ARTICLE / INVESTIGACIÓN

The impact of a fermented diet including Iraqi probiotics on a few productive characteristics in Chinese ducks

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Abstract: This study was conducted in a private field for duck breeding in Al-Muthanna Governorate from 12/14/2021 to 02/14/2022. A total of 125 one-day-old chicks were reared from Pekingese ducks, with an average weight of 42 g; ducklings were prepared from local markets in Al-Diwaniah Governorate, and chicks were reared at a semi-enclosed hall with dimensions of 25 × 10 m. Chicks were randomly distributed into five treatments; each treatment was three replicates (10 chicks/replicate), placed in 15 Pens, and the area of one pen was 1.5 × 1 m. The experiment treatments were as follows: the control treatment (T1) and other treatments used feed fermentation with Iraqi probiotics Vs. dry feed 25%+75%, 50%+50%, 75%+25% and 100%+0%, for treatments T2, T3, T4 and T5 respectively. The results indicated a significant improvement in the average live body weight, weight gain, feed consumption and feed conversion factor for ducks fed by fermentation with the Iraqi probiotics compared to the control treatment at 4 and 8 weeks of the bird's age.

Key words: Feed fermentation, Iraqi probiotics on, productive traits, Chinese ducks

Introduction

As a result of the large gap that occurred in the production of eggs and meat for poultry and the increasing population growth, this was accompanied by changes in the cultural, health and economic levels, as well as a change in social tradition and the increase in the price of red meat[1]. Evolution of poultry breeds, including ducks, such as growth rate, weight gain, and food conversion efficiency, which increased its nutritional, administrative and health requirements[2]. Poultry farming, including ducks, is based, it has three main pillars: breed, management and nutrition, nutrition is one of the essential pillars in establishing poultry projects, including ducks, because it constitutes about 60-70% of the costs of installing poultry projects[3]. Nutritionists have turned to improve the nutritional value of the feed, including microbial, physical, and chemical properties, reflected positively on the digestive efficiency and absorption of the meal, giving a noticeable rise in egg and meat products[1].

One of the techniques that increase the readiness of nutrients for feed intake by birds is heat treatment, such as roasting some of the feed materials or soaking with water, such as moisturizing the feed or fermenting the feed in the presence of fortifiers. The fermentation process of fodder with beneficial microorganisms while providing the appropriate conditions to complete the fermentation process will benefit by increasing the production of organic acids and reducing pathogenic bacteria such as *E. coli* and salmonella because they cannot tolerate acidic medium[4,5].

Increased levels of the protease enzymes lipase and amylase, which digest nutrients like proteins, carbohydrates and fats, ease of absorption, reflect positively on the productive performance of ducks, as well as breaking the large bonds of complex food, like high-fiber feed, to smaller units that are easy to digest and absorb by the bird. Fermentation increases the readiness of some elements, calcium phosphorous found in grains such as barley and wheat. The birds do not benefit from more than one-third of the phosphorous present in the grains. They lack phytase enzyme in the digestive system, which was secreted from the beneficial microorganisms used in the fermentation process[6]. The fermentation process is carried out in aerobic and anaerobic fermentation[7].

The beneficial bacteria used in forage fermentation are anaerobic; feeding poultry, including ducks, on fermented feed, whether wholly or partially, will enhance the nutritional value of the feed eaten by ducks, specifically the use of alternative feeds, which are characterized by low protein[8]. The fermentation process directs beneficial microorganisms and their enzymes to a qualitative improvement of this feed, as well as attractions for ducks, like the flavor and palatability desired by ducks, which reflects on growth, final weight and egg production with improved health[9].

The current study aims to show the effect of fermentation feed with Iraqi probiotics on some productive traits of Chinese ducks.

Materials and methods

This study was conducted in the poultry field of the Department of Animal Production, Agriculture College, Al-Muthanna University, from 7/12/2021 to 1/2/2022. The field experiment was included to study the effect of the Iraqi probiotics on some productive traits of Chinese ducks.

