The Effect of Using Rice Bran With Enzymes on The Production Performance of Turkey

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Abstract

This study was conducted in the poultry field of the Department of Animal Production at the University of Tikrit, Faculty of Agriculture, and the aim of this study was to know the effect of using rice bran at a rate of (0, 15, 20%) with and without adding a mixture of enzymes containing amylase, protease and cellulose by 0.5 g/kg in turkey rations for a period of 10 weeks, 120 unsexed Bronze turkeys were used. The birds were distributed into six treatments, each treatment included four replicates (cage) five birds. The results showed a significant superiority (P ≤ 0.05). For the second treatment (0% rice bran + 0.5 g/kg mixture of enzymes) in live body weight, weight gain, feed conversion efficiency, while it was significantly (P ≤ 0.05) superior to the sixth treatment (20% rice bran + 0.5 g/kg mixture of enzymes) In feed consumption compared to the third treatment, and there were no deaths in any of the study treatments throughout the experiment period.

Keywords: Turkey, Enzymes, Rice bran.

1. Introduction

Poultry farmers are now interested in using cheap source of agro industrial byproducts as an ingredient of poultry feed to reduce the feed cost. Most of the agro industrial byproducts have some limitations such as high indigestible fiber which hinders their uses [1]. Rice bran is one of the available and cheap feed ingredient containing anti-nutritional [2], complex fibrous materials and in case of monogastric animal like broiler limit its inclusion level [3], as this anti-nutritional factors affects the digestibility of feed [4], nutrient availability to the birds [3]. Protein sources from cereals are used in poultry diets, usually in order to reduce feeding costs. However, their efficient use in poultry diets is limited by the level of fiber whose compounds are resistant to digestion in the small intestine; due to this sugars are not digested by endogenous poultry enzymes[5], the presence of phytic acid [6], which binds minerals, phosphorus, and proteins in the digestive tract, resulting in a reduced availability of minerals and protein, and low nutrient absorption from the feed. The binding capacity of phytic acids leads to low viability of minerals and protein, and cause low absorption of nutrient from the feed. In addition, low nutrient absorption can cause environmental pollution, especially with phosphorus in feces [7]. Poultry is an imperative domesticated livestock species that provides high quality protein and micronutrients as meat and eggs and in poultry production, feed is the single major input constituting 70-75% of total production cost [8]. The aim of this study is to know the effect of using rice bran with and without adding enzymes such as amylase, cellulose and protease on the productive performance of turkey.

2. Materials and Methods

This study was conducted in the poultry field of the Department of Animal Production, College of Agriculture, Tikrit University, the objective of the experiment was to study the effect of adding three levels of rice bran (0, 15, 20%) with and without enzymes 0.5 g/kg of feed for a period of 10 weeks. The productive traits (live body weight, feed consumption, weight gain, feed conversion ratio) were studied. 120 unsexed Bronze turkeys were used. The birds were distributed into six treatments, each treatment included four replicates (cage) five birds, the average weight of the birds at the beginning of the experiment was 1180 g, starting from 28 days of age of the birds, the treatments were the following:

T1: control transaction without any addition
T2: Add enzymes 0.5 g/kg feed
T3: contains 15% rice bran.
T4: Rice bran contains 15% with enzymes, 0.5 g/kg of feed.
T5: contains 20% of rice bran.
T6: Rice bran contains 20% with enzymes 0.5 g/kg of feed.
2.1 Management of turkeys during the experiment

The birds were housed in a field of dimensions (60 m long * 8 m wide * 2.5 m high). The birds were placed in ground cages made of iron, with dimensions (2 * 2 * 2) m. The floor of the cages was laid with sawdust with a thickness of 10 cm. Water and fodder (Ad-Libitum) were introduced and the lighting was continuous.

The rice bran was brought from one of the specialized laboratories for rice production in Najaf Governorate. The rice cultivar was chemically analyzed in a laboratory at the College of Agriculture - Tikrit University as in the table below.

Use the commercial product LABAZYME supplied by New Pharm, which contains enzymes and is supported by the following beneficial bacteria: Protease (2.750 Colony starch unit CSU), Amylase (5.500 Starch laysis unit SLU) and Cellulase (27.5 Filter Paper Unit FPU).

