ORGANOLEPTIC INDICATORS AND TASTE EVALUATION OF BROILER CHICKEN MEAT USING COMPLEXLY ZEOLITE AND MICROWAVE TREATED- FEED, INFECTED WITH MICROTOXINS

ANNOTATION

The research purpose is to determine the effect of the complex use of zeolite and microwave-treated feeds, infected with mycotoxins, on the organoleptic indicators of broiler chicken meat and to conduct a taste evaluation of the quality of meat and broth.

The basis for the realization of livestock production, including poultry production, from the consumer's point of view, depends on the taste qualities of the products, which are determined by tasting. Therefore, we conducted a taste evaluation of the broth and boiled meat prepared from the experimental group of broiler chicken meat.

When determining the organoleptic indicators of the experimental birds, the transparency and aroma of the meat during cooking were noted. We also observed that fat on the surface of the broth collected in large droplets, and the taste of the broth in all the examined groups corresponded to the characteristics of a high-quality product, without foreign odors.

The taste and aroma of meat determine the consumer value of the product. Extractive substances extracted from meat by water, which pass into the broth during cooking, play an important role in the evaluation of taste and aromatic properties of meat. They provide specific features of the taste and aroma of meat.

Based on the data getting from the taste evaluation of broiler chicken meat and broth, it can be concluded that the complex use of zeolite and microwave-treated feed infected with mycotoxins does not have a negative impact on the organoleptic properties of broiler chicken meat and broth.

Key words: tasting, organoleptic indicators, poultry meat, meat broth, quality indicator, poultry farming.

Introduction. Poultry farming is one of the most profitable branches of animal husbandry, taking a leading role in providing the population with full-fledged dietary food products. The poultry industry faces the challenge of meeting the growing demands of the population for poultry products and increasing production to a level comparable to developed European countries. The foundation for increasing production volumes, as well as growing and obtaining high-quality poultry products, is the creation of a reliable feed base and the rational use of feeds [1,2]. Poultry meat is easily digested by the human body, contains all the necessary substances for complete human nutrition, and serves as a source of essential nutrients presented in optimal quantitative and qualitative ratios [3,4].

Today, the main directions of poultry farming development are increasing poultry productivity and the quality of poultry products.

The complexity of mycotoxin analysis in compound feeds is determined by several reasons: the detection of only a small portion of known toxins even by modern laboratories and the cumulative properties of mycotoxins.

It has also been proven that a significant portion of feeds is contaminated with mycotoxins and contains several varieties of them at the same time. This increases the danger, as some substances have a synergistic effect on toxicity.
Under conditions of high production intensity on poultry farms, agricultural birds can be exposed to various environmental pathogens. One such factor is the contamination of feed with Fusarium, Aspergillus, and other molds, leading to the infection of birds with their secondary metabolites — mycotoxins [5,6,7,8].

Mycotoxins are frequently found in feeds and exert a toxic effect that can be detrimental to the health of agricultural poultry [9]. Furthermore, when entering the poultry production, mycotoxins can pose a significant threat to public health [10,11,12]. One of the main solutions to this problem is to enhance the immunobiological status of poultry through the application of enterosorption methods.

Mycotoxins reduce meat productivity and negatively impact the health of animals and poultry due to their toxic effects, affecting virtually all biological processes in the animal's body. Therefore, combating mycotoxins is one of the crucial directions for poultry farmers to maintain the health and productivity of poultry.

According to researchers such as O.M. Soboleva and our own research findings, one of the most effective physical methods for destroying toxins in feeds is high-frequency treatment, which additionally eliminates unwanted microflora and increases the nutritional value of the processed raw materials [13,14].

The quality of poultry meat is an important factor in consumer interest. Organoleptic evaluation of meat is a critical element in assessing its quality, and the results of organoleptic assessment often play a decisive role in determining meat quality [15].

The success of animal products, including poultry meat, from the consumer's perspective, largely depends on taste qualities, which can be determined through tasting [16]. Therefore, we conducted a taste evaluation of broth and boiled meat prepared from the broiler chicken meat of the experimental groups [17].

The research purpose is to determine the influence of the complex use of zeolite and microwave-treated feed infected with mycotoxins on the organoleptic indicators of broiler chicken meat and to conduct a taste evaluation of the quality of meat and broth.