A total of 75 unsexed, one-day Chinese duck chicks were used, prepared from one of the incubators in Al-Qadisiyah Governorate, were randomly distributed to 4 treat-

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ments, and each treatment included three replicates (5 chicks each replicate); the treatments were as follows:

T1: First treatment: control (dry diet).

T2: Second treatment: 25% Iraqi fermented feed + 75% dry feed.

T3: Third treatment: 50% fermented feed with Iraqi probiotic + 50% dry feed.

T4: Fourth treatment: 75% fermented feed with Iraqi probiotic + 25% dry feed.

T5: Fifth treatment: 100% fermented feed with Iraqi probiotic + 0% dry feed.

The chicks were reared on the floor in a particular room for raising ducks; it provided all the conditions for breeding ducks. The hall has been divided into 12 pens with dimensions of 200 cm x 125 cm per pen.

Feed materials that were used in the experiment (Table 1) were brought from local markets in Al-Muthanna Governorate. The birds were fed according to the requirements of the Chinese ducks for the starter and growth periods; as for the Iraqi probiotics, it was brought from Baghdad Governorate and added to the feed according to the levels of added experience.

Studied traits

Body weight

Live body weight when marketing is an essential economic criterion in judging the productive performance of Chinese ducks. The live body weight of the birds was calculated by weighing all the chicks from each replicate on the first day of life, at the end of every two weeks during the 8-week trial period.

Weight gain

The weight gain of the birds was calculated every two weeks according to the following equation:

Weight gain (gm) = live body weight at the end of the period (gm) - live body weight at the beginning of the period (gm).

Feed intake

A good diet is that feed that is high in nutritional value and that achieves the best economic return; feed consumption for birds has been calculated by weighing the remaining amount of feed at the end of each week and subtracting it

Items	Starter 0-4 weeks	Grower 5-8 weeks
Maize	48.00	52.00
Wheat	20.00	18.00
Soybean meal	25.00	12.00
Protein concentrate	5.00	5.00
Limestone	1.00	1.00
Dicalcium Phosphate	0.50	1.00
Premix	0.25	0.25
Salt	0.25	0.25
Beans	-	9.00
Vegetable oil	-	1.50
Total	100.00	100.00
Chemical analysis		
Crude protein (%)	20.00	16.53
Metabolize energy (Kcal/ kg diet)	2903	3031
Fat (%)	2.57	2.72
Fiber (%)	3.38	3.19
Calcium (%)	0.78	0.98
Available phosphorus	0.35	0.43
Lysine (%)	1.60	0.85
Methionine + Cysteine (%)	0.70	0.61

Table 1. Chemical analysis of the basal diet used in the starter and grower periods with chemical analysis.

from the total amount provided at the beginning of the week.

Feed conversion

It was defined as the amount of feed consumed to produce one unit of body weight; breeding birds is represented in the birds' high ability to convert the consumed feed materials into foodstuffs that benefit humans. The feed conversion factor for birds was calculated as shown in the following equation:

Feed conversion factor = the average amount of feed consumed in a certain period (gm) / the average weight gain during the same period (gm)

Complete random design (CRD) was used to study different treatments' effects on the traits studied. The significant differences between the means were compared with the Duncan[10] multiple range test under the significance level of 0.05. The program SPSS[11] was used in the statistical analysis.

Results

Body weight

Table 2 shows the effect of fermented feed with the Iraqi probiotic on body weight (gm) for ducks, a significant increase (P≤0.05) in the mean live weight of ducks at 4 weeks of age for treatments T3, T4 and T5 compared to the control treatment. There are no significant differences between the treatments T3, T4 and T5, and treatments T1 and T2; this significant rise continued in the fermentation of feed with the Iraqi probiotics, compared to the control treatment, as for the general average of live body weight, it reached 1318, 1407, 1465, 1525 and 1554 gm, for treatments T1, T2, T3, T4 and T5 respectively.

Weight gain

Table 3 shows the effect of fermented feed with Iraqi probiotic feed on the rate of weight gain of Chinese ducks; a significant increase in the rate of weight gain for all treatments of fermentation of fodder with the Iraqi probiotic compared to the control treatment at the age of 4 weeks, the same significant effect was also observed at the age of 8 weeks, as well as in the rate of total weight gain.

