Wood sorbent in feeding quails

Denis Osepchuk¹, Alexandra Danilova¹*, Artyom Vlasov¹, Alexandra Skamarokhova¹, Sergei Smolin¹, Natalia Agarkova¹, and Andrey Svistunov¹

¹Krasnodar Research Centre for Animal Husbandry and Veterinary Medicine, Krasnodar, Russian Federation

Abstract. Based on the results of the studies, it has been found that the live weight of quails increased relative to the control by 6.9 (P<0.001) and 4.5% (P<0.01); survival rate - by 2.5 and 1.3%, according to the sequence of groups. Food conversion rate per unit of production was reduced by 6.5% and 3.9%, respectively. The internal organs of all groups of birds developed within the normal range, significant differences were noted in the length of the caecum in the second group of the experiment - this indicator decreased by 17.2% (P<0.01). In the third group, there was a downward trend by 1.6%. The length of the intestine significantly decreased by 15.0% (P<0.001) and 17.4% (P<0.01) %, respectively. The data obtained during the experiment indicate that the use of an active carbon feed additive with sorption properties and a phytocomponent has a positive effect on the main zootechnical indicators and does not adversely affect the development of the internal organs of the bird.

1 Introduction

Poultry farming is the main direction of livestock farming, as it provides the market with high quality and affordable protein. Quail farming is becoming a promising area of poultry farming. The modern trend in poultry farming ensures the rapid production of dietary meat, and allows achieving economic efficiency indicators. Currently, due to the popularization of a healthy lifestyle, the demand for safe food products is increasing. Safe products can be obtained using feed products of natural origin. The raw materials for such feed additives may contain products of plant origin. Forestry waste can lead to the production of high quality, low-cost feed. In recent years, quail farming has gained significant popularity among poultry farmers due to the possibility of obtaining dietary meat in a short time. This opens up new prospects for expanding the range of poultry products. The high productivity rates and reproduction rate of quails make this area of poultry farming particularly profitable and competitive. [1].

Quail farming is one of the areas in poultry farming, allowing replenishing meat resources of the country with dietary food products. In recent years, there has been a noticeable growth rate in the quail farming industry. This industry is for through the production of new nutritious dietary products - quail eggs and meat, it provides an

* Corresponding author: aledana2207@mail.ru
opportunity to increase the range of products. Fast growing, meat and egg precocity, short period quail reproduction makes it possible successfully use them to obtain products. Good payment for feed and high ability to obtain large quantities products per unit area make it possible for quails to compete with chickens for meat and egg production. Quail meat has a very delicate texture, high juiciness, wonderful aroma, good taste, high content of retinol, B vitamins, microelements, essential amino acids and is considered a gourmet product. [2].

Quails are unpretentious when reared and they mature quickly enough: at the age of 42 days, on average, the bird reaches marketable weight. Also, the age at which the first egg is laid is 35-40 days, sometimes even 30 days. On average, a female quail becomes sexually mature after reaching 40 days of age. Males reach sexual maturity at the age of 35-40 days.

When raising quails, you can have relatively small areas of premises compared to other types of poultry due to their small size, so the profitability of this direction of the poultry industry is very high. [2].

Feed antibiotics are used in livestock and poultry farming in the Russian Federation. Feed antibiotics, synthetic or natural, produced by certain bacteria or lower fungi, are used to prevent the growth, development of bacteria and their destruction. They are not effective against viral and fungal pathogens, but only treat infectious diseases of bacterial etiology. There is a problem of accumulation of antibiotics in the body of animals, which is transmitted to humans through the food chain. Ingestion of antibiotic residues into the human body through food can cause antibiotic resistance in humans. [3].

In poultry farming, the widespread use of antibiotics causes resistance in pathogens of various dangerous quarantine diseases, which can lead to outbreaks of dangerous infections. The widespread use of feed antibiotics in poultry farming is explained by the desire to improve the safety of livestock and increase the live weight of poultry. However, these methods are ineffective against toxins and viruses. In this regard, it is necessary to search for preventive feed additives that can prevent diseases of various etiologies. [4].

