# INFLUENCE OF ADSORBENT VITACORM REO-AG ON NUTRIENTS DIGESTIBILITY IN BREEDING GILTS

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**Abstract**

*The purpose of the scientific research was to analyze the digestibility of nutrients in local fodders by breeding gilts under the influence of the adsorbent Vitacorm REO-AG. The gilts were divided into four groups CG, EG1, EG2, EG3, on the principle of analogy, three head each. The animals in the control group were fed with basic compound feed. In the experimental groups the basic compound feed was supplemented with the adsorbent Vitacorm REO-AG at different levels – 1.0, 1.5 and 2.0 kg/t, respectively. The researches were carried out at the enterprise "Moldsuinhibrid". The utilization of the preparation Vitacorm REO-AG had a positive effect on nutrient digestibility in the gilts in all the experimental groups compared with the control group. The digestibility of dry substances in EG3 was higher by 1.28 or 1.51 % (P≤0.1) and of the organic substance – by 1.04 or 1.20 % (P≤0.01); the protein digestibility coefficient increased by 1.88 or 2.37 %, of fats – by 0.80 or 1.07 %, of cellulose – by 0.87 or 1.48 %, and of NFE – by 0.90 or 0.97%, in comparison with the control group. The supplementation of the fodder for the breeding gilts with the adsorbent Vitacorm REO-AG at the level of 2.0 kg/t proved to be more effective.*

**Key words**: digestibility, fodder, adsorbent, breeding gilt

## INTRODUCTION

Pig farming is one of the most important branches of the national and global economy. Animal nutrition influences the level of animal production, the animals' reproduction, growth and development processes and health, and, as a whole, the economic efficiency - the decisive goal of animal husbandry [10].

The intensification of agriculture, global weather changes, uncontrolled use of various chemicals in crop production, lead to an increase in the number of poisoning of animals with mycotoxins. The Food and Agriculture Organization (FAO) has estimated that up to 25% of food crops worldwide are contaminated with mycotoxins. The most dangerous mycotoxins are synthesized by molds that grow on cereals [3]. Some toxic molds can be found all around the world, while others exist only in small regions.

During the storage period, unfavorable storage conditions, such as humidity and high temperature, promotes the growth of mold and the synthesis of toxins. In a field, mycotoxins develop due to many factors such as drought, hail and insects that destroy grains, and facilitate the penetration of mold and toxin synthesis [8; 4].

In order to reduce the negative effects of mycotoxins in the products used in human and animal nutrition, different strategies have been proposed and applied [5]. These strategies aim to prevent contamination with mycotoxins, to detoxify the mycotoxins which are present in food and fodder, and to inhibit the absorption of myctoxins into the gastrointestinal tract.

Swine productivity largely depends on the digestibility of the nutrients the animals receive with fodder [11].

The improvement of the digestibility of fodder nutrients is possible through the utilisation of some adsorbents, which enhance the process of assimilation of nutrients and leads to a decrease in energy expenditure of the body, thus increasing body mass. Food nutrients (proteins, lipids and carbohydrates), under the influence of mechanical, biological and chemical factors in the digestive tract decompose into simpler

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compounds that enter the bloodstream and lymphatic system [1].

In order to organize a standardized diet, it is necessary to know the digestibility degree of certain nutrients. Digestibility is characterized by the difference between the nutrients which have been ingested with feed and those excreted in animal feces.

## MATERIAL AND METHOD

The scientific and practical experiment on digestibility was conducted at the SE «Moldsuinhibrid", during a period of eleven days. To perform the experiment, twelve similar (by age, sex, body mass) [9] gilts were selected and separated in four groups (CG, $EG_1$, $EG_2$, $EG_3$) three head each.

The animals were fed according to the feeding technology of the enterprise and the regulatory requirements described in [6]. The purpose of the study was to determine the effect of the supplementation of compound feed for young swine with the adsorbent preparation Vitacorm REO-AG at different levels (1.0, 1.5 and 2.0 kg/ton) on nutrients digestibility (table 1).

Table 1 Scheme of the experiment

| Groups | Number of animals in group, head | Feeding features |
|---|---|---|
| CG | 3 | Basic compound feed (BCF) |
| $EG_1$ | 3 | BCF+1.0 kg/t Vitacorm REO-AG* |
| $EG_2$ | 3 | BCF+1.5 kg/t Vitacorm REO-AG* |
| $EG_3$ | 3 | BCF+2.0 kg/t Vitacorm REO-AG* |

**The adsorbent Vitacorm REO-AG consists from highly active cellulose, hemicelluloses, lignin, pectin, vegetable beta-glucans bentonite, humic acids, macro- complexes and chelated micro nutrients based on sodium humate.*

Each experimental animal was placed in a digestibility cage with systems for collecting urine and feces. The keeping parameters were identical. The sampling of feed, feces and urine were conditioned and chemically analyzed according to [7].

