# Effect of enzyme preparations “Sanzaym”, “Sanfayz 5000” and lecithin on the quality of broiler meat

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## Abstract

Quality indicators of broiler meat may depend on the combination of feed and biologically active preparations introduced into the diet of poultry. The paper presents the results of scientific and economic experience on broiler chickens to study the effect of enzyme preparations Sanzaym, Sanfayz 5000 and lecithin on the quality of meat of experimental livestock. The research was carried out in the state enterprise plemreproduktor "Achkhoy – Martanovsky" of the Chechen Republic on broiler chickens of the ROSS-308 cross, from daily to 45 – day age, on compound feeds prepared using corn, barley, wheat, sunflower cake. 400 day-old chickens selected by the method of analogous groups were divided into 4 groups: control and 3 experimental. The control group of poultry was fed, depending on the growing phase, complete feed for broilers "Start", "Growth", "Finish", prepared on the basis of corn, barley, wheat, sunflower cake. For their analogues from 1 experimental group, enzyme preparations Sanzaym and Sanfayz 5000 were added to the feed, at the rate of 100 g / t of feed. Broilers of the 2 experimental group in addition to the main diet received lecithin, at the rate of 10 g/kg of feed. In the 3 experimental group, the experimental bird was additionally fed all three studied drugs together, in the same norms. The results obtained indicate a positive effect of the studied drugs on the indicators of the chemical composition of poultry meat. This was expressed primarily in the increase in the chest muscles of dry matter from 25.27 to 26.58%, and in them of protein from 22.12 to 23.11%, in the leg muscles, respectively, of dry matter from 24.03 to 25.79%, and protein from 19.45 to 20.84%. By optimising the protein, carbohydrate and lipid metabolism, improved the ratio of protein and fat in meat, thereby increasing the tasting estimation of meat on average 0.4 points, broth - 0.5 points.

**Keywords**: enzymes; lecithin; broiler chickens; growth.

# Introduction

The poultry market, and in particular the meat of broiler chickens, is one of the most developed and dynamic markets for consumer goods due to the high demand for these products from the mass buyer (Omerovic et al 2016). Poultry meat, namely broiler chickens, is one of the important sources of complete protein, which helps to solve the problem of its deficiency. In solving the problem of increasing meat productivity and quality of meat, a certain role is played by additives including enzyme preparations in poultry diets both individually and in combination with other feed elements (Zlepkin & Kolobova, 2013; Tmenov et al., 2014; Kaloev et al., 2017; Chernov, 2017, Rashidi & Gheisari 2019).

Many Russian scientists associate the possibility of intensifying protein and carbohydrate metabolism mainly with the use of various enzyme preparations and their complexes for enriching diets from local grain components, characterized by an increased content of cellulose, hemicellulose, lignin and other non-starchy polysaccharides. Improving the digestibility and absorption of nutrients in the diet can increase the productive, physiological and economic indicators of broiler fattening (Baeva et al., 2011; Ibragimov, Kaloev, 2020; Nufer, 2011; Kaloev, Khadaeva, 2011; Kaloev, Chertkoev, 2017; Selle et al., 2010; Yuldaschbaev et al., 2018; Kaloev et al., 2019; Rashidi & Gheisari 2019).

Other authors draw attention to the possibility of using other forms of biologically active substances, such as lecithin, to intensify metabolic processes in the body of broilers. Currently, scientists are increasingly realizing that poultry meat production depends not only on the intensity of protein and carbohydrate metabolism, but also to a large extent on lipid metabolism. There are more and more publications about the influence of feed factor on fat metabolism in the body of poultry. They note the positive effect of this drug on the use of nutrients, on morphological and biochemical parameters of blood and the environmental safety of the resulting products (Aydinyan, 2015; Kairov et al., 2019; Kaloev & Ibragimov, 2020).

# Material and methods

The research was carried out in the state enterprise plemreproduktor "Achkhoy – Martanovsky" of the Chechen Republic (Latitude: 43°11.3982′ n.l., Longitude: 45°17.0238′ e.l.). Studies on the influence of enzyme preparations Sanzaym, Sanfayz 5000 and lecithin, as separately and together, on the quality parameters of meat broiler chickens was conducted in the framework of scientific and economic experience in the context of GUP nucleus "Achkhoy – Martan" the Chechen Republic on chickens-broilers of the ROSS 308, with a daily up to 45 days of age, the feed, made with corn, barley, wheat, sunflower meal produced locally. To conduct scientific and economic experience, according to the research plan, by the method of analogues, 4 groups of daily chickens with 100 heads in each were formed. The experimental groups of broiler chickens were fed according to the scheme shown in table 1.