Feed intake

Table 4 shows the effect of the Iraqi fodder fermented with the probiotic in the ration on feed consumption (g), a significant increase in treatments T3, T4 and T5 compared to treatments T1 and T2 at 4 weeks of age, as for the eighth week. The total feed consumption of the birds showed a significant increase for the T4 and T5 treatment compared to the rest of the treatments.

Feed conversion factor

Table 5 shows the effect of fermented fodder with Iraqi probiotics in the diet on the feed conversion factor; significant improvement in the feed conversion factor in treatments T4 and T5 compared to the rest of the treatments in the experiment; there were no significant differences between treatments T3, T4 and T5 and treatments T2 and T3 at the fourth week of life, as for the eighth week of the birds' life, a significant improvement was observed for all of the forage fermentation treatments with the Iraqi probiotic

Treatment	Age		
	1 day	4 weeks	8 weeks
T1	41.8	625 b	1318 b
T2	42.7	684 ab	1407 a
T3	42.5	715 a	1465 a
T4	42.3	726 a	1525 a
T5	41.9	737 a	1554 a
Sig.	N.S	0.05	0.05

Table 2. The effect of fermented feed with the Iraqi probiotic on body weight (gm) for ducks.

Treatment	Age		Total
	4 weeks	8 weeks	
T1	583.2 b	693 b	1276.2 b
T2	641.3 a	723 ab	1364.3 ab
T3	672.5 a	750 a	1422.5 a
T4	683.7 a	799 a	1482.7 a
T5	695.1 a	817 a	1512.1 a
Sig.	0.05	0.05	0.05

Table 3. The effect of fermented feed with the Iraqi probiotic on weight gain (gm) for ducks.

Treatment	Age		Total
	4 weeks	8 weeks	
T1	1755.43 a	3069.99 b	4828.43 b
T2	1693.03 b	2978.76 c	4671.79 c
T3	1741.77 a	3052.50 b	4794.27 b
T4	1743.43 a	3203.99 a	4947.42 a
T5	1751.65 a	3227.15 a	4978.80 a
Sig.	0.05	0.05	0.05

Table 4. The effect of fermented feed with the Iraqi probiotic on feed intake (gm) for ducks.

compared to the control treatment no significant differences between treatments T4 and T5 and treatments T2, T3 and T4 at the same age, as for the total weight gain, a significant improvement was observed in favor of treatments T3, T4 and T5 compared to the control treatment.

Discussion

The results showed the effect of fermented feed with Iraqi probiotic feed on the rate of weight gain of Chinese ducks; this is agreed with (12) who noticed a significant increase in the average body weight of groups of birds that took fermented feed with Iraqi probiotics, it may be attributed to the fermentation process that directs the microorganisms to make the gut environment acidic, negatively affects the pathogenic bacteria, as well as increasing the secretion of digestive enzymes, which help in the process of digestion and absorption, which increases growth rate and body weight. The significant increase in feed consumption may be due to the increase in the surface area of the alimentary canal as a result of the high length of the villi and the depth of the crypts, as well as increasing the palatability of the feed as a result of the fermentation process with a probiotics[13]. Furthermore, the significant improvement may be due to an increase in the rate of digestion in the alimentary canal, thus, increasing digestive efficiency, which increases the growth rate, reflected in the feed conversion factor in all feed fermentation treatments compared to the control treatment[14].

Conclusions

The results indicated a significant improvement in the average live body weight, weight gain, feed consumption and feed conversion factor for ducks fed by fermentation with the Iraqi probiotics compared to the control treatment at the age of 4 and 8 weeks of the bird's age.

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Treatment	Age		Total
	4 weeks	8 weeks	
T1	3.01 c	4.43 c	3.78 c
T2	2.64 b	4.12 b	3.42 b
T3	2.59 ab	4.07 b	3.37 ab
T4	2.55 a	4.01 ab	3.33 a
T5	2.52 a	3.95 a	3.29 a
Sig.	0.05	0.05	0.05

Table 5. The effect of fermented feed with the Iraqi probiotic on feed conversion (gm feed intake/ gm weight gain) for ducks.

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