The statistical processing of the results was carried out according to the method described in [2]. Data derived from the research were processed using the method of variation statistics and the computer program EXCEL.

## RESULTS AND DISCUSSION

The experimental animals were fed with compound feed which consisted of indigenous traditional grain used for feeding pigs (table 2).

Table 2 Compozition and nutrients concentration of compound feed by periods

| Feed components | Period | | |
|---|---|---|---|
| | Up to 90 days | 91-120 days | 121-finish |
| Compozition of compound feed, % | | | |
| Corn | 16.0 | 24.0 | 26.0 |
| Barley | 16.7 | 38.8 | 37.5 |
| Wheat | 9.6 | 21.0 | 20.0 |
| Extruded corn | 10.0 | - | - |
| Extruded barley | 13.7 | - | - |
| Extruded wheat | 10.0 | - | - |
| Soy meal | 12.0 | 11.3 | 10.0 |
| Bran | 6.6 | - | - |
| Fish meal | 3.0 | 2.5 | 4.0 |
| Primix 2231 | 2.0 | 2.0 | 2.0 |
| Salt | 0.4 | 0.4 | 0.5 |
| Nutrients concentration in 1 kg of compound feed | | | |
| Metabolic energy, MJ | 14.12 | 14.27 | 13.93 |
| Crude protein, g | 146.3 | 143.6 | 136.9 |
| Digestible protein, g | 120.2 | 118.2 | 112.3 |
| Lisyne, g | 7.58 | 7.87 | 7.42 |
| Methionine + cystine, g | 5.76 | 4.95 | 5.16 |
| Raw cellulose, g | 47.81 | 52.11 | 49.89 |
| Salt, g | 3.50 | 5.00 | 5.00 |
| Ca, g | 9.16 | 8.81 | 7.56 |
| P, g | 3.77 | 5.16 | 5.62 |
| Fe, mg | 142.4 | 127.5 | 131.5 |
| Cu, mg | 6.54 | 5.96 | 5.91 |
| Zn, mg | 36.46 | 32.87 | 33.70 |
| Mn, mg | 27.10 | 20.65 | 19.94 |
| Co, mg | 0.23 | 0.15 | 0.14 |
| I, mg | 0.36 | 0.25 | 0.28 |
| Vitamins: carotene, mg | 2.31 | 2.06 | 2.17 |

The accounting of feed and water consumption and the excretion of feces and

urine were made daily during the whole experimental period.

The data on fodder consumption in the experimental groups (table 3) show that there were small differences, except $EG_2$, as compared with the control group, while the feces excretions were insignificantly higher.

Table 3 Data collected during the digestibility experiment (average/head)

| Groups | During 24 hours | | | |
|---|---|---|---|---|
| | Ingested quantity | | Excreted quantity | |
| | compound feed, g | water, l | feces, g | urine, l |
| CG | 1.043 | 3.388 | 0.398 | 2.349 |
| $EG_1$ | 1.083 | 3.288 | 0.471 | 1.958 |
| $EG_2$ | 0.942 | 2.427 | 0.425 | 1.156 |
| $EG_3$ | 1.143 | 2.776 | 0.504 | 1.296 |

The amount of nutrients excreted in feces could be influenced by many factors such as the quality and source of feed, the proportion of other nutrients, processing methods, age and environmental factors. Feces samples collected throughout the experimental period were analyzed chemically (table 4) according to the laboratory methodology described in [7].

On the basis of the obtained data on feed consumption and feces excretion, as well as the chemical analysis, the coefficients of the digestibility of nutrients in the compound feed were determined. The research on nutrient use showed that the supplementation of the basic compound feed for growing pigs with the adsorbent Vitacorm REO-AG at different levels influenced the digestibility of the nutrients in the basic compound feed in the experimental groups (table 5).

Table 4 The chemical composition of the feces excreted during the assessment experiment, g

| Specification | Group | | | |
|---|---|---|---|---|
| | CG | $EG_1$ | $EG_2$ | $EG_3$ |
| Dry substance | 334.412 | 284.606 | 277.989 | 261.604 |
| Organic substance | 248.671 | 211.608 | 209.803 | 195.557 |
| Crude ash | 85.741 | 72.998 | 68.186 | 66.047 |
| Crudde protein | 55.094 | 45.169 | 44.225 | 42.580 |
| Crude fat | 16.174 | 13.751 | 13.325 | 13.383 |
| Raw cellulose | 84.183 | 71.261 | 70.034 | 69.786 |
| NFE | 93.220 | 81.426 | 82.219 | 69.808 |