In the course of scientific and economic experience, a careful account was taken of all the main zootechnical indicators and, in particular, the quality of the meat obtained, by determining the chemical composition of the chest and leg muscles, as well as conducting a tasting evaluation of meat and broth laboratories of the Research Institute of Agrarian Ecology of the Gorsky GAU (NII AE).

**Table 1** - Schedule of experience

| Group | Peculiarities of feeding experimental birds |
|---|---|
| Control | Complete feed for broilers "Start", "Growth", "Finish" based on corn, barley, wheat, sunflower cake or meal (OR-the main diet) |
| 1 experienced | OR + enzyme preparation Sanzaym, at the rate of 100 g / t of feed + enzyme preparation Sanfayz 5000, at the rate of 100 g / t of feed |
| 2 experienced | OR + lecithin, at the rate of 10 g / kg of feed |
| 3 experienced | OR + enzyme preparation Sanzaym, at the rate of 100 g/ton feed + enzyme preparation Sanfayz 5000, at the rate of 100 g/ton feed + lecithin 10 g/kg of feed |

Enzymatic preparations Sanzyme and Sanfayz 5000 are developed by specialists of Chinese company "Wuhan Sunhy Biology Co., Ltd" and produced by "Company Agroros" Ltd. of Ekaterinburg.Sanzyme is a complex means for mixed rations, obtained by bacterial synthesis.

Sanzyme contains four active enzymes: xylanase - at least 12000 K-ed/g, beta-glucanase - at least 4000 G-ed/g, mannanase - at least 100 M-ed/g, cellulase - at least 2000 C-ed/g; filler - corn starch.

Sanfayz 5000 is a preparation on the basis of phytase (myo-inositol-hexaphosphate-phosphohydrolase), obtained by bacterial synthesis. The minimum activity of dry Sanfayz is 5000 PE/g, the filler is corn starch. The economic component of growing broilers provides not only the use of full-fledged feed, but also the possibility of reducing their cost by using, if possible, components of local production. The composition of full-fledged compound feeds used in the scientific and production experience included corn, barley, wheat, and sunflower cake produced in the region, as well as animal feed and mineral top dressing. In order to provide poultry with trace elements, vitamins

and individual amino acids, a special premix was introduced into the feed, depending on the growing period (table 2).

The given formula of compound feeds, in each period of fattening, provided good feed palatability, balance on the main elements of nutrition, optimal energy-protein ratio, high safety and obtaining the planned average daily increases in live weight of broilers of experimental groups.

**Table 2** - Composition and nutrition of feed for broiler chickens

| Components, % | Type of compound feed and feeding period | | |
|---|---|---|---|
| | «Start» | «Height» | «Finish» |
| | 1-14 days | 15-28 days | 29-45 days |
| Corn | 40 | 44 | 47 |
| Barley | 8 | 8 | 8 |
| Wheat | 16 | 13 | 13 |
| Sunflower cake / soy | 20 | 19 | 17 |
| Fodder yeast | 5.5 | 5.5 | 4.5 |
| Fish meal | 6 | 5 | 4 |
| Animal feed fat | 2 | 3 | 4 |
| Table salt | 0.3 | 0.3 | 0.3 |
| Tricalcium phosphate | 1.2 | 1.2 | 1.2 |
| Premix | 1.0 (P5-1-89) | 1.0 (P5-1-89) | 1 (P6-1-89) |
| 100 g of feed contains: | | | |
| - exchange energy, kcal | 308.00 | 316.00 | 325.00 |
| crude protein, g | 23.97 | 22.55 | 19.10 |
| crude fat, g | 6.82 | 7.91 | 6.60 |
| - crude fiber, g | 4.80 | 4.78 | 4.40 |
| - calcium, г | 1.04 | 1.04 | 1.02 |
| - phosphorus, г | 0.74 | 0.70 | 0.70 |
| - sodium, г | 0.17 | 0.16 | 0.18 |
| - lysine, г | 1.33 | 1.24 | 1.09 |
| - methionine + cystine, г | 1.05 | 0.92 | 0.83 |

At the same time, it can be noted that the presence of a significant number of grain components indicates a relatively high content of difficult-to-digest substances in the feed, to facilitate the splitting of which, for broiler chickens of experimental groups, the declared enzyme preparations and lecithin were used.

