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USE OF UNCONVENTIONAL FEED FOR BROILER CHICKENS

David POGOSYAN, Vladimir ZEMNYAKOV, Elena ZUEVA, Elena VARLAMOVA

Penza State Agrarian University, 30 Botanicheskaya Street, 440014, Penza, Russia

Corresponding author email: pogosyan.d.g@pgau.ru

Abstract

Studies have been conducted on the effectiveness of the use of fattening broilers at the age of 15-38 days of unconventional grain feed for poultry farming in the amount of 30% of the feed mass used instead of corn grain. It has been established that the use of bare-grain barley and triticale grains in the composition of the fed experimental compound feeds increases the digestibility of dry substances and crude protein in the digestive tract of chickens by 2.4-2.8 and 3.3-3.5%, which is accompanied by an increase in the growth rate of young animals by 7.4-7.8%, respectively, compared with the use of corn in the control group. The use of bare oats is considered not an effective method, as it leads to a decrease in meat productivity of chickens by 3.1% due to a decrease in the digestibility of nutrients. There is a decrease in feed costs for producing 1 kg of poultry meat when feeding barley and triticale grain by 2.8-3.9% and an increase in slaughter yield of 1%.

Key words*: bare oats, triticale, chickens, barley.*

INTRODUCTION

In the structure of the diets of poultry, grain feed accounts for 70-75% and most of them are corn and wheat. At the same time, feed production in the Russian Federation is experiencing a significant shortage of feed corn, the deficit of which is covered by imports.

In order to import substitution, it is necessary to study the possibilities of using non-traditional grain feeds of domestic selection in poultry feeding, which can become an alternative to corn (Winkler et al., 2018).

Grains of traditional barley and oats in compound feeds intended for young birds, due to the high content of crude fiber (4.5-9.5%), glucans, pentosans and a low level of metabolic energy, is rarely used. By peeling it is possible to increase their nutritional value, but at the same time, the cost of grain increases (Winkler et al., 2017).

The solution to this problem in poultry can be the use of non-traditional grain feeds: a new variety of barley grain – "Omsk bare-grained 1" and oats – varieties "Tyumen bare-grained 1". The advantage of filmless varieties is a low level of crude fiber (1.6 to 2.8%) and a high protein content (12.3-19.5%). By energy value, they are slightly inferior to corn, but superior to wheat by 3.4% and film varieties of barley, oats by 10-14.2% (Jacob, 2012).

Of practical interest for poultry farming may be the triticale grain, which is characterized by a high level of crude protein (13-18%) and metabolic energy (285 kcal/100 g), lysine and contains much less growth inhibitors than rye. Therefore, triticale and bare-grained varieties of crops are promising feed for poultry that would reduce the cost of feed by reducing the proportion of corn and high-protein feed.

An undesirable aspect of the use of non-traditional grains feed in poultry farming is the presence of anti-nutritional substances in them, albeit in a limited amount. Therefore, their effective use is possible only when using a wide range of enzyme preparations in animal feed (Alagawany et al., 2018). In the scientific literature there is a limited amount of information on the use of the studied crops, and the results obtained on the effectiveness of their use are contradictory and require further research, especially on the norms for introducing grain into compound feed intended for poultry farming.

MATERIALS AND METHODS

The experiment was carried out in the vivarium of the Penza State Agrarian University (Penza, Russia) on broiler chickens of the cross "ROSS-508" aged 15 to 38 days. The risk of death at day old due to the presence of small amounts of anti-

nutritional factors prompted us to conduct an experiment on older chickens. For the experiment, four groups of chickens were formed with 40 animals each, analogues in live weight.

In the control group, the chickens received loose feed, in which the corn grain content was 30%. In the composition of compound feeds intended for chickens of the first, second and third experimental groups, instead of 30% of the corn grains in the control group, they included a similar amount of bare-grain barley and oats and, accordingly, triticale grains ("Ukro" variety). The norm for introducing bare grain varieties of grain and triticale into mixed feeds for broiler chickens was taken on the basis of published data.

Due to the high crude protein content in the studied unconventional feed compared with corn, to obtain isoprotein feed at the level of 21%, in the experimental groups increased the rate of input of wheat and reduced the content of sunflower meal.

The required protein level in compound feeds was achieved by introducing high-protein feeds such as full-fat soybean, sunflower meal, peas and protein-vitamin-mineral concentrate (bio supplement "WAFI"). This bio supplement with 49% protein content included: soybean meal, fish meal, minerals, vitamins, enzyme complex (Roxazim G2), phytase (Ronozim 5000) and antioxidants.

The studied compound feeds were completely taking into account the norms for introducing individual feeds into the composition of the compound feed and taking into account the periods of growth of the chickens were balanced according to the main nutrients.

Chickens of both groups were in the same conditions of floor keeping on a litter with free access to water and feed. Watering was carried out using group drinking bowls, and feeding - from group feeders.