**Table 1.** Chemical analysis for raw rice bran.

| Material     | Chemical ratio (%) |
|--------------|--------------------|
| Protein      | 13                 |
| Fat          | 6.9                |
| Ether extract| 15                 |
| Fiber        | 6.2                |
| Ash          | 7.3                |
| Energy       | 3100 kcal/kg       |

**Table 2.** Components of turkey rations with chemical composition.

| Feed staff                   | Starter(4-6w) | Grower(6-10w) | Finisher(10-14w) |
|------------------------------|---------------|---------------|------------------|
|                              | T1 T2 T3 T4 T5 | T6 T1 T2 T3 T4 T5 T6 T1 T2 T3 T4 T5 T6 | T1 T2 T3 T4 T5 |
| Yellow Corn                  | 40 25.7 20.97 45.8 31.85 | 27.25 58.6 44.9 40.4 | |
| soybean meal (48%)           | 46.6 45.2 44.7 41.3 39.83 | 39.3 26.7 25 24.4 | |
| Rice bran                    | 0 15 20 0 15 20 | 0 15 20 0 15 20 | |
| protein concentrate          | 5 5 5 5 5 5 | 5 5 5 5 5 5 | |
| permex                       | 3.1 3.2 4.03 2.7 3.02 3.15 | 4.4 4.8 4.9 | |
| sunflower oil                | 2.5 2.5 2.5 2.5 2.5 2.5 | 2.5 2.5 2.5 | |
| Calcium carbonate            | 1.5 1.5 1.5 1.5 1.5 | 1.5 1.5 1.5 | |
| Dicalcium Phosphate          | 1 1 1 1 1 1 | 1 1 1 1 | |
| Salt                         | 0.3 0.3 0.3 0.3 0.3 | 0.3 0.3 0.3 | |
| Total %                      | 100 100 100 100 100 | 100 100 100 100 | 100 100 100 |
| ME, kcal/kg                  | 28.01 28 28 26 26 | 26 20 20 20 | |
| Crude protein (%)            | 2880.79 2880.58 2880.62 2900 2900 | 2900 3135 3135 3135 | |
| Methionine (%)               | 0.69 0.69 0.69 0.69 0.69 | 0.69 0.69 0.69 | 0.69 0.69 0.69 |
| Lysine (%)                   | 1.55 1.56 1.56 1.42 1.43 | 1.43 1.43 1.06 | 1.06 1.06 1.06 |
| Crude fiber (%)              | 4.31 5.39 5.75 0.67 0.67 | 0.67 0.67 0.60 | 0.60 0.60 0.60 |
| Methionine + cysteine (%)    | 1.09 1.07 1.06 1.05 1.02 | 1.02 0.90 0.88 | 0.87 0.87 0.87 |
| Calcium (%)                  | 1.57 1.57 1.57 1.56 1.56 | 1.56 1.52 1.52 | 1.52 1.52 1.52 |
| phosphorous available (%)    | 0.87 0.88 0.88 0.86 0.87 | 0.87 0.83 0.84 | 0.84 0.84 0.84 |

* use the wafi protein concentrate (Dutch origin), which contains 40% crude protein, 2118.13 kcal/kg, 5% crude fat, 3.85% lysine, 3.70% methionine, 4.11 methionine + cysteine, 3.00% calcium, and 5.83% 5.38 phosphorous available.

** use mixtures of vitamins and minerals produced by Bromix of Dutch origin, containing 10% crude protein, 753.82 kcal/kg, 2.14% crude fat, 20.08% calcium, 10.83% available phosphorous, 1.60% lysine, 6% methionine, and 6.06% Methionine + cysteine.

*** Chemical composition of the rice cultivar Table (1)

**** The values of the chemical composition of the feed materials included in the diet were calculated according to NRC [12].

3. Results

Table (3) shows the effect of using rice bran at levels (0, 15, 20%) with and without adding enzymes by 0.5 g/kg to turkey diets on live body weight for the six experimental treatments. The results in the fourth and fifth periods showed a significant increase (P≤0.05) for the second treatment (only the enzyme mixture was added to it) on all treatments of the experiment.

Also in the table (4) which shows the data of the weight gain, we note the results for the total period (28-98) days, a significant increase (P ≤ 0.05) for the second treatment over all the experiment treatments.
We found feed consumption (g/bird/14 days) in Table 5 a significant increase (P ≤ 0.05) for the sixth treatment (20% bran + 0.5 g/kg enzymes) compared to the third treatment (15% bran), and there were no significant differences between The sixth and the first, second, fourth and fifth transactions. Feed conversion ratio We notice a significant improvement (P ≤ 0.05) for the second treatment. 2.70 on all the treatments of the control, third, fourth, fifth and sixth experiment Table 6.