In the state unitary enterprise plemreproduktor "Achkhoy – Martanovsky", during the period of our research on broiler chickens, differentiated three-phase feeding was used:

- the first phase - at the age of 1-14 days, according to the formula of feed "Start"; - the second phase - at the age of 15-28 days, according to the formula of mixed feed " Growth»; -the third phase - at the age of 29-45 days, according to the formula of compound feed "Finish".

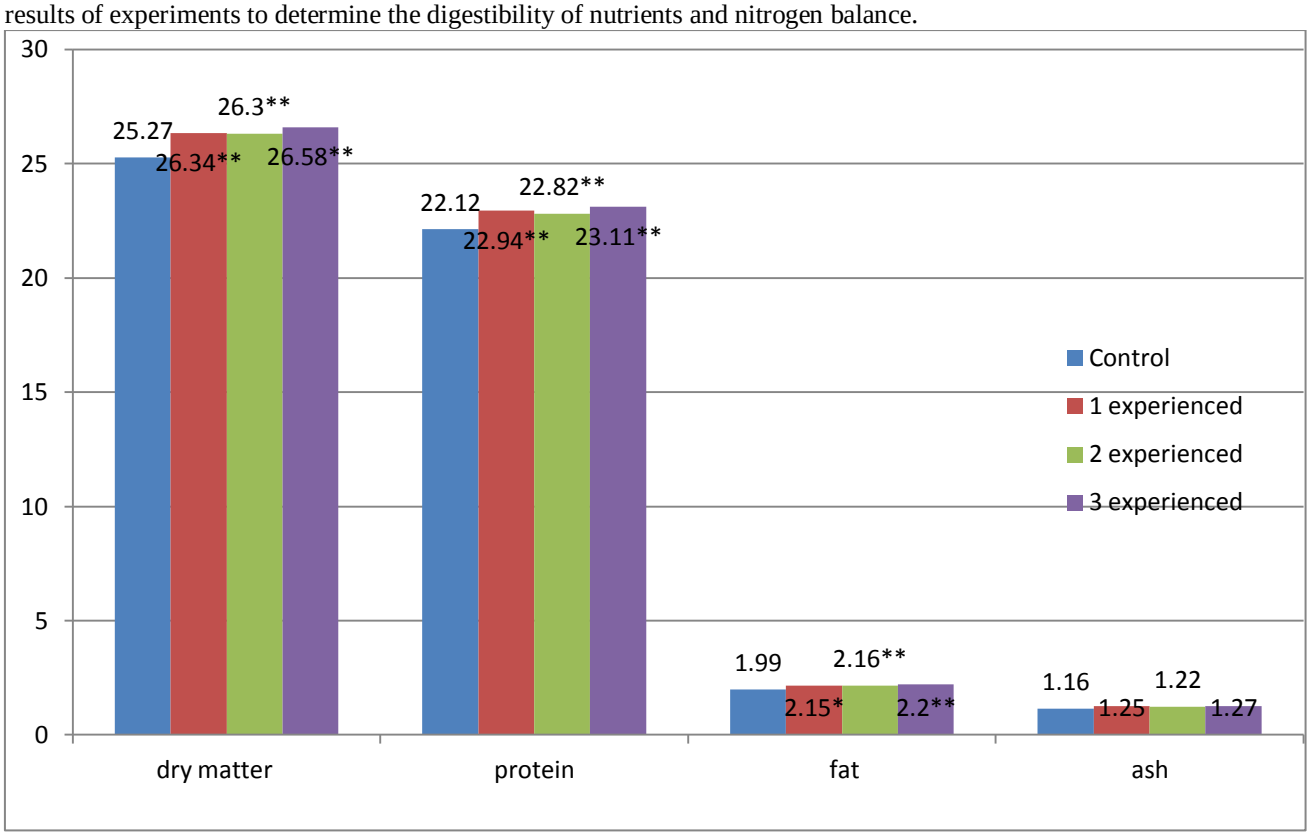
## Results and discussion

During each feeding phase, the experimental bird received a complex of nutritional, mineral and biologically active substances in accordance with existing feeding standards. Quality indicators of meat are characterized by the chemical composition of the chest and leg muscles (white and red meat), which are shown in figures 1 and 2.

Analysis of the data presented in figures 1 and 2 shows that the studied drugs contributed to a significant decrease in water and, accordingly, an increase in the content of dry matter, both in the chest and leg muscles. Thus, the content of dry matter in the chest muscles increased from 25.27 % in the control group, to 26.30 – 26.58%, in the experimental groups, in the leg muscles, respectively, from 24.03 to 25.26 % - 25.79 %, with a high degree of confidence of the obtained difference ($P \geq 0.99$, $P \geq 0.999$).

