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THE INFLUENCE OF ENZYME ADDITIVES ON NUTRIENT UTILISATION IN PIGLET NUTRITION

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Using enzyme additives targeted better digestibility and nutrient utilisation. The experiment was conducted with 105 piglets, splited into three groups. Group 1 did not have enzyme additives. Group 2 and group 3 had enzyme additives (enzyme mixture – Allzyme Vegpro®) in concentracion of 0.1 and 0.2%. The digestibility was measured using the indirect indicator method. The experimental period was splited in two parts: preparation and collection period. The indicator in the diet was chrome(III) oxide. The digestibility of all nutrients was better with enzyme additives than the control group.

Key words: pig; piglet; feed; Allzyme Vegpro®; body weight; digestibility

ВЛИЈАНИЕ НА ЕНЗИМИТЕ КАКО АДИТИВИ ВРЗ ИСКОРИСТУВАЊЕ ХРАНЛИВИ МАТЕРИИ ВО ИСХРАНАТА НА ОДБИЕНИ ПРАСИЊА

Користењето на ензимите како адитиви во храната има задача да помогне за подобро и потполно варење и искористување на хранливите материи од оброкот. Опитот е поставен со 105 прасиња распоредени во 3 групи. Првата група на прасиња немала додатни ензими во оброкот, додека другите две групи имале додатни смеси на ензими (Allzyme Vegpro®) во концентрација од 0.1 и 0.2%. Одредувана е сварливоста на хранливите материи со користење на индиректен метод на индикатори. Експерименталниот период е поделен на два дела: подготвителен и собирен. Индикатор во храната бил хром(III)оксид. Сварливоста на сите хранливи материи била подобра кај двете групи со додаток на ензими во споредба со контролната група.

Клучни зборови: свињa; прасе; храна; Allzyme Vegpro®; телесна маса; сварливост

1. INTRODUCTION

Considering the overall economy of this form of rearing pigs from the point of the rise and development, our research gave the insight on the impact of the application of additive Allzyme Vegpro while used in pig smiling, at the height of the average daily food consumption and daily food conversion.

Different considerations are presented for the entire course of experiment. Complete fodder mixtures were given to piglets, starting from the transition to food-Starter, later to the food which was used for feeding, until the turn to the fattening-Grover.

Special significance for pigs in growing and fattening have proteolytic, amylolytic and cellu-

lytic enzymes. Their presence contribute to better usage of proteins and energy gained from food, if they are used in appropriate quantities.

Synthetic supplements are mostly produced as enzyme cocktail, in that way they are greatly applied in livestock breeding and are especially important in pig rising.

It has been shown to be justified that in this paper we should approach to the analysis of the effects arising due to the application of Allzyme Vegpro as additive in pig food mixture, combined in the form of a Starter and Grover.

2. REVIEW OF LITERATURE

Belić et al. (1972) highlight the importance of balance meal for pigs in growing and fattening, especially in terms of essential amino acids.

Huskić-Bačar (2003) emphasizes the need for enzymatic processing of fodder mixtures before bing used by pigs. Enzyme cocktails making, such as Allzyme Vegpro, and its adding to the fodder mixtures, significantly increases the production results and makes them profitable.

Radovanović et al. (1990 and 1997) recommend the composition of meals which involve enzymes and proteins. These meals contribute significantly and efficiently to usability, which gives better results in rising.

Paskaš Snežana (2001) states that the enzyme fitase contributes to better utilization of proteins used in feeding pigs.

Grčak Dragana (2000) analyzes the impact of enzyme cocktails on nutrient utilization by piglet in the breeding and says that the cocktail of enzymes made the utilization of food easier, reduced the coefficient of conversion and had a detoxic effect.

Fagan S. M. et al. (2004) point to the reasonableness of the use of enzymes in the preparation of fodder mixtures for pigs and give the data for the proteolytic ferment, which by her saying consume even 60% of the total production of enzymes in the industrial food.

Shiwarand et al. (2004) describe the efficiency of Allzyme Vegpro, being added to the food on the basis of sunflower, on the production performance of monogastric animals. This additive improved the food adoption and led to savings of 2–5 g. per kilo of gain.

Kovčin et al. (2004) in their paper described the efficiency of enzyme supplement, with the exclusion of nutrients of animal origin.

Jovanović et al. (2000) in their work found that enzymes play an important role in improving the impact of fodder mixtures on pigs.

Officer, D. J. (1992) in the work determined that the enzymes, especially in the diet of growing animals, are very important.

Campel et al. (2000) speak about the addition of enzymes in monogastric animals nutrition as a convenient, economically feasible problem.

