INCREASE OF PERFORMANCE PARAMETERS OF PIGS WITH THE USE OF PHYTOBIO蒂CS
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Abstract: One of the methods of increasing the productivity of pigs is the use of stimulants of productivity and preservation, while the focus remains on their safety. In this regard, the search for biologically active feed additives instead of antibiotics is of scientific and practical interest today. With this in mind, the influence of liquid and dry forms of phytobiotics «Liptosa Expert» on the intensity of growth of crossbred young pigs (Large white × Landrace) × «Maxter») was studied. The use of phytobiotics «Liptosa Expert» in the period of weaning, rearing and fattening can be an effective method of replacing the use of antibiotics and growth stimulants, which leads to an increase in the survival of piglets in the weaning period, average daily increases in live weight at fattening and the development of useful microflora in the intestines of pigs. However, the studied phytobiotic supplement did not have a positive effect on the formation of meat qualities of experimental groups of pigs.

Keywords: beneficial microflora, phytobiotics, pigs, productive qualities, technology.

INTRODUCTION
A number of countries in Europe and the world have introduced programs aimed at reducing the overall level of antibiotic use in animal husbandry: both as growth stimulants and for prevention and treatment. The Netherlands became the first country to ban the use of antibiotics in animal husbandry for therapeutic purposes, resulting in a 51% drop in antibiotic sales. Then, in 2006, a ban on antibacterial growth promoters was introduced in other EU countries as well. In the USA, the Directive on the use of veterinary drugs in feed was introduced, and in Canada, a «veto» on antibacterial growth stimulants was introduced in 2017 [3, 7, 12-14].

All this stimulated the development and development of innovative products that could replace the use of antibiotics as growth promoters and combat pathogens. The metabolic processes that the microflora performs in the gut are similar to those performed by one or another organ: digestion of unused nutrients, stimulation of cell growth, inhibition of the growth of pathogenic microorganisms, adaptation of the immune system to respond to pathogens, protection from diseases. Maintaining stable microbiota in the gut is the basis of effective animal husbandry. Intestinal health can be ensured by enriching diets with phytoactive feed additives (phytobiotics). Phytobiotics can be defined as products of plant origin, which are isolated from parts of plants, in solid or liquid forms - herbs, spices, volatile and non-volatile plant extracts and their bioactive molecules. The most famous active molecules of phytobiotics include carvacrol, cinnamic aldehyde, eugenol, thymol, anethole and others. Most of these compounds have the properties of phenols [2, 5, 8, 12, 15-16, 19-22].

Phytoactive feed additives in combination with medium-chain fatty acids indirectly affect the composition of intestinal microflora. Thus, plant extracts model intestinal microflora due to their antimicrobial effect on pathogens.
As shown by research results [5-6, 9, 17, 23], the number of colonies of pathogenic Gram (-) microorganisms \( E. \text{coli} \), \( S. \text{enteritidis} \) and \( S. \text{typhimurium} \) decreased after using essential oils at a concentration of 500 mg/kg of substrate. According to these studies, plant extracts had a negative effect on pathogenic Gram (+) microflora and, on the contrary, contributed to the better growth of beneficial microflora.

In addition to antibacterial and bacteriostatic action, phytobiotics improve the digestibility of nutrients by stimulating the release of digestive enzymes and enhancing their activity. In addition, numerous studies have established a positive effect on the morphology of the tissues of the small intestine (in particular, an increase in the length of the villi and the depth of the crypts, the content of goblet cells, etc.) [5, 12, 16].

**MATERIAL AND METHODS**

The increase in productive parameters of pigs using the phytobiotic «Liptosa Expert» was the content of a scientific and economic experiment in three stages. Since one of the methods of increasing the productivity of pigs is the use of stimulants of productivity and survival, at the same time their safety remains in the center of attention. In this regard, the search for biologically active feed additives instead of antibiotics is of scientific and practical interest today. With this in mind, the influence of liquid and dry forms of phytobiotics (Liptosa Expert) by «Lipidos Toledo S.A.», Spain, supplier of LLC «Company «Agrotradehim» (registration certificate AA-05457-04-14, 01.10.2014, Ukraine), was studied on the intensity of growth of crossbred young pigs ((Large white × Landrace) × «Maxter»).

Three stages of research were conducted. The first stage was carried out on two groups of piglets, which were weaned at the age of 21-28 days, 40 pigs per group. Housing and feeding conditions were the same in the two groups. The piglets of the control and experimental groups received the same full-ration pre-starter compound feed by LLC «PK Alternativa» company. The difference was in the scheme of veterinary treatment of piglets during the weaning period. Thus, piglets of the control group received the colistin sulfate with water at the rate of 6 mg/kg of live weight for 5 days during weaning. Piglets of the experimental group, instead of antibiotic therapy, received a liquid phytobiotic supplement «Liptosa Expert», which consisted of plant extracts and medium-chain fatty acids in a dose of 0.7 l/t of drinking water. The phytobiotic was given 3 days before weaning and 4 days after. During the experiment, the number of cases of enteritis (units), survival of piglets (%), live weight (kg) was determined [4].