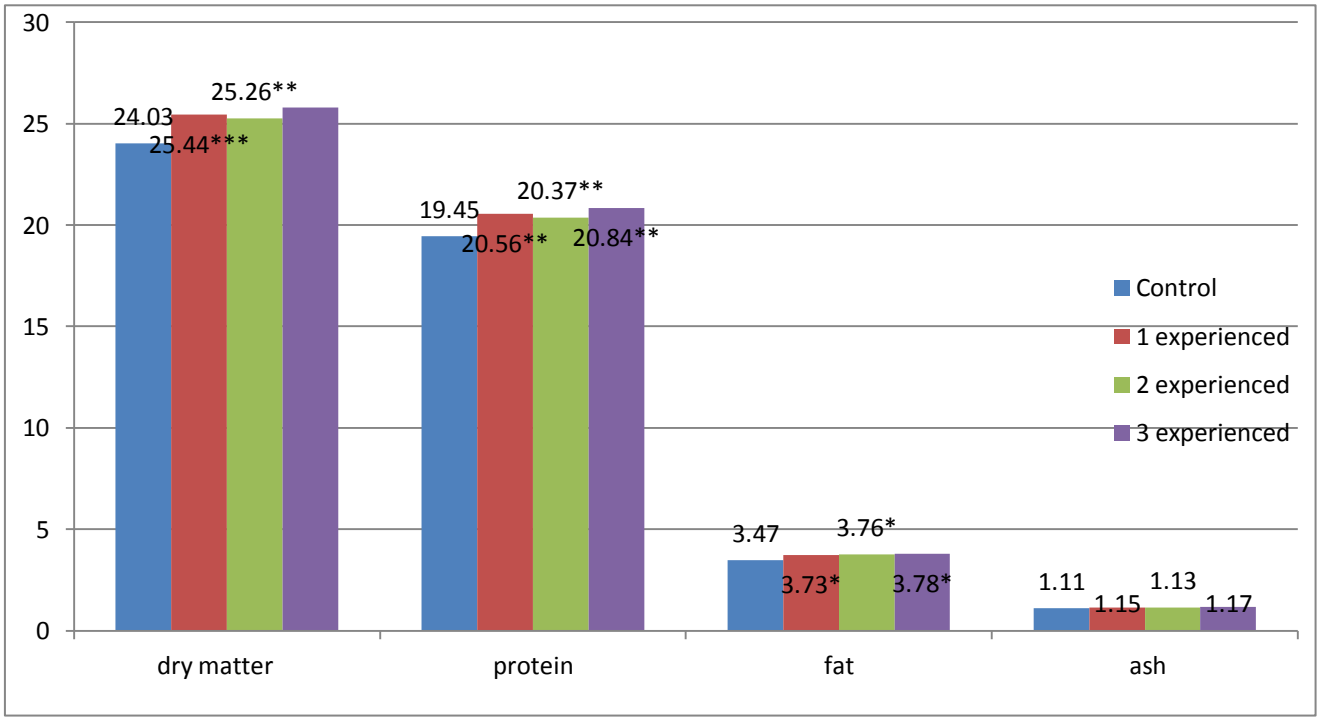
Greater accumulation of nutrients is established when the combined inclusion of enzyme preparations and lecithin in the diet of poultry. It was also found that the increase in the dry matter content in the experimental groups was mainly due to protein and fat, both in the chest and leg muscles. These two indicators had a significant superiority in the samples of poultry muscles of the experimental groups, compared to the control. In particular, the index of protein content in the chest muscles increased from 22, 12 to 22.82-23.11 %, in the leg muscles, respectively, from 19.45 to 20.37-20.84 %. This circumstance probably contributed to the improvement of protein metabolism in the body of broilers of experimental groups, due to the intensive inclusion of enzyme preparations

and lecithin in the metabolism. Moreover, when they are used together, they have increased the effect of each other as a result of optimizing individual metabolic processes in the body of broilers. These data are consistent with the results of experiments to determine the digestibility of nutrients and nitrogen balance.




*-p≥0.95, **-p≥0.99, ***-p≥0.999.

**Figure** 1 - Chemical composition of the chest muscles, g




*-p≥0.95, **-p≥0.99, ***-p≥0.999.