**Research materials and methods.** The object of the study was the meat obtained after slaughtering broiler chickens in the control and experimental groups, with a growth duration of 30 days. The work was carried out at the Department of Veterinary Sanitary Examination of the Kazan State Academy of Veterinary Medicine named after N.E. Bauman.

Research on the impact of the complex use of zeolite and microwave-treated feeds infected with mycotoxins on the organoleptic properties of broiler chicken meat was conducted on 40-day-old birds, with 5 groups of "Cobb 500" cross broiler chickens formed. Each group consisted of 60 heads: the 1st control group of birds received regular feed (OR); the 2nd control group of birds received feed containing mycotoxins (OR); the 3rd group of birds received feed containing mycotoxins (OR) subjected to microwave treatment; the 4th group of birds received feed containing mycotoxins (OR) subjected to microwave treatment + 3% zeolite; the 5th group of birds received feed containing mycotoxins (OR) + 3% zeolite. The conditions of housing and feeding for the control and experimental groups of birds were the same during the research period. Full ration broiler feed was used to provide the necessary nutrients for broiler chickens. During the growing period, the nutritional value of the main diet feed was adjusted according to the age of the broiler chickens.

The feeding of the experimental poultry was carried out in two phases during the growth period. At the end of the experiment, a control slaughter of the experimental poultry was performed. The poultry was slaughtered after an 8-hour pre-slaughter period, with access to water according to standard practice. The poultry carcasses were then allowed to mature at +4°C for 12 hours.

The organoleptic quality indicators of the broiler chicken meat from all groups were determined according to the standards GOST 9959-2015, GOST 31470-2012, GOST R 51944-2002 [18,19,20].

A 9-point scale was used to evaluate the quality of poultry meat, as presented in tasting sheets. According to the general rules of tasting, the organoleptic properties of boiled meat were assessed based on the following parameters: appearance, aroma, taste, tenderness, juiciness. The taste evaluation also included the quality of the broth based on appearance, aroma, taste, and consistency.

Statistical analysis of getting results was performed using standard Microsoft Excel XP software.

**Research results.** The poultry carcasses in both the control and experimental groups were well bled, clean, and free of feather remnants, fluff, and down. The surface of the carcasses was dry, with a pale yellowish color and a pinkish hue; subcutaneous fat was pale pink; the meat had an elastic consistency, with an impression that quickly leveled when pressed with a finger; both on the surface and inside the cut, there was a specific fresh poultry meat smell.
The culinary preparation of the broiler chicken meat involved immersing whole carcasses in cold water at a 3:1 ratio, bringing them to a boil, and simmering until fully cooked. The temperature of the muscle thickness was measured, reaching 75 ± 5°C. About 30 minutes before readiness, 1% table salt was added to the meat mass.

When cooking meat, the broth was clear and aromatic. On the surface of the broth, fat accumulated in the form of large drops; the taste of the broth in all the examined groups corresponded to the characteristics of a good-quality product, without any foreign odors.

After full culinary preparation, the carcasses were removed from the broth, cooled to 35±5°C, and presented for tasting.

The tested broth was poured into glass cups, with a volume of at least 50 ml.

Table 1 - Evaluation of the quality of boiled poultry meat, scores

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Control Groups</th>
<th>Experimental Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td>Breast meat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>7,4±0,05</td>
<td>6,9±0,04</td>
</tr>
<tr>
<td>Aroma</td>
<td>6,8±0,1</td>
<td>6,6±0,3</td>
</tr>
<tr>
<td>Taste</td>
<td>6,6±0,2</td>
<td>5,9±0,3</td>
</tr>
<tr>
<td>Consistency (tenderness, firmness)</td>
<td>6,4±0,19</td>
<td>6,0±0,11</td>
</tr>
<tr>
<td>Juiciness</td>
<td>6,8±0,08</td>
<td>6,1±0,02</td>
</tr>
<tr>
<td>Total Score</td>
<td>6,8±0,10</td>
<td>6,3±0,15</td>
</tr>
<tr>
<td>Thigh meat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>7,8±0,08</td>
<td>7,0±0,06</td>
</tr>
<tr>
<td>Aroma</td>
<td>7,2±0,04</td>
<td>6,2±0,03</td>
</tr>
<tr>
<td>Taste</td>
<td>6,8±0,08</td>
<td>6,0±0,07</td>
</tr>
<tr>
<td>Consistency (tenderness, firmness)</td>
<td>7,4±0,05</td>
<td>6,0±0,02</td>
</tr>
<tr>
<td>Juiciness</td>
<td>6,8±0,13</td>
<td>6,1±0,19</td>
</tr>
<tr>
<td>Total Score</td>
<td>7,2±0,07</td>
<td>6,2±0,07</td>
</tr>
</tbody>
</table>

In summary, the results of the organoleptic analysis of broiler chicken carcasses from both the control and experimental groups were characteristic of fresh meat.