In the modern food industry, special attention is paid to environmental safety issues. This is achieved through the use of non-traditional feed components of natural origin, based on the recycling production waste. This approach not only reduces waste, but also creates more sustainable and environmentally friendly food products. [5-6].

These also include phytosorbents, such as charcoal based on waste of timber processing industry, enriched with pine extract. Coniferous extract contains carotene, vitamin C, vitamin E, as well as vitamins B, K, P, iron, manganese, magnesium, without which normal functioning of the body is impossible. [7].

Charcoal is a carbon-containing residue from various industrial processes that is highly porous. Charcoal has proven itself excellent in feeding poultry. It allows you to remove toxins, heavy metals, viral agents and other pollutants from the bird’s body that come with feed and water. Due to these processes, the immunity and general health of the poultry are increased, which has a positive effect on the safety of the livestock and increases productivity. By improving basic zootechnical indicators, production profitability increases while the cost of finished products decreases. [8].

Phytobiotics have high antimicrobial activity, and therefore can act as prophylactic agents in the fight against pathogenic bacteria. With a decrease in the incidence of various infections, the safety of poultry increases. The antioxidant activity of phytobiotics improves the overall health of the bird, thereby improving digestion and feed conversion. Phytobiotics are a potential alternative to antibiotics in poultry production. These are compounds obtained from plant extracts that improve live weight gain, survival rate and productivity of farm animals. In particular, they contain a mixture of organic and bioactive compounds that can prevent the development of antibiotic resistance. Phytobiotics are also added to complete feeds in order to maintain a balanced composition of the gastrointestinal
microbiome, improve the immune readiness of animals, and reduce oxidative, thermal and other types of stress [9].

The use of coniferous extract demonstrates high rates of live weight gain in poultry and may represent a promising alternative to synthetic feed additives [10].

Research conducted by both domestic and foreign scientists confirms the positive impact of the use of charcoal in poultry farming, which is manifested in an increase in poultry productivity [11-14]. As a result of the above, it is necessary to search for unconventional feed products that would make it possible to bind waste products of microscopic fungi (mycotoxins) and other pollutants that enter the body of poultry with feed and water, while preventing diseases caused by them; and also avoid the uncontrolled use of antibiotics. At the same time, it is necessary to look for a safe alternative to antibiotics, which will minimize the frequency of their use. By preventing diseases, it is possible to increase the survival rate of livestock, reduce feed costs per unit of production and increase the productivity of poultry.

The listed problems can be solved by a sorbent with a phytobiotic component, in which activated charcoal will act as a toxin absorber, and pine extract will act as a potential replacement for antibiotics.

The insufficient number of studies on this topic emphasizes the relevance of further research and analysis of the possibility of using plant waste from the timber processing industry. This will make it possible to effectively solve a double problem - on the one hand, to ensure more environmentally friendly waste processing, and on the other, to use safe natural feed additives in poultry farming. This approach could make poultry farming more environmentally sustainable and productive.

The purpose of the research is to study the effectiveness and safety of using active carbon feed additive (ACFA) when raising young quails.

The objective of the study is to determine the effect of the studied feed additive on the main zootechnical indicators and the development of internal organs of quails.

2 Materials and methods

Experiment was carried on the territory of the Krasnodar Research Centre for Animal Husbandry and Veterinary Medicine on young quails of the "Texas White" breed in accordance with the standard methodology (VNITIP) (2013).

The duration of the experiment was 42 days. Compound feed for quails was complete.

The first group (control) received complete feed without additives, the second one received 0.1% active carbon feed additive (ACFA) throughout the entire period, the third group received 0.1% ACFA during the start and finish periods, and standard complete feed during the growth period.