The second stage of research was conducted on 90 piglets of the same combination aged 45-65 days (starting period), which were divided into two groups: control and experimental. The difference in feeding the piglets was that the animals of the control group received a complete combined feed with the addition of the antibiotic colistin sulfate and amoxicillin, while the piglets of the experimental group were fed dry phytobiotic «Liptosa Expert». At the end of the experiment, a study of the quantitative composition of the microflora of the large intestine of experimental groups of pigs was carried out in the independent laboratory of Biolights Expert Center, Ukraine. Microbiological examination of feces for the quantitative presence/absence of the following microbiota: \( \text{Bifidobacterium spp.} \), \( \text{Lactobacillus spp.} \), \( \text{Escherichia coli} \), \( \text{Candida spp.} \), \( \text{Candida albicans} \), their identification, qualitative assessment of their concentration using the MALDI-TOF MS device [1, 14].

The identical third stage of research using the dry form of the phytobiotic «Liptosa Expert» was carried out for fattening pigs when they reached a pre-slaughter live weight of 100 and 120 kg at a dose of 1.5 kg per 1000 kg of compound feed. Indicators of live weight (kg) and average daily growth (g) were studied according to generally accepted zootechnical methods [4].
RESULTS AND DISCUSSION

As a result of conducting the first series of research (Table 1), it was established that in the control group, the survival rate of pigs was 2.5% less likely, than in the experimental group and amounted to 95.0% (р˂0.05).

Table 1. Performance parameters of experimental piglets (first series of research), \( \bar{X} \pm S_{\bar{x}} \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>The number of piglets at the beginning of the experiment, head</td>
<td>control 40</td>
</tr>
<tr>
<td>The number of piglets at the end of the experiment, head</td>
<td>38</td>
</tr>
<tr>
<td>Safety, %</td>
<td>95.0±1.00</td>
</tr>
<tr>
<td>Live weight at the beginning of the experiment, kg</td>
<td>6.40±0.32</td>
</tr>
<tr>
<td>Live weight at the end of the experiment, kg</td>
<td>7.49±0.20</td>
</tr>
<tr>
<td>Average daily increase, g</td>
<td>155.7±2.7</td>
</tr>
<tr>
<td>Number of piglets with enteritis, head</td>
<td>4</td>
</tr>
<tr>
<td>Cases of enteritis, %</td>
<td>10</td>
</tr>
</tbody>
</table>

Note. * - р˂0,05.

The average live weight of piglets at the end of the experiment in the control group was 7.49 kg, while in the experimental group it was 7.55 kg, or 0.8% more. It is also worth noting that the average daily weight gain of piglets in the control group was 4.42% lower compared to the experimental group, where it amounted to 162.9 g (р˂0.05). Apparently, this was caused by cases of enteritis in the control group, the number of which was 10% against 5% in the experimental counterparts.

Thus, the use of liquid phytobiotic «Liptosa Expert» can be an alternative to the use of a standard scheme with antibiotics. During the second series of studies, the influence of dry phytobiotic «Liptosa Expert» on growth parameters of piglets during the starting period (Table 2), as well as the state of intestinal microflora (Figure 1), was determined.

Table 2. Productivity of experimental piglets (second series of research), \( \bar{X} \pm S_{\bar{x}} \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number, head</td>
<td>control 45</td>
</tr>
<tr>
<td>Age of piglets at the beginning of the experiment, days</td>
<td>45</td>
</tr>
<tr>
<td>Age of piglets at the end of the experiment, days</td>
<td>65</td>
</tr>
<tr>
<td>Duration of the experiment, days</td>
<td>20</td>
</tr>
<tr>
<td>Average live weight of piglets at the beginning of the experiment, kg</td>
<td>10.8±0.26</td>
</tr>
<tr>
<td>Average live piglets at the end of the experiment, kg</td>
<td>21.3±0.38</td>
</tr>
<tr>
<td>Average daily increase, g</td>
<td>525±4.20</td>
</tr>
<tr>
<td>Feed conversion, kg</td>
<td>2.90</td>
</tr>
</tbody>
</table>

Note. ** - р˂0,01; *** - р˂0,001.

The research results indicate that the average live weight of piglets in the experimental group at the end of the experiment was 7% higher, than that of the control counterparts and amounted to 22.8 kg, the average daily increase in live weight was also greater, than in the control group by 12.4% and amounted to 590 g. At the same time, feed conversion was lower in the experimental group by 13.8% compared to the control.