**Table 3.** Effect of using rice bran and adding enzymes on the live body weight of turkeys (gm/bird/14 days) (mean ± standard error).

| Treatments | age / day | 28-42 | 42-56 | 56-70 | 70-84 | 84-98 |
|------------|-----------|-------|-------|-------|-------|-------|
| T1         | 1794.00±21.26 | 2468.00±72.92 | 3069.00±11.23 | 3701.00±41.03 | 4544.00±82.17 |
| T2         | 46.85±1823.00 | 67.25±2471.00 | 3291.00±6.40 | 3949.00±17.15 | 4891.00±46.34 |
| T3         | 1786.95±30.31 | 2411.00±63.77 | 3150±60.27 | 3615.00±102.42 | 4316.00±127.96 |
| T4         | 1755.00±54.19 | 2409.00±91.74 | 2989.00±75.56 | 3599.00±90.07 | 4360.00±129.60 |
| T5         | 1794.00±57.70 | 2471.00±88.60 | 3112.00±64.27 | 3591.00±67.65 | 4390.00±88.12 |
| T6         | 1836.00±23.72 | 2532.00±40.13 | 3118.00±37.29 | 3728.00±42.48 | 4575.00±85.39 |

*Different letters within the same column indicate the presence of significant differences at the level of probability (P ≤ 0.05).

**Table 4.** Effect of using rice bran and adding enzymes on turkey weight gain (gm/bird/14 days) (mean ± standard error).

| Treatments | age / day | 28-42 | 42-56 | 56-70 | 70-84 | 84-98 | 28-98 |
|------------|-----------|-------|-------|-------|-------|-------|-------|
| T1         | 1382.00±114.37 | 1903.00±104.13 | 1807.00±43.43 | 2354.00±211.46 | 3055.00±113.55 | 10501.00±384.00 |
| T2         | 1393.00±75.65 | 2009.00±149.76 | 1587.00±117.26 | 2116.00±16.67 | 2892.00±0271.57 | 9997.00±621.55 |
| T3         | 1227.00±84.10 | 1830.00±51.34 | 1741.00±54.63 | 1786.00±325.67 | 3034.00±36.53 | 9618.00±327.84 |
| T4         | 1306.00±59.16 | 1949.00±98.67 | 1789.00±99.09 | 2171.00±148.03 | 3095.00±95.08 | 10310.00±366.52 |
| T5         | 1466.00±94.56 | 2071.00±89.35 | 1991.00±313.73 | 2052.00±169.69 | 3145.00±156.07 | 10725.00±149.99 |
| T6         | 1618.00±130.68 | 2235.00±112.30 | 1933.00±97.23 | 2215.10±212.87 | 3335.00±133.00 | 11336.10±507.18 |

*Different letters within the same column indicate the presence of significant differences at the level of probability (P ≤ 0.05).
The digestive system of poultry produces enzymes that help digest nutrients. However, birds do not have enough enzymes to fully digest fiber and need some commercial exogenous enzymes in the diet to improve digestion. The enzyme is a biocatalyst consisting of proteins, amino acids, minerals and vitamins. The advantages of using commercial enzymes in poultry feed include improved production performance and feed utilization and reduced environmental pollution due to lower nutrients from manure [9]. The superiority of the second treatment (adding a mixture of protease, Amylase, and Cullulose enzymes at a rate of (0.5 g/kg) in live weight may be due to the higher nutritional value of maize and the low content of fiber, and this reflected positively on the average live body weight, while it may be due to the decrease in the body weight rate. Live in transaction birds to which rice bran was added as an alternative to corn by 15 and 25 percent due to the high percentage of fiber in it, especially when 25 percent of yellow corn was replaced with rice bran, which led to an increase in the size of the physical diet without an increase in the nutritional value necessary for growth and production [10].

It is necessary to add enzymes in poultry rations in order to obtain the optimal use of nutrients from complex feeds. The addition of Amylase enzyme improved body weight and food conversion efficiency when added to rations containing newly harvested yellow corn. This may be due to increased digestion of starch in the channel. Upper alimentary tract and increased energy use of forage [11]. The use of the enzymes Amylase and xylanase caused a high level of reduced sugar concentration in the feed to which the two enzymes were added and decreased the sugar concentration at the end of digestion [13]. Animal use of nutrients is affected by enzyme type and physical and chemical properties of feed ingredients such as protease and phytase that target fiber and carbohydrates in the poultry digestive system [14]. Addition of a mixture (α-amylase, β-glucanase, xylanase) significantly improved the digestibility of all amino acids of maize and soybean meal [15]. According to these reasons, the significant increase may be due to the second treatment (adding enzymes by 0.5 g/kg) compared to the rest of the experimental treatments. The reason for the low efficiency of treatments to which rice bran was added by (15, 20%) may be due to the rice bran containing phytate, which is an anti-nutritional in poultry diets [16]. That the presence of phytate in poultry diet negatively affects protein and energy utilization in poultry [17]. Also, the high fat content in rice bran may be a reason for lowering the feed conversion ratio compared to defatted rice bran, although there was no significant difference in growth performance during the starting period [18 20].

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