To study the effect of different types of grain on digestibility and the use of nutrients of compound feed, a balance experiment was carried out at the end of fattening at the age of 35 days on five broilers of the same mass from each group. In the balance experiment for 5 days, the amount of feed consumed, the amount of excreted litter were taken into account, the digestibility of dry substances was determined.

The protein content in compound feeds, litter was determined by the Kjeldahl-method and protein digestibility was found. At the end of the balance experiment at the age of 38 days, a control slaughter of chickens of 10 goals from each group was performed.

RESULTS AND DISCUSSIONS

In the conducted studies, it was found that when weighing chickens at the age of 28 days, the largest live weight and, correspondingly, high growth rates were found in young animals of the first and third experimental groups when glazed barley and triticale were included in the feed (Table 1).

Moreover, the average daily gain in live weight in broiler chickens in these groups was 68.9 and 69.5 g, which was higher by 4.8 and 5.8% ($P < 0.001$) than in the control and 7.2– 8.5% higher compared to the second experimental group.

In the final period of fattening at the age of 28 to 38 days, in general, the best results were also preserved in the first and third experimental group.

Thus, the live weight of chickens when feeding grain of barley and triticale at the end of the experiment averaged 2185 and 2190 g, which was 6.3 and 6.6% higher compared to control and 9.0-9.3% compared to the use of grain of black oats in mixed fodders .

On average, during the experiment, equally high average daily gain in live weight of 75 g was obtained in the first and third experimental groups, which was 7.4-7.8% higher compared to the control and 11% respectively higher than in the second experimental group.

Table 1. The dynamics of the growth rate of chickens

Indicator	Group			
	Control	1 experimental	2 experimental	3 experimental
Live weight, aged, g: 15 days	452±5.6	455±4.3	448±4.9	457±4.8
28 days in% of control daily average gain, g in% of control	1306±1.1 100 65.7±0.65 100	1351±9.6* 103,4 68.9±0.71* 104.8	1281±13.6 98.0 64.1±0.84 97.6	1361±9.6* 104.2 69.5±0.71* 105.8
38 days in% of control daily average gain, g in% of control	2056±18.2 100 74.9±0.72 100	2185±18.1* 106.3 83.4±0.82* 111.3	2001±19.0 97.3 72.0±0.91 96.1	2190±19.0* 106.6 82.9±0.82* 111.1
During the experiment: absolute gain, g daily average gain, g in% of control	 1603±12.2 70.0±0.89 100	 1730±15.2* 75.2±0.98* 107.4	 1553±18.8 67.5±1.08 96.9	 1733±14.6* 75.3±0.98* 107.8

Note: * - P <0.001 to the control and the second experimental group.

The results of our research are partly consistent with the data of other scientists. In particular, it was found that enrichment of compound feeds with the enzyme preparation "Rovabio" (50 g/t) allows increasing the rate of entry of bare-barley from 10-15 to 25-35%, which contributes to an increase in live weight of chickens by 2.5-4.5% and to reduce feed costs per 1 kg of growth by 1.8-3.6%.

The inclusion of "Roxazim G2" enzyme preparation in mixed feeds with different levels of wheat replacement on triticale from 10 to 25% contributed to an increase in digestibility and assimilation of nutrients of mixed feeds, which led to an increase in meat productivity of chickens.

In our studies, the best results were obtained with a 30% introduction of triticale grains into compound feeds, which is probably due to the presence of a modern enzyme preparation (Roxazim G2, Ronozim 5000) in the highly mentioned Bio Supplement, which has a wide spectrum of action, a high level of enzymatic

activity and, in addition, phytases (Ronozyme 5000), as well as the use of a spring grain variety in the experiment.

As a rule, winter varieties of triticale grains, unlike spring ones, contain more anti-nutritional substances in the form of non-starch polysaccharides, which have a negative effect on the physiology of birds, whose effect is reduced due to the use of enzyme preparations and their use in poultry farming is economically justified even against the background of traditional feeds. In the literature, there is information about obtaining positive results on the use of golden oats against the background of enzyme preparations in the diets of laying hens and goslings-broilers in an amount of 20 to 50% (Alagawany et al., 2018).

Ambiguous results were obtained in studies on the glaze of oats in poultry feeding, which is apparently associated with the use of various grades of grain that differ in different nutritional values and, above all, in the content of Non-Starch Polysaccharides (NSPs).

In the experiments conducted by Belarus researchers, it was found that the inclusion of broiler chickens by the growth periods (start, growth and finish): 10, 20 and 30% of the glazed oats of the Vandrovnik variety allows increasing the live weight of young animals at the end of feeding by 3, 5% (Yanochkin, 2016). Nevertheless we did not obtain positive results on the use of bare-grain varieties of oats in poultry feeding.

The problem was that the studied grains of film-free varieties of oats was soft in structure, which indicated a high NSPs content and, during crushing on sieves with a diameter of 5 mm or more, the grain turned into flour. When receiving the powder of the powdery fraction, the primary task is to ensure a granular and homogeneous structure, which can be achieved by granulating the food.