Active carbon feed additive (ACFA) (LLC Scientific and Technical Center "Khiminvest" (Nizhny Novgorod)) consists of 80.0% wood sorbent, 20.0% of an aqueous solution of pine needle extract.

The obtained data at the end of the experiment were entered into Microsoft Excel and calculated using the method of standard biometric data processing.

3 Results and Discussion

At the end of the experiment, the live weight of the birds was significantly higher than the control values by 6.9 (P<0.001) and 4.5% (P<0.01), respectively, for the groups.
Table 1. Dynamics of poultry live weight, g, M±m, n=40.

<table>
<thead>
<tr>
<th>Age, days</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9.7±0.10</td>
<td>9.7±0.10</td>
<td>9.8±0.07</td>
</tr>
<tr>
<td>14</td>
<td>72.3±0.80</td>
<td>72.7±0.60</td>
<td>74.4±1.68*</td>
</tr>
<tr>
<td>28</td>
<td>211.4±2.20</td>
<td>217.9±2.50*</td>
<td>214.7±4.76</td>
</tr>
<tr>
<td>42</td>
<td>298.3±3.70</td>
<td>318.9±4.90***</td>
<td>311.7±6.31**</td>
</tr>
</tbody>
</table>

Note: * – P<0.05; ** – P<0.01; *** – P<0.001

The survival rate of the birds in the control was at the level of 97.5%, and in the experimental groups it increased by 2.5 and 1.3%, compared to the control.

Feed consumption per unit of production in the control group was at the level of 3.07 kg, and in the experimental groups less by 6.5% and 3.9%, according to the sequence of groups in the experiment.

Table 2. Weight of internal organs of the bird, M±m, g, n=6.

<table>
<thead>
<tr>
<th>Weight</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>uneviscerated carcass</td>
<td>256.2±10.1</td>
<td>268±6.32</td>
<td>253.6±4.17</td>
</tr>
<tr>
<td>gizzard</td>
<td>5.14±0.51</td>
<td>5.66±0.11</td>
<td>4.88±0.10</td>
</tr>
<tr>
<td>In % to uneviscerated carcass</td>
<td>2.00±0.16</td>
<td>2.12±0.09</td>
<td>1.90±0.05</td>
</tr>
<tr>
<td>Intestines</td>
<td>7.24±0.37</td>
<td>8.10±1.03</td>
<td>6.64±0.59</td>
</tr>
<tr>
<td>In % to uneviscerated carcass</td>
<td>2.85±0.22</td>
<td>3.02±0.35</td>
<td>2.61±0.22</td>
</tr>
<tr>
<td>Liver</td>
<td>5.32±0.36</td>
<td>5.12±0.29</td>
<td>5.36±0.65</td>
</tr>
<tr>
<td>In % to uneviscerated carcass</td>
<td>2.07±0.07</td>
<td>1.92±0.15</td>
<td>2.12±0.26</td>
</tr>
<tr>
<td>Heart</td>
<td>1.66±0.02</td>
<td>1.60±0.03</td>
<td>1.66±0.02</td>
</tr>
<tr>
<td>In % to uneviscerated carcass</td>
<td>0.65±0.03</td>
<td>0.60±0.02</td>
<td>0.66±0.02</td>
</tr>
<tr>
<td>internal fat</td>
<td>2.06±0.31</td>
<td>2.32±0.20</td>
<td>1.40±0.40</td>
</tr>
<tr>
<td>In % to uneviscerated carcass</td>
<td>0.81±0.12</td>
<td>0.86±0.07</td>
<td>0.55±0.10</td>
</tr>
<tr>
<td>Length of cecum, cm</td>
<td>17.44±1.1</td>
<td>14.44±0.54**</td>
<td>17.16±0.52</td>
</tr>
<tr>
<td>In % to control</td>
<td>100.0</td>
<td>82.8 (-17.2)</td>
<td>98.4 (-1.6)</td>
</tr>
<tr>
<td>Length of intestine, cm</td>
<td>33.4±1.4</td>
<td>28.38±0.5***</td>
<td>27.60±0.77**</td>
</tr>
<tr>
<td>In % to control</td>
<td>100.0</td>
<td>85.0 (-15)</td>
<td>82.6 (-17.4)</td>
</tr>
</tbody>
</table>