**Figure 2 - Chemical composition of the leg muscles, g**

Enzyme preparations and lecithin, in addition to protein, activated lipid metabolism, which contributed to the additional accumulation of fat in the muscle tissue. On the one hand, this has a positive effect, since it helps to improve the taste and energy value of meat, but on the other hand, it slightly worsens the dietary properties of the resulting products. Use in the diet of broilers enzyme preparations Sanzaym and Sanfayz 5000 increased fat content in breast muscle at a rate of 8.0 %, foot – by 7.5 %, compared with the control.

The introduction of lecithin phospholipid into the broiler diet increased the fat content in the chest muscles by 8.5 %, and the leg muscles by 8.4 %. When combined with the inclusion of enzyme preparations and lecithin in the diet of experimental birds, the increase in fat content was: in the chest muscles -10.5 %, in the leg muscles-8.9 %. The higher content of dry matter in the samples of breast and leg muscles of chickens of the experimental groups caused, among other things, a certain increase in the content of mineral substances, however, this increase was statistically unreliable.

No less important indicators of meat quality are consumer qualities determined during its tasting. Moreover, new feed components that have a positive impact on productivity indicators can worsen their taste advantages. In this case, the conducted tasting assessment of meat and poultry broth of experimental groups, data on which are given in tables 1 and 2, showed that the studied drugs not only did not worsen, but even improved the studied organoleptic indicators. The difference in the estimates of individual indicators between the control and experimental groups varied in the range from 0.1 to 0.7 points.

**Table 3** -Assessment of the quality of broiler chicken meat (average score)

| Indicator | Group | | | |
|---|---|---|---|---|
| | control | 1-experienced | 2-experienced | 3-experienced |
| Appearance | 8.1 | 8.3 | 8.4 | 8.4 |
| Color on the section | 7.9 | 8.1 | 8.1 | 8.2 |
| Smell | 7.2 | 7.5 | 7.6 | 7.7 |
| Taste | 6.9 | 7.2 | 7.5 | 7.6 |
| Consistency | 7.3 | 7.5 | 7.5 | 7.6 |
| Juiciness | 6.8 | 6.9 | 7.0 | 7.1 |
| Overall assessment | 7.4 | 7.6 | 7.7 | 7.8 |

The overall rating given to the meat samples of the control group was 7.4 points on a 10-point scale, and the broth was 6.8 points on the same scale.

**Table 4** – Assessment of the quality of the broth of the meat of broiler chickens (average score)

| Indicator | Group | | | |
|---|---|---|---|---|
| | control | 1 experienced | 2 experienced | 3 experienced |
| Appearance | 6.9 | 7.2 | 7.2 | 7.3 |
| Smell | 6.7 | 7.0 | 7.1 | 7.2 |
| Taste | 6.6 | 6.9 | 7.2 | 7.3 |
| Richness | 7.0 | 7.3 | 7.4 | 7.4 |
| Overall assessment | 6.8 | 7.1 | 7.2 | 7.3 |

The use of enzyme preparations increased these indicators by 0.2 and 0.3 points, respectively. Phospholipid lecithin improved the overall tasting score of meat by 0.3 points, and broth – by 0.4 points. The maximum improvement in tasting ratings was obtained when using enzyme preparations and lecithin together – the overall rating of meat increased by 0.4 points, and broth – by 0.5 points.

Thus, the improvement of consumer qualities of meat products obtained from poultry of experimental groups, especially when used together, is confirmed.

# Discussion

Comparing the performance of the experimental groups with that of the control group, it can be argued that each of the studied drugs had its own positive effect on the chemical composition and taste of the meat of broiler chickens, but it became maximum evident when they were used together. This can be explained, on the one hand, by the optimization of carbohydrate and protein metabolism, due to the influence of the enzyme preparation Sanzyme on the poultry organism, the improvement of mineral metabolism, in particular the use of calcium and phosphorus, due to the influence of the enzyme preparation Sanfayse 5000, as well as an increase in the synthesis and metabolism of fat-soluble vitamins, due to lecithin phospholipids. The results are consistent with those of other authors (Nufer, 2011; Aydinyan, 2015; Kairov et al., 2019).

**Conclusion**

In General, it can be stated that when combined with feed prepared on the basis of corn, barley, wheat, sunflower cake of local production, enzyme preparations Sanzaym and Sanfayz 5000, as well as lecithin, the quality of broiler meat increases, due to the improvement of its chemical composition, which is confirmed by the tasting of meat and broth. In this case, the best results on chicken broilers obtained by the joint use of enzyme preparations and lecithin in doses: Sanzyme - 100 g / t mixed feed + Sanfayz 5000 - 100 g / t mixed feed + lecithin - 10 g / kg mixed feed.

