

## THE EFFECTS OF THE USE OF THE ALLZYME VEGPRO® ENZYME COCKTAIL ON THE DAILY WEIGHT GAIN AND FEED CONVERSION IN WEANED PIGLETS

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This paper analyzes the influence of the enzyme cocktail additive Allzyme Vegpro® in quantities of 0.1 and 0.2% on production results: daily weight gain, consumption and food conversion in weaned piglets. The experiment lasted 52 days. Nine litters of piglets were included. The initial body weight of piglets was 8–9 kg. The piglets were divided into three groups: Piglets with 0.2% of enzyme production achieved the best results. Although established differences were not statistically significant, the group of piglets fed with the addition of enzymes had less metabolic disturbances.

**Key words:** pigs; piglets; feed; Allzyme Vegpro; body weight; consumption; conversion

## ЕФЕКТИ ОД КОРИСТЕЊЕТО НА КОКТЕЛ ЕНЗИМИ ALLZYME VEGPRO ВО ИСХРАНАТА НА ОДБИЕНИ ПРАСИЊА ВРЗ ПРИРАСТОТ И ПОТРОШУВАЧКАТА НА ХРАНА

Во овој труд е испитувано влијанието на додавањето коктел од ензими Allzyme Vegpro® во храната на одбиени прасиња во количина од 0,1 и 0,2% врз производните резултати: дневен прираст, консумација и конверзија на храна. Опитот траеше 52 дена и беа опфатени девет легла. Почетната телесна маса на прасињата беше 8–9 kg. Прасињата се поделени во три групи. Прасињата со додаток на 0.2% ензими оствариле најдобри производни резултати. Иако утврдените разлики не беа статистички значајни, групите со додаток на ензими имаа помали метаболни нарушувања.

**Клучни зборови:** прасе; храна, Allzyme Vegpro; телесна маса; консумација; конверзија

### 1. INTRODUCTION

Since the industrial revolution there has been an increase in livestock, and pig production. This increase is caused by several reasons: visible share of genetics, natural selection and nutrition. Resultantly, pigs became the most wide spread type of livestock. This is especially important knowing that by the naturalization of wild boars we have created more domestic types of pigs, who

are giving a certain number of offspring, and also progress quickly. If we consider the growing of Mangalitsa which gives mainly one litter per year with 5 to 6 piglets, while noble breed Great Yorkshire and Landrace pigs of 20 given in the litter with the litter farrowing 2–2, 2/year. Therefore, we are working on the application of the most recent knowledge, especially in the field of nutrition and the health of pigs, for achieving the current practices.

Improved nutrition began by changing various additives, especially synthetic enzymes. By better utilization of food, better results were achieved. Therefore utilization of additives raised production to modern levels, while reducing the consumption of food nutrition.

This is the case with young animals that are getting prepared for fattening by early weaning. With the introduction of additives into feed at a young age, we can achieve a body mass difference of 60–80%.

Proteins are the basic building materials in animals and allow the creation of meat in the body. Its main ingredients are amino acids (essential and non essential). If an animal lacks only one of the essential amino acids, the proper synthesis of necessary proteins is disrupted. Therefore, various additives have to be added to the pigs in growth as well as in the fattening process.

Often it is necessary to add photolytic enzymes where the full effect was demonstrated by "Allzyme Vegpro". This production is done by the company "Alltech" based in Kentucky, USA. This product is the kind of enzyme obtained by fermentation with fungi *Aspergillus Niger*. This is actually an enzyme cocktail which combines protease, pentosanase, beta glucanase, galactomanase, hemicellulase and cellulase.

## 2. REVIEW OF LITERATURE

In the literature we covered the problems of non-ruminant nutrition including pigs, especially the younger ones. This requires the preparation of complete fodder mixtures with added additives.

Indicators of success of this application are growth and food conversion, which presents the efficiency of livestock production.

Animal feeding in the breeding process depends on the formulation of their meal, as well as a number of interactions that are established in the metabolism of present food ingredients.