3. AIM AND TASK OF THE PAPER

The bibliography which we used shows that the extensive research on the examination of the physiological and nutritional value of enzymes in the pig food were only recently published. Our testing was performed in order to analyze the effect of the examined enzyme for the realization of food consumption and conversion, among other parameters described in other papers.

Allzyme Vegpro, in the form of the resulting enzyme product i.e. in a form of a cocktail, combines activities (protease, pentosanase, galactosidase and alpha amylase) and contributes to better utilization of nutrients, which improves economy of meals and the production becomes economically profitable.

4. MATERIAL AND METHODS OF RESEARCH

The study comprised a total of 105 pigs (Landrace and Yorkshire) mestizo F1 generation.

Our work task included the following units:

– Chemical analysis and preparation of fodder mixtures for piglets in accordance with the physiological needs of animals and appropriate legislation.

– The establishment of a biological experiment by a group control system and determining the mass of cultivated animals at the beginning and at the end of the experiment.

– Organization of pig feeding according to the requirements of a biological experiment.

– Making records on the consumption of food according to groups and counting of feeding days.

– The statistical analysis of the experimentally obtained data.

The whole research was done on a mini farm near Valjevo. The experiment consisted of 3 groups as follows: Control – K, and two sample I-O and II-O. In the control group pigs did not receive enzyme, while the I-O group received the enzyme in quantities of 0.1%, and the sample II-O in the amount of 0.2%. The experiment lasted 52 days starting from February 1st, 2006, to March 24th, 2006.

Piglets nutrition was based on the needs of the young animals and the comparative study of nutritive value of forage mixtures that were used.

This enzyme Allzyme Vegpro was created by fermentation with fungi Aspergilus niger, and it is an enzyme cocktail. This enzyme is designed for meals that contain higher concentrations of polysaccharides, which are meals that are formed with a larger share of cereals.

Piglets were in prefabricated buildings, in separate boxes and there were 7 boxes by 5 pigs in the group. All the boxes were on the common channel, which was swelling urine and feces to the collecting lagoon.

Table 1 shows the composition of the raw material in forage mixtures.

The chemical composition obtained by the method of analysis by Wendea, shown in Table 2, must also be taken into consideration.

We did the statistical analysis of the results obtained by using the methods of Hadživuković (1991) and we determined the statistical significance.

Table 1

Composition of the raw material in forage mixtures

Raw proteins. %		20			18	
Piglet weight		8 – 15			15 – 25	
Group	K	I-O	II-O	K	I-O	II-O
Allzyme Vegpro	–	+	+	–	+	+
		8 – 15			15 – 25	
	K	I-O	II-O	K	I-O	II-O
Corn	57.60	57.50	57.70	62.75	62.65	62.55
Animal flour	5.0	5.0	5.0	5.0	5.0	5.0
Soybean meal	13.5	13.5	13.5	13.5	13.5	13.5
Sunflower pellet	4.0	4.0	4.0	4.0	4.0	4.0
Allzyme Vegpro	–	0.1	0.2	–	0.1	0.2
Alfalfa meal	2.0	2.0	2.0	2.0	2.0	2.0
Fish meal	5.0	5.0	5.0	5.0	5.0	5.0
Milk replacement	10.0	10.0	10.0	10.0	10.0	10.0
Livestock Chalk	0.6	0.6	0.6	0.6	0.6	0.6
Dicalcium phosphate	1.2	1.2	1.2	1.2	1.2	1.2
Salt	0.1	0.1	0.1	0.1	0.1	0.1
Premix	1.0	1.0	1.0	1.0	1.0	1.0
Total:	100	100	100	100	100	100

Table 2

Chemical composition of food

N	Chemical composition of food	K	I-O	II-O	K	I-O	II-O
1.	Raw material	85.24	86.48	86.52	88.12	88.54	88.32
2.	Moisture	14.76	13.52	13.48	12.88	11.46	11.68
3.	Raw ash	4.65	4.38	4.26	4.31	5.87	4.88
4.	Raw proteins	20.52	20.18	20.43	18.52	18.24	18.38
5.	Raw lipids	5.20	5.08	5.11	5.08	5.09	5.11
6.	Raw cellulose	3.40	3.50	3.30	4.52	4.54	4.38
7.	BEM	51.47	53.34	53.43	54.80	51.80	55.57
	Total (2–7)	**100**	**100**	**100**	**100**	**100**	**100**
8.	Calcium	1.03	1.05	1.00	1.00	1.02	1.04
9.	Phosphorus	0.90	0.88	0.90	0.92	0.94	0.92
10.	Sodium	0.15	0.18	0.17	0.19	0.20	0.18
11.	Lysine	0.81	0.85	0.86	0.87	0.88	0.86
12.	Methionine	0.38	0.28	0.32	0.33	0.31	0.32
13.	Energy values ME.MJ/kJ	13.52	13.38	13.34	14.24	13.88	14.08

5. RESEARCH RESULTS AND DISCUSSION

In the production of pigs, the breeding period of piglets up to 25 kg of body weight, can cause a lot of problems. Those can be manifested in lagging the rise because of diseases (diarrhea), therefore as the addition to the antibiotics enzymes, acids, probiotics and prebiotics can be used. Consumption of food is shown in Table 3.