Note: ** – P<0.01; *** – P<0.001

The weight of the uneviscerated carcass in the control was at the level of 256.2±10.1 g, and in the second experimental group there was a trend toward an increase in this indicator by 4.6%. In the third group, this indicator was not significantly lower than the control by 1.0%.

The weight of the gizzard in the control was 5.1±0.5 g, in the experimental group there was a tendency to increase against the control by 10.1%, and in the third group it was lower by 5.0%.
The weight of the gizzard relative to the uneviscerated carcass in the control was at the level of 2.0 ± 0.12%, in the second experimental group it was higher by 0.12%, and in the third group it was lower by 3.5% at the trend level.

The weight of the intestine in the control was 7.2 ± 0.4 g. The weight of the intestine shows a tendency to increase in the second group of the experiment, which consumed a feed additive with sorption properties throughout the entire period of the experiment, by 6.0%. In the third group, which consumed the feed additive for the first 28 days of the experiment, this indicator decreased unreliably by 3.5%.

There was a trend toward an increase in intestinal weight (expressed as a percentage) in the second group of the experiment by 0.17%; in the third group – the dynamics decreased by 0.24% relative to the control.

The liver weight in the first group was 5.3 ± 0.4 g. It should be noted that the liver weight in the second experimental group decreased by 3.7% against the control group, and in the third group there was a tendency to a slight increase by 0.7%.

The weight of the liver in relation to the uneviscerated carcass was 2.1±0.1%. When using the ACFA throughout the entire period of the experiment, there was a trend towards a decrease in the relative weight of the liver in the second group of the experiment by 0.15%, and when using the ACFA for the first 28 days of the experiment, there was a trend towards a slight increase by 0.05%.

The heart weight in the control and the third experimental group was identical (1.7±0.0 g), and in the second group, there was a trend towards a decrease in this indicator by 3.6%.

There was a trend towards a decrease in the relative weight of the heart in relation to the eviscerated carcass in the second group of the experiment by 0.06% compared to the control (0.7±0.0%). In the third group, this indicator was at the level with the control.

The weight of abdominal fat in the control was 2.1±0.3 g, in the second group it increased insignificantly by 12.6% and in the third group, it decreased at the trend level by 32.0%.

The relative content of abdominal fat in the control was at the level of 0.8±0.1%, when using a feed additive with sorption properties, the entire period of the experiment was unreliably higher than the control value by 0.06% in relation to the eviscerated carcass, and when using the feed additive during the first 28 days of the experiment, a tendency towards a decrease in this indicator by 0.26% was noted.

The average intestinal length in the control group was 33.4±1.4 cm. In both experimental groups there was a significant decrease in intestinal length by 15.0 (P<0.001) and 17.4% (P<0.01) in comparison with control.

The average length of the cecum in the control was 17.4±1.1 cm. It should be noted that there was a significant decrease in the length of the cecum of quails when using ACFA throughout the growing period by 17.2% (P<0.01) relative to the control. When feeding ACFA for the first 28 days over the complete feed, there was a trend toward a decrease in this indicator by 1.6% relative to the control.

When using ACFA, which is a phytosorbent, in feeding young quails, a significant decrease in intestinal length was observed, which can be associated with the fact that the studied feed additive exhibits increased detoxification activity.

4 Conclusion

Thus, the use of active carbon feed additive (ACFA) has a positive effect on the main zootechnical characteristics when growing young Texas White quail. The use of wood sorbent with a phytocomponent does not negatively affect the development of internal organs of quails, and increased detoxification activity is manifested.
References

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