Often it occurs that by the application of enzymes as food additives, we stop the flow of nutrients. This requires an improvement in manufacturing.

Matošić-Čajavec, Vera (1987) points to the need to add next photolytic and amyloidal ferment.

Tucher et al. (2000) have found that it is coming to intensification of proteins hydrolysis.

Allzyme Vegpro was created in 1991, as a research of nutrition of non-ruminants food of vegetable origin was used.

Pierce, J. J. (2002) talks about the necessity for a combination of enzymes and microbial phytase in the diet of younger and older categories of pigs where mainly grain food is used.

Lindemann et al. (1997) have done a complete study in the application of Allzyme Vegpro in pigs and poultry, and they are recommending the use of these enzymes in preparation of concentrated nutrients.

Researchers Jovanović et al. (2000) state that all enzymes do not have a consistent efficiency, and that enzymes of the digestive tract increase their catalytic ability with the addition of synthetic enzymes.

Milenković (2000) examines the impact of photolytic enzymes as additives in foods rich in protein nutrition of piglets and concluded that the presence of enzyme supplements leads to better conversion of food consumption and, consequently, there was greater growth in pigs.

Kim, V. S., Backer, D. H. (1996) explored the use of enzyme preparations in pig feed based on soy flour.

Radovanović et al. (1990) recommend that the composition of feed for pigs includes proteins and enzymes. With these meals better results in growing pigs are achieved.

Grčag Dragana (2000) researched the influence of enzyme cocktails on food utilization, which reduce the coefficient of conversion and brought about the reduction of intoxication.

Lee, Jonston et al. (2003) discussed the impact of enzymes on the digestibility of food in piglets, and states the need for the ongoing search for production and application of efficient products and enzymes. This has improved the daily gain of pigs fed with feed mixtures that contain wheat bran and additives. They release cellulose food ingredients that were built based on corn and soybeans.

Nyachoti, Š. M. et al. (2006) found that the enzyme beta glucan combined with phytase food for pigs, prepared on the basis of barley and peas, improved digestibility of phosphorus and nitrogen in the intestinal tract.

Kovčín et al. (2000) fed weaned piglets with foods that excluded animal origin, but they were rich in Allzyme Vegpro and phytase. This pre-

sented a balance of forage mixtures in the amino acid level, and was made up of nutrients based on soybean meal, grits and lecithin. There is a recognized high daily weight gain and the effective utilization of food, which is attributed to the effect of enzymes.

Change et al. (1993) have investigated the impact of "Allzyme Vegpro" as additives in feed mixtures, and came to the conclusion that the pigs had higher final body mass, greater food consumption and conversion decreased.

The science and practice of livestock breeding constantly strive to reduce the cost of breeding domestic animals and optimize economical and profitable production.

To achieve these objectives we must consider both the formulation of adequate meals and the use of various food additives and their translation into economic advantage, and utilize the most modern technological solutions to prevent adverse effects that this production carries with it in terms of environmental pollution.

Using "Allzyme Vegpro" of pigs obviously represents a practical method for improving production.

### Goal

The goal of this research was to generate scientific data on the impact of the enzyme, under the trade name of "Allzyme Vegpro", as a food additive in feed mixtures for young pigs.

In this paper we are trying to determine whether as a synthetic product it is obtained as a combination of enzymes and whether in itself shows activity of some enzymes protease, pentosanase, galactozidase and alpha amylase.

This leads to the better use of nutrients, increasing economic profit and influencing the rapid development of young livestock.

## 3. MATERIAL AND METHODS

To determine how the addition of forage mixture is used in growing pigs in our experiment and better utilization of nutrients, it was necessary that our work assignment included the following sections:

– Chemical analysis and preparation of fodder mixtures for pigs in accordance with the standard quality of food and feed for animals (OJ

FRY 20/2000 and Fig. Gazette of Serbia 38/2001), based on the method Wende.