At the end of the experiment, a quantitative composition of the microflora of the large intestine was studied. In particular, it was established that the number of beneficial
microorganisms *Bifidobacterium spp.* in the intestines of piglets of the experimental group exceeded by a thousand times the analogs of the control group, and *Lactobacillus spp.* - 125 times. The number of pathogenic *E. coli* microflora was 2.3 times lower in the intestines of piglets of the experimental group, and the colonies of *Candida spp.* and *Candida albicans* was 152 times less compared to the control.

Figure 1. Quantitative composition of the microflora of the large intestine of experimental groups of pigs
(*Bifidobacterium spp.*, *Lactobacillus spp.* – CFU/g × 10^5; *Escherichia coli* – CFU/g × 10^7; *Candida spp.*, *Candida albicans* – CFU/g × 10^3)

One of the promising ways of increasing the productivity of pigs in the conditions of industrial technology and improving the quality of meat can be the use of a number of phytogenic additives that contribute to the activation of metabolism, improvement of the palatability of feed, and their assimilation [9, 10, 14, 18, 19-22]. Using phytobiological preparations in pig feeding, it is possible to achieve a positive effect on the peristalsis of the digestive tract, stabilization of the intestinal microflora, reduction of the formation of toxins, stimulation of the immune system, regulation of inflammatory processes and, ultimately, an increase in their performance parameters [5]. When studying the growth of young pigs, the dynamics of changes in live weight, which is a universally recognized complex indicator characterizing the level of development of an organism during ontogenesis, is of greatest interest for research.

The results of the research proved that the phytobiotic «Liptosa Expert» had a positive effect on the growth of pigs in different age periods, starting from birth until the animals reached a live weight of 120 kg (Figure 2).

By the end of the suckling period, the live weight of piglets of the experimental group exceeded that of control animals by 0.79%, but the difference was statistically unreliable. During the growing period at the age of 63 days, a significant difference in live weight was recorded between animals of the experimental and control groups, amounting to 1.5 kg (6.58%; p<0.05). By the end of the growing period, a significant difference in this indicator remained, and at the age of 77 days it reached 1.52 kg (4.64%; p<0.01). During the fattening period, the excess live weight of the animals of the experimental groups compared to the control at the age of 107 days was 3.56 kg (6.15%; p<0.001), at 137 days – 4.66 kg (5.51%; p<0.001), in 167 days – 5.22 kg (4.71%; p<0.001) and in 197 days – 6.42 kg (5.14%; p<0.001).
The analysis of the received data on the assessment of the intensity of growth based on indicators of average daily gains of young pigs confirmed the established regularity (Figure 3). The average daily increase in live weight of the experimental group piglets during the weaning period exceeded that of the control animals: at 7 days – by 2.8 g (1.42%), at 14 days – by 2.9 g (1.29%), at 28 days – 7.2 g (4.42%), however, the difference was statistically insignificant.

Starting from the 35th day, the average daily increase in live weight of piglets of the experimental group significantly exceeded the control by 20.1 g (4.1%; p<0.05). At the end of the rearing period at the age of 77 days, the average daily growth of piglets of the experimental group exceeded the similar indicator of peers of the control group by 25.7 g (3.47%; p<0.01). The most significant difference in average daily gains was observed, directly, during the fattening period, where the excess compared to the control group in the experiment was: at 107 days – 68.0 g (8.13%; p<0.001), at 137 days – 36.7 g (4.13%; p<0.01), in 167 days – 18.7 g (2.15%; p<0.05), in 197 days – 40.0 g (8.46%; p< 0.01).

Studying the meat productivity of pigs using the phytobiotic «Liptosa Expert» in their diet is of scientific and practical interest. In this regard, at the end of the experiment, a control slaughter of experimental groups of animals was carried out. The results of the
control slaughter showed that the studied phytobiotic did not have a positive effect on the pre-slaughter and slaughter weight of pigs and, as a result, the slaughter yield.

CONCLUSIONS

Therefore, the use of phytobiotics «Liptosa Expert» in the period of weaning, rearing and fattening can be an effective method of replacing the use of antibiotics and growth stimulants, which leads to an increase in the survival of piglets in the post-weaning period, average daily gains in live weight and the development of useful microflora in the intestines of pigs. For feeding the phytobiotics «Liptosa Expert» during the fattening period, the animals of the II experimental group compared to the pigs of the control group according to the following parameters: live weight by 4.71-6.15%; average daily increases by 2.15-8.46% (p<0.01). The results of the control slaughter showed, that the studied phytobiotic did not affect the pre-slaughter and slaughter weight of pigs and, as a result, the slaughter yield. Therefore, the investigated phytobiotic additive did not have a positive effect on the formation of meat qualities of experimental groups of pigs, and therefore requires further study.

REFERENCES