Table 3

Consumption of food

Group	Food days	n	x	S	Cv	Index,=. %
K	1820	35	0.772	0.06	7.89	100.00
I-O	1820	35	0.797	0.05	6.00	102.52
II-O	1820	35	0.803	0.04	5.20	104.01

The data presented in the Table 3 indicate that Allzyme Vegpro when used in feed mixtures for fattening pigs affected the reduction of daily food consumption and average daily feed conversion in experimental groups compared to the control group.

The Average daily consumption was 0.797 for the first and 0.803 per kilo for the second experimental group, compared to the control group, 0.772 kg.

Statistical significances were not noticed at this stage, but the index differences are greater for the first experimental group for 2.52% and 4.01% for the second experimental group, compared to the control group.

During the experiment feed consumption per kilogram of gain (conversion) was much lower in the experimental groups, and amounted up to 2.36 kg. in the first sample, 2.30 for the second and 2.40 for the control group.

Table 4

Consumption, food conversion per kg of growth during the experiment

Group	n	x	S	Cv	Index, %
K	35	2.40	0.15	6.13	100.00
I-O	35	2.36	0.16	6.61	98.33
II-O	35	2.30	0.17	6.52	97.56

Statistical significance was not noticed, but the index decreased up to 1.67% in the first experimental group and 2.44% in the second experimental group, compared to the control group.

Table 5

The coefficients of apparent digestibility of food,%

Group	Dry material	Organic material	Raw proteins	Raw fat	Raw cellulose	BEM
K	73.75	74.15	62.62	33.58	24.27	86.71
I-O	74.05	75.11	69.80	37.65	25.00	84.35
II-O	74.24	75.60	69.90	37.70	25.32	83.25
INDEXES						
K	100	100	100	100	100	100
I-O	100.40	101.29	101.14	112.41	103.00	96.02
II-O	100.69	101.94	101.46	112.27	104.32	96.12

According to the data from the table having been processed and having been done the comparative review of digestibility of individual ingredients contained in the feed mixtures in addition to the enzyme concentrations for 0.1% and 0.2% (Allzyme Vegpro), for the experimental group of animals and the control group of animals without additives, expressed in percentage and index calculated by the difference, we can state the following:

– All the nutrients have better usability in the I-O and II-O group of pigs that received Allzyme Vegpro by food, except in terms of exploiting the BEM material whose digestibility is higher in K group for 3 , 98% compared to the I-O group, and 3.88% compared to the II-O group.

– The insight into the experimental data from the Table 5 shows that coefficients achieved in this experiment in the K group of pigs and I-O and II-O group were better in the form of dry material, organic material, raw protein, raw fat and raw fiber.

Following the results obtained in our study which examined the effect of using Allzyme Vegpro (as food additive) we found that the data in the literature show certain amount of coincidence.

It is the general conclusion of the large number of authors (Radovanović, 1990; Fagan, 2004; Huskić-Bačar, 2003; Paskaš Snežana, 2001) that the success of breeding pigs in fattening is affected by several factors, but by proper selection of nutrients and well-balanced meals, with the addition of the enzyme, high results can be achieved.

Our investigations are in full compliance with the allegations of authors mentioned.

There was no mortality or disease in the experiment, so we did not come to any kind of change.

In the conditions of our experiment the positive effect of usage of Allzyme Vegpro is reflected in its impact on the amount of daily consumption and average daily feed conversion of cultivated animals. That makes the production economical and profitable.

6. CONCLUSIONS

Analyzing the results of the research, we came to the following conclusions:

– The average daily consumption of food is the largest in the K group, and lower in experimental groups.

– The average daily feed conversion is conditioned by the addition of Allzyme Vegpro, which contributes to the justification of the usage of investigated enzymes as additives in fodder mixtures for piglets. In its structure those additives have all those nutrients that are good for achieving better effects in the production.

– Digestibility of nutrients which was analyzed in the I-O group shows that all the chemical ingredients, except BEM had greater value in experimental groups of pigs in relation to the K group. All of this made the performance of body mass and growth of pigs of greater value.

– There was no mortality or disease in the experiment, so we did not come to any kind of change.

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