Table 5 Digestibility of nutrients, % X±Sx

| Specification / Groups | Dry substance | Organic substance | Ash | Protein | Fat | Cellulose | NFE |
|---|---|---|---|---|---|---|---|
| CG | 84.592± 0.168 | 86.628± 0.164 | 72.433± 0.455 | 79.445± 0.468 | 75.095± 0.631 | 58.943± 1.634 | 92.908± 0.393 |
| $EG_1$ | 84.931± 0.172 | 86.922± 0.203 | 73.030± 0.0034 | 80.576± 0.216 | 75.659± 0.719 | 59.754± 0.854 | 92.932± 0.286 |
| $EG_2$ | 84.657± 1.223 | 86.462± 1.219 | 73.872± 1.456 | 80.282± 0.939 | 75.482± 1.977 | 59.045± 2.599 | 93.471± 1.192 |
| $EG_3$ | *85.87± 0.052 | **87.67± 0.134 | 75.153± 0.836 | 81.332± 0.337 | 75.905± 0.508 | 59.812± 0.976 | 93.810± 0.163 |

*$P \leq 0.1$; ** $P \leq 0.01$*

According to the obtained results, the digestibility of organic and dry substances in the gilts in the experimental groups which were fed with feed supplemented with the adsorbent Vitacorm REO-AG at the levels 1.0 kg/t, 1.5 kg/t and 2.0 kg/t was slightly superior compared to the same index in the CG; the highest level was observed in $EG_3$, by 1.28 or 1.51 %, with a criterion for authenticity of $P \geq 0.1$ as to the dry matter, and by 1.04 or 1.20 % with a criterion for authenticity of $P \geq 0.01$ as to the organic substance (figure 1).

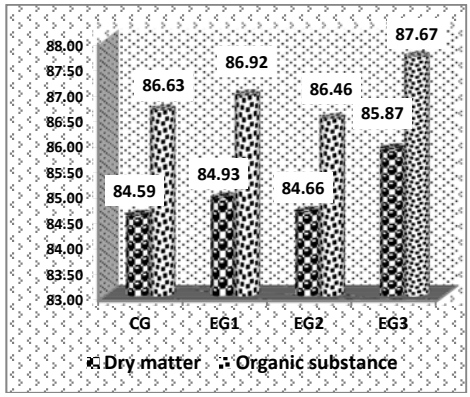


Figure 1 Digestibility of organic and dry substances, %

The same tendency was observed in relation to the digestibility of protein and fat. The supplementation of the diet for the gilts with the adsorbent Vitacorm REO-AG at the level of 2.0 kg/t, increased the digestibility of protein and fat by 1.88 and 0.8 or by 2.37 and 1.06 %, respectively, compared to the CG (figure 2).

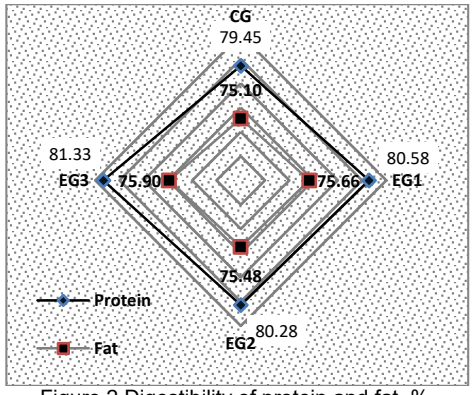


Figure 2 Digestibility of protein and fat, %

The digestibility of cellulose and nitrogen-free extract in the experimental groups compared to the control group was insignificantly higher: the digestibility of cellulose – by 0.81 and 1.37 % in $EG_1$, by 0.10 and 0.17 % in $EG_2$, and by 0.87 and 1.48% in $EG_3$; the digestibility of nitrogen-free extract – by 0.02 and 0.02 % in $EG_1$, by 0.56 and 0.60 % in $EG_2$, and by 0.90 and 0.97% in $EG_3$ (figure 3).

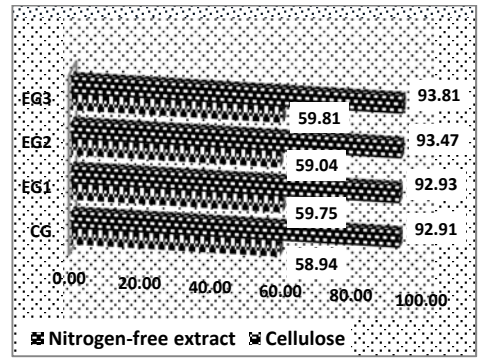


Figure 3 Digestibility of cellulose and nitrogen-free extract, %

Of all organic substances, pigs assimilated best nitrogen-free extracts. That is why this species is mainly fed with compound feed the main component of which is corn.

## CONCLUSION

The supplementation of the basic diets for the breeding pigs in $EG_1$, $EG_2$ and $EG_3$ with the adsorbent Vitacorm REO-AG at the levels of 1.0, 1.5 and 2.0 kg/t, respectively, during the growing period, increased the digestibility of nutrients in all the experimental groups in comparison with the control group.

The optimum quantity of Vitacorm REO-AG that should be added to the feed is 2.0 kg/t.

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