However, the high content of NSPs worsens the granulation process and leads to the disintegration of the granules, which requires additional costs associated with the introduction

of fixing granules. In turn, friable compound feed with a powdery consistency leads to an increase in feed viscosity, sticking of the beak, and the formation of a hard-to-digest sticky mass in the goiter and stomach, which, in turn, reduces appetite and, accordingly, feed intake.

At the same time, the passage of chyme decreases, water consumption increases, the spread of putrefactive microflora in the intestine increases and, as a result, the growth rate of young animals decreases, which could lead to the death of chickens.

Apparently in this regard, in the second experimental group, mortality of bred chickens was observed, where the safety was only 90%, while in the remaining groups this indicator corresponded to 100%. Due to the low content of NSPs, corn is an excellent raw material for the production of animal feed, which is actively used in foreign countries. It has a high energy value due to the high content of starch, but its disadvantage is the low level of crude protein. In a comparative aspect, the quality of grain of bare-grain barley for poultry farming due to its high protein content and low level of NSPs could be considered ideal if anti-nutritional substances were completely absent in it.

Lowering the rate of entry of bare oats in broiler diets using certain enzyme preparations may be more effective than corn.

The indicators of the dynamics of live weight of young animals obtained in our studies indicate that the efficiency of the use of nutrients in broiler chickens from triticale and bare-grained barley for productive purposes was much higher than when using traditional corn and barley oat grain. This is evidenced by the results of the balance experiment, in which it was found that the chickens of the first and third experimental groups consumed dry matter with animal feed 6.9 and 5.1% more than in the control group, and 7.5-5.7% more than in the second experimental group, which accordingly, it was accompanied by an increase in the intake of crude protein with feed (Table 2).

Table 2. Digestibility of solids and protein in the digestive tract of broiler chickens

Indicator	Group			
	Control	1 experimental	2 experimental	3 experimental
Combined feed consumed, g	305.4	326.5	303.7	321.2
Litter highlighted, g	253.2	260.4	263.1	261.4
Solids consumed, g	277.9	298.4	275.0	292.1
Highlighted solids with litter, g	60.9	58.0	66.4	56.1
Digestibility of solids,%	78.1	80.5	75.8	80.8
Crude protein consumed, g	53.1	57.5	52.4	56.2
Highlighted protein with litter, g	9.75	8.62	10.91	8.31
Digestibility of crude protein,%	81.7	85.0	79.2	85.2

At the same time, there was an increase in the total digestibility of nutrients when using barley and triticale as part of the studied feeds, due to an increase in the digestibility of dry substances and crude protein in the digestive tract of chickens by 2.4-2.8 and 3.3-3.5%. The use of bare oats led to a deterioration in the intake and digestibility of nutrients in comparison with the control. High feed consumption led to an increase in feed consumption per head during the experiment in the first and third experimental groups by 5.1 and 3.2% compared with the control and the second experimental group by 5.7-3.8% (Table 3).

Table 3. Feed consumption during the experiment

Indicator	Group			
	Control	1 experimental	2 experimental	3 experimental
Feed consumption per 1 head: during the experiment, total kg	3.52	3.70	3.50	3.65
in % of control	100	105.1	99.4	103.2
including: growth phase	1.51	1.57	1.53	1.55
finish phase	2.01	2.13	1.98	2.1
per 1 head for the entire fattening period, kg	4.02	4.20	4.05	4.15

Feed conversion, kg	1.96	1.92	2.02	1.90
Feed consumption to receive 1 kg of meat, kg	2.81	2.73	2.92	2.70
in % of control	100	97.2	103.9	96.1

Despite this, due to more intensive growth over the entire period of fattening, the highest rates of feed conversion (1.9-1.92 kg) were established in the first and third experimental groups. At the same time, feed consumption per 1 kg of meat when using grain of bare-grain barley and triticale was 2.8 and 3.9% less compared to using corn.

The results of the control slaughter conducted at the end of the feeding showed that due to the higher live weight, the chickens of the first and third experimental groups had, respectively, a high slaughter mass of carcasses (Table 4).

Table 4. The indicator of slaughter chickens

Indicator	Group			
	Control	1 experimental	2 experimental	triticale
Pre-slaughter mass, g	2042±26.3	2180±27.1	2005±30.8	2187±29.7
Slaughter weight, g	1431±15.6	1549±18.3*	1387±18.8	1557±17.6
Slaughter result, %	70.1	71.0	69.2	71.1

Note: * - P <0.001 to the control and the second experimental group.
Moreover, their slaughter result was higher by 0.9 and 1.0% compared with the control group.

CONCLUSIONS

In our studies, it was found that “Omsk bare-grained 1” and “Ukro” spring triticale grain are a good alternative to traditional corn in broiler chicken feeds and it is advisable to include 30% of the feed mass from 18 days of age until completion fattening.

The use of oats variety “Tyumen bare-grained 1” requires further study by determining the optimal input standards with the selection of certain enzyme preparations.

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