63,1±1,95	64,9±1,03	64,1±0,96*

* $p< 0,05$

Compared with the primary data, the level of red cells in the blood of piglets in the experimental group was higher at the end of the study at 22.1%, hemoglobin - 24.6% and the leukocytes lower than the control -19.2%. The dynamics of leukogram of piglets fed in the diet with the zeolite minerals showed that there is normalization of the ratio of different types of white blood cells.

Also, studies identified a significant difference between the performance of the total protein and protein fractions in piglets of the experimental group relative to baseline, indicating a positive effect of the feed additive on the protein metabolism of the organism.

During the experiment, total protein level in the blood of piglets fed with zeolite increased by 6.3% and in control group about three times (2.2%). In addition, among the experimental group we can assume tendency of growth of γ-globulin fraction.

Conclusion

On the basis of analysis of the experiences there were obtained positive influence of including of 3% natural zeolite from Chankanay deposit on the diet of piglets on physiological functions and efficiency. Inclusion in the diet of this mineral contributed to increase the productivity and growth dynamics of experimental piglets. However, this study is the first practical based experiment. In near future more studies need to be undertaken in a similar direction to prove all the data obtained from this report. Results of this study suggest that dietary supplement of zeolite can be used as a feed additive for pigs.

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ПОВЫШЕНИЕ ПРОДУКТИВНОСТИ И ГЕМОТОЛГИЧЕСКИЕ ПОКАЗАТЕЛИ КРОВИ ПОРОСЯТ ПРИНИМАВШИЕ НАТУРАЛЬНЫЕ ЦЕОЛИТЫ ЧАНКАНАЙСКОГО МЕСТОРОЖДЕНИЯ (КАЗАХСТАН)

Аннотация

По результатам исследования было определено влияние природных цеолитов Чанканайского депозита на ежедневный прирост, состояние здоровья и показатели кормления поросят. Поросята белой породы 45 дневные (n=60) были разделены на четыре группы: контрольная группа без каких-либо добавок и три группы, получавшие цеолит 2%, 3% и 5% концентрации в течение 60 дней. Результаты сравнивались с параметрами, определяемые у контрольных свиней. Было установлено, что добавление цеолитов оказывает положительное влияние на ежедневный прирост и продуктивность свиней и улучшает гематологические параметры в крови. Результаты этого исследования показывают, что цеолиты Чанканайского депозита могут быть использованы в качестве кормовой добавки для свиней и может влиять на улучшение параметров гематологических показателей свиней.

Ключевые слова: поросята, цеолиты, диета, производительность.

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ЧАНКАНАЙ (ҚАЗАҚСТАН) КЕН ОРНЫНЫҢ ТАБИҒИ ЦЕОЛИТІН АЗЫҚТЫҚ ҚОСПА РЕТІНДЕ ҚАБЫЛДАҒАН ТОРАЙЛАРДЫҢ ӨНІМДІЛІГІНІҢ АРТУЫ МЕН ҚАНЫНЫҢ ГЕМОТОЛОГИЯЛЫҚ КӨРСЕТКІШТЕРІ

Аңдатпа

Чанканай кен орнының Цеолитін азықтық қоспа ретінде қабылдаған торайлардың өнімділігінің артуы мен қанының гемотологиялық көрсеткіштері осы зерттеудің нәтижелерінде анықталды. Ақ буданды 45 күндік (n=60) торайлар цеолит қоспасы жоқ бақылау, сонымен қатар 2%, 3% және 5% көлемдегі Цеолитті қабылдаған төрт топқа біріктірілді. Нәтижелер бақылау тобындағы торайлардан анықталған көрсеткіштермен салыстырылды. Цеолитті азықтық қоспа ретінде қолдану торайлардың күнделікті өсімділігіне, өнімділігіне және қанның гематологиялық көрсеткіштерін жақсартуға әсері анықталып, зерттеу нәтижелерінде көрсетілгендей Чанканай кен орнынан өндірілген цеолит шошқа шаруашылығында азықтық қоспа ретінде қолдануға болады деуге болады.

Кілт сөздер: торайлар, цеолит, азықтық қоспа, өнімділік.

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ANALYSIS OF POST-VACCINATION ANTIBODY THE AGAINST FOOD AMD MOUTH DISEASES TYPES A, O, ASIA-1 BY ELISA ANIMALS IN OF KYZYLORDA REGION

Abstract

It was presented the results of a study of vaccinated animals Kyzylorda region trivalent inactivated vaccine against FMD types A, O and Asia-1 and examine the duration of immunity generated by inactivated vaccine by ELISA in the archly.

Key words: Foot and mouth disease, the trivalent inactivated vaccine against FMD types A, O and Asia-1, immunogenic activity, vaccine-drug.