# References


1) Aydinyan G.. 2015. Influence of joint use of lecithin and L-carnitine in mixed feed of broiler chickens with a reduced level of exchange energy. Zootechny. 9: 20-22.
2) Baeva A.A., Tletseruk I.R., Dzidzoeva Z.G. 2011. Influence of enzyme preparations on productivity and metabolism in broiler chickens. Bulletin of the Maikop state technological University, 3: 30-33.
3) Chernov I.S. 2017. Food and biological value of broiler chicken meat when using enzyme preparations in diets. In the collection: Scientific support of the agro-industrial complex. Collection of articles based on the materials of the XI all-Russian conference of young scientists dedicated to the 95th anniversary of the Kuban state UNIVERSITY and the 80th anniversary of the Krasnodar territory. Pp. 174-175.
4) Ibragimov M.O., Kaloev B.S. 2020. Possibilities of increasing the activity of digestive enzymes in the body of broiler chickens. News of Gorsky state agrarian University. 57: 50-54.
5) Kaloev B.S., Khadaeva R.B. 2011. Ways to improve the use of nutrients in the diets of broiler chickens. News of Gorsky state agrarian University. 48 (1): 107-109.
6) Kaloev B.S., Chertkoev G.B. 2017. Influence of dry bard in combination with the enzyme preparation "Fidbest VGPro" on the digestibility and use of nutrients by broiler chickens The Perm agrarian journal. 3(19): 135-140.
7) Kaloev B. S., Ibragimov M. O., Pskhatsieva Z. V. 2017. Opportunities to improve the meat qualities of broiler chickens Bulletin of the Ulyanovsk state agricultural Academy. 3: 118.
8) Kaloev B.S., Ibragimov M.O., Gogaev O.K., Nogaeva V.V., Albegova L.H., Mouraova R.H., Kokoeva A.T. 2019. Effect of enzyme preparations on hematological parameters of rearing and laying hens Research journal of Pharmaceutical, Biological and Chemical. March-April, RjPBCS 10 (2):1091 - 1097
9) Kaloev B. S., Ibragimov M. O. 2020. Enzyme preparations and lecithin in feeding broiler chickens News of Gorsky state agrarian University. 57(1): 45-50.
10) Kairov A.V., Temiraev R. B., Mamukaev M. N., Ktsoeva I. I., Kozhokov M. K, Lamarton S. F., Vityuk L. A., Beslaneev E. V. 2019. Digestibility and digestibility of nutrients when including biologically active preparations for detoxification of T-2 toxin in the diet of poultry News of Gorsky state agrarian University. 56 (4): 108-113.
11) Nufer A. 2011. Sanzaym and Sanfayz-amplifiers of the nutritional value of feed. Poultry Farming, 12: 28-29.
12) Omerovic I., Milosevic B., Ciric S., Spasic Z., Lalic N., Samardzic S. 2016. Effect of prebiotic on performance and slaughter traits of broiler chickens fed lower protein diets. Journal of Livestock Science 7: 168-171
13) Rashidi H., Gheisari A. 2019. Effect of different levels of amino acid and vitamins in starter period of broilers on performance and antibody titer production. Journal of Livestock Science 10: 126-131.
14) Selle, P.H. Cadogan D.J., Ru Y.J., G.G. 2010. Partridge Impact of Exogenous Enzymes in Sorghum- or Wheat-Based Broiler Diets on Nutrient Utilization and Growth Performance. International Journal of Poultry Science. 9(1): 53-58.
15) Tmenov I. D. Kaloev B. S., Nogaeva V. V. 2014. Influence of the enzyme preparation Phytase on the slaughter indicators of broiler chickens. News of Gorsky state agrarian University. 51 (3): 102-106.
16) Yuldaschbaev Y.A. Ibragimov M.O., Kairov V.R., Kaloev B.S., Kozhokov M.K., Baeva A.A., Tsalieva L.V. 2018. Studying the Metabolism in Broiler-Chickens on the Diets with Enzyme Preparations Journal of Pharmaceutical Sciences and Research. 10(11): 3009 – 3011
17) Zlepkin D. A., Kolobova T. S. 2013. Qualitative indicators of broiler chicken meat when used in rations of ginger cake in combination with enzyme preparations . Proceedings of the lower Volga agrodiversity complex: Science and higher professional education. 4 (32): 185-188.