– Establishment of a biological experiment by determining the mass of agricultural animals, feeding the demands of the organization of biological experiments, recording the consumption of food groups and analysis of feeding days, and statistical analysis of data obtained in the experiment.

– All the experiments took place on a farm in the town of Valjevo, Serbia. The experiment was established with a control group of K, and two samples O-I and O-II group.

– The study included 105 pigs of the mixed breed of F1 generation (Landrace x Yorkshire), divided into groups according to plan experiments shown in Table 1. Groups are divided equally to contain 35 piglets. The experiment lasted 52 days, from 01/02/2006 to 24/03/2006. Piglets were placed in 5 groups of 7 pigs each. Control groups were not fed Allzyme Vegpro; the experimental group I received 0.1% and the control group II 0.2% of sample II allowance of Allzyme Vegpro.

Parameters of body weight gains were monitored from the beginning of the feeding process to weaning and transition to another form of feeding.

This is actually the enzyme cocktail, used in meals that contain higher concentrations of polysaccharides. This means that most of their meals are based on cereals compatible with many food ingredients and premixes and usually adds 1,000 g. per ton of food for the Experimental Group I, or 2000 g per ton of food for O-II group.

Piglets were housed in prefabricated buildings and fed a starchy mixture whose composition is illustrated in Table 1

For fuller consideration of nutrient value of forage mixtures used, it was necessary to gain insight into the content of the chemical composition of the mixtures. The chemical composition of the mixture used is analyzed by the method of Wende and shown in Table 2.

According to our results, pigs were fed in the first period with fodder mixtures containing between 20.18 and 20.52% protein, while in the second period from 18.25 to 18.52% protein. Here we analyzed the conversion of food and nutrient digestibility.

All results obtained are analyzed using statistical analysis (Hadživuković, 1969).

Arithmetic value, standard deviation, standard error, coefficient of variation were calculated and their significance was assessed.

Table 1

*Composition of fodder mixtures for weaned pigs*

Raw protein	20			18		
Piglets mass	8 – 15			15 – 25		
	K	I-O	II-O	K	I-O	II-O
Allzyme Vegpro						
Corn	57.60	57.50	57.40	62.75	62.65	62.55
Livestock flour	5.00	5.00	5.00	5.00	5.00	5.00
Soybean Meal	13.5	13.5	13.50	13.20	13.20	13.20
Sunflower seed	4.0	4.0	4.0	4.50	4.50	4.5
Allzyme Vegpro	–	0.1	0.2	–	0.1	0.2
Alfalfa flour	2.0	2.0	2.0	2.5	2.5	2.5
Fish meal	5.0	5.0	5.0	4.0	4.0	4.0
Piglet milk substitute	10.0	10.0	10.0	5.0	5.0	5.0
Dicalcium phosphate	1.2	1.2	1.2	1.2	1.2	1.2
Salt	0.1	0.1	0.1	0.25	0.25	0.25
Chalk	0.6	0.6	0.6	0.6	0.6	0.6
Pre mix	1.0	1.0	1.0	1.0	1.0	1.0
Total:	100	100	100	100	100	100

Table 2

*Chemical composition of forage mixtures for weaned piglets*

N <sup>o</sup>	The chemical composition of food and time period	I <sup>st</sup> period			II <sup>nd</sup> period		
		K	I-O	II-O	K	I-O	II-O
1	Dry materials	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	Proteins	20.52	20.18	20.43	18.52	18.24	18.38
5	Crude fat	5.20	5.08	5.11	5.08	5.09	5.11
6	Crude fibre	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
	<b>Total (2–7)</b>	100	100	100	100	100	100
8	Calcium	1.03	1.05	1.00	1.50	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	0.30	0.28	0.32	0.33	0.31	0.32
13	Energy value of ME. MJ/kJ	13.52	13.38	13.34	14.24	13.58	14.08

#### 4. RESEARCH RESULTS AND DISCUSSION

For observing the effect, studying the enzyme Allzyme Vegpro as a food supplement in the diet of piglets in growth of the breed mixture (Yorkshire, Landrace), the following changes were determined:

- final weight,
- average daily gain,
- consumption of food,
- usage of food.