Based on the results of the sensory evaluation, the average scores for breast meat samples across all groups ranged from 6.3 to 8.2, and for thigh meat, the scores ranged from 6.2 to 8.1, as presented in Table 1.

From the table, it can be observed that the meat from the broiler chickens in the 4th group, which received feed affected by mycotoxins, underwent microwave treatment, and included zeolite, surpassed the 1st control group in terms of appearance by 9.2%, aroma by 8.5%, taste by 20.8%, consistency by 23.1%, and juiciness by 20.5%. The thigh meat of the 4th group outperformed the 2nd control group in terms of appearance by 20.2%, aroma by 18.7%, taste by 37.2%, consistency by 41.6%, and juiciness by 34.4%.

For the 3rd and 5th experimental groups, the organoleptic scores for both breast and thigh meat, on average, were as follows: for the 3rd group, appearance - 7.9 points, aroma - 7.3 points, taste - 7.2 points, consistency - 7.4 points, juiciness - 7.2 points, and for the 5th group, appearance - 7.9 points, aroma - 7.0 points, taste - 7.5 points, consistency - 7.2 points, juiciness - 7.2 points.

Overall, the results of the comprehensive organoleptic evaluation of broiler chicken meat samples showed that the meat from the experimental groups received an average score of 7.6 points, while the control group received an average score of 6.6 points.
Table 2 - Evaluation of the quality of the broth, scores

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Control Groups</th>
<th>Experimental Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td><strong>Breast meat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>7,6±0,11</td>
<td>7,1±0,15</td>
</tr>
<tr>
<td>Aroma</td>
<td>6,4±0,2</td>
<td>6,0±0,1</td>
</tr>
<tr>
<td>Taste</td>
<td>6,8±0,14</td>
<td>6,0±0,11</td>
</tr>
<tr>
<td>Broth richness</td>
<td>6,6±0,13</td>
<td>6,2±0,14</td>
</tr>
<tr>
<td>Total score</td>
<td>6,9±0,14</td>
<td>6,3±0,12</td>
</tr>
<tr>
<td><strong>Thigh meat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>7,8±0,1</td>
<td>6,9±0,2</td>
</tr>
<tr>
<td>Aroma</td>
<td>6,8±0,2</td>
<td>6,2±0,3</td>
</tr>
<tr>
<td>Taste</td>
<td>7,0±0,07</td>
<td>6,9±0,05</td>
</tr>
<tr>
<td>Broth richness</td>
<td>7,2±0,04</td>
<td>6,2±0,04</td>
</tr>
<tr>
<td>Total score</td>
<td>7,2±0,10</td>
<td>6,6±0,14</td>
</tr>
</tbody>
</table>

Based on the data in Table 2, the results of the commission tasting evaluation of broth samples showed the following average indicators across all groups: breast muscle meat scored between 6.3 and 7.7 points, while thigh muscle meat scored between 6.6 and 8.2 points.

The most significant differences between the groups were observed in the taste characteristics of the broth. Specifically, the taste quality of the broths from broiler chicken meat was notably higher in the fourth group, being 20.2%, 27.6%, 5.0%, and 9.2% higher than in the first, second, third, and fifth groups, respectively.

Quality evaluation scores for broth, from the 1st to the 5th groups of experimental birds, based on both breast and thigh muscle meat, were as follows: in the 1st group, appearance scored 7.7 points, aroma scored 6.6 points, and richness scored 6.9 points. In the 2nd group, appearance scored 7.0 points, aroma scored 6.1 points, and richness scored 6.2 points. In the 3rd group, appearance scored 7.8 points, aroma scored 7.1 points, and richness scored 7.4 points. In the 4th group, appearance scored 8.1 points, aroma scored 7.9 points, and richness scored 7.5 points. In the 5th group, appearance scored 7.8 points, aroma scored 7.2 points, and richness scored 7.2 points.

The average rating for the broth from the meat of broiler chickens in the experimental groups was 7.7 points, while in the control groups, it was 6.8 points.

A similar trend is observed in the evaluation of meat broth. Overall, higher ratings were noted in the experimental group that received feed containing zeolite and microwave-treated feed contaminated with mycotoxins. The best results were also observed in the experimental groups in terms of richness, appearance, and aroma.

**In conclusion,** the using of zeolite and microwave-treated feed contaminated with mycotoxins in the diet of broiler chickens increased the biological value of meat: it led to a 0.7% to 0.9% increase in calorie content, a 10.0% to 15.8% increase in protein content in white muscle tissue, and a 6.7% to 10.4% increase in red muscle tissue. This had a positive impact on the organoleptic characteristics of the meat in the 4th group of chickens.

**REFERENCES**


РЕЗЮМЕ

Цель данной работы определить влияние при комплексном использовании в кормлении птиц цеолита и СВЧ-обработанных кормов, пораженных микотоксинами на органолептические показатели мяса цыплят – бройлеров и провести дегустационную оценку качества мяса и бульона.

Основа реализации продукции животноводства, в том числе продукции птицеводства, с точки зрения потребителя, зависит от вкусовых качеств продукции, которые определяются путем
дегустации, поэтому нами была проведена дегустационная оценка бульона и варенного мяса, приготовленного из мяса цыплят-бройлеров экспериментальной группы.

При определении органолептических показателей подопытных птиц, отмечено прозрачность и ароматность мяса при варке. При определении нами также отмечено, что на поверхности бульона жир собирался в виде крупных капель, вкус бульона во всех исследуемых группах соответствовал показателям доброкачественного продукта, без посторонних запахов.

По показателям вкуса и аромата мяса определяют потребительскую ценность продукта. В оценке вкусовых и ароматических свойств мяса, важную роль играют экстрактивные вещества, извлекаемые из мяса водой, которые переходят в бульон при варке. Они обеспечивают специфические особенности вкусовых и ароматических свойств мяса.

На основании полученных данных проведенной дегустационной оценки мяса и бульона цыплят-бройлеров, можно сделать вывод, что при комплексном использовании цеолита и СВЧ-обработанного корма, пораженного микотоксинами, не оказывают отрицательного воздействия на органолептические свойства мяса и бульона цыплят-бройлеров.

Бул жұмыстың мақсаты құстарды тамақтандыруда цеолит пен микротолқынды өңделген жемді микротоксиндермен зақымданған бройлер тауықтары етінің органолептикалық көрсеткіштеріне кешенді қолдануының әсерін анықтау және ет пен сорпаның сапасын құстар тақырыпты.

Мал шаруашылығы өйлөмдік өнімдерін, оның ішінде құстар етін сату құстардың құндылығы бойынша өндіріс негізі, ол дәм тату арқылы анықталады, сондықтан біз эксперименттік топтың бройлер тауықтарының етінен алынған сорпа мен бірге қайнатылған етке дәмдік баға бердік.

Сынақ құстарының органолептикалық көрсеткіштерін анықтау кезінде прозрач мөлдірлік мен хош іісі байқалады. Анықтау кезінде сорпаңың бетінде май ұлкен тамшылар түрінде жиналып, зерттелетін барлық топтардан сорпаның дәмі жақсы оның көрсеткіштерінің сәйікес келетіндігін, бөгде иістенісі екенін қамтамасыз етті.

Мяса дәмі мен хош іісі бойынша етінің тұтынушылық құңдылығы анықталады. Мяса дәмі мен хош іісті қасиеттерін бағалауда етінен Судан алынған экстрактивті заттар мен алынған және иістенісі айналады. Олар ерекше ерекшеліктерінің қамтамасыз етеді.

Бройлер тауықтарының еті мен сорпасын дәмдік бағалаудағы нәтижелеріне сүйене отырып, микротоксиндерден зардан шекен ет пен микротолқынды өңделген тағамды кеңейді пайдалану кезінде бройлер тауықтарының еті мен сорпанның органолептикалық қасиеттеріне теріс есер етеді деген корытынды жасауға болады.