##### *Body weight of piglets*

The average value of body weight of pigs, the number of animals in the group, measures of variation (S and Cv) are shown in Table 3.

Table 3

##### *Average weight of piglets at the beginning and end of the experiment*

Group	Group initial weight				
	n	x	S	Cv	Index, %
K	35	8.40	1.12	14.33	100.00
I-O	35	8.20	0.74	9.00	97.62
II-O	35	8.35	1.10	12.44	99.41
Group	Group final weight				
	n	x	S	Cv	Index, %
K	35	24.61	3.30	11.85	100.00
I-O	35	25.81	3.29	12.85	100.90
II-O	35	26.10	3.32	12.73	101.12

Analyzing the statistical significance of values, differences in the relative indexes were determined. Indexes at the beginning were different and lower in groups of IO group were 2.38 for the lower, and in II-A group 0.59% lower compared to the control group.

At the final body weight there was no statistical significance, but the indexes were higher in the IO group 0.90, and in II-O to 1.12% higher than in the control group.

Considering the data of the amount of daily increment of grown piglets the average daily growth is presented. Thus, Table 4 shows that we obtain a daily gain in experimental animals throughout the experiment.

Table 4

##### *Daily weight gain of piglets to 25 kg body weight*

Group	Variation				
	n	x	Sd	Cv	Index. %
K	35	0.438	2.09	12.59	100.00
I-O	35	0.465	1.71	10.86	100.19
II-O	35	0.506	2.21	12.94	100.26

This showed little statistical significance, but the indexes demonstrated that the IO group was higher by 0.19, and group II-A, 0.26%, compared to the control group.

#### 5. DISCUSSION

Considering the literature available to us it is clear that it is necessary to add enzymes for better growth of young animals, and thus achieving higher weight gain (Vera Matošić-Čajavec). Tacher and collaborators have found out that intensification of protein hydrolysis has been achieved.

Researcher Pierce J. J. and associates talk about the need for a combination of enzymes and phytase in calf feeding animals, including pigs. Also, Osei, Odro and Pirc emphasize the usefulness of using this combined with other enzymes.

Lindeman and associates have done a complete investigation of Allzyme Vegpro in pig and poultry feed, and recommended the application of this enzyme, especially concentrated nutrients which coincide with our research.

In addition, Kantor and Peskatore according with the findings of Pirconsidered the actions of the synthetic enzyme preparations (proteases, amylase, silanase and galactooxidase) in different parts of the intestinal tract.

The researcher McLean comes to the same conclusions as in our research, that this enzyme works best in young animals at the beginning of growth.

According to Jovanović, all enzymes have a constant efficiency, but increase the catalytic ability of adding synthetic enzyme preparations.

The research examined the impact of Milenković's proteolytic enzymes in pig nutrition, especially protein rich in nutrients.

Also, with the addition of this enzyme, there is greater growth and body weight of pigs, which we proved in our research.

Some research scientists (Radovanović et al.; Grčak Dragana; Nyachot et al.) found that adding enzymes improves their body mass and growth, which is found in our research, too.

## 6. CONCLUSION

On the basis of the above we can make the following conclusions:

– The average body weight of piglets reached a higher value in the experimental group compared to the control group.

– The highest body mass is achieved in the II-A group; 26.10 kg., followed by the I-A group; 25.81 kg., and finally the control group 24.61 kg.

– Analysis of variance showed little statistical significance; the weaned pigs with higher body weight probably gave better results in the process of fattening.

– Average daily gain was greatest in group A-II 0.506 kg, 0.465 kg and OI., and lowest in the control group, 0.438 kg. Again, statistical significance was not found.

We should continue further research, however the breeding of pigs and piglets cannot be considered without adding additives.

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