

EFFECT OF DIFFERENT LEVELS OF SOAKED-WATER BARLEY AND FABA BEAN (MINOR) AS A PARTIAL SUBSTITUTE FOR MAIZE AND SOYBEANS IN GROWTH AND PRODUCTION OF QUAIL'S DIETS

Samir Hameed Majeed

Firas Khalil Ibrahim

Malik Mohamad Shukri

Salim thanon younis

Nenavah Research Department – Office of Agricultural Research

Email: firmas_kahlil@yahoo.com

ABSTRACT

The study was carried out in the Poultry farms/ Nineveh Research Department, by using 756 unsexed quail birds two weeks aged, distributed into nine experimental treatments with 3 replicates per treatment, each contained 28 birds, primary live weight 63.8 g, birds were fed on growth and production diets depending on growth stage. Results showed a significant improvement ($P \leq 0.05$) for soaked-water barley (SWB) treatments 10% and 20% on weight gain g/ bird (WG) and feed conversion ratio (FCR), FCR g food/g egg, egg production% for first four weeks of production, hatching% from total eggs for the first four, second and third weeks of production. Mathematical difference showed for the rest of the traits. The levels of Faba Bean (FB) FB minor 10% and 20% had a negative and significant effect ($P \leq 0.05$) on the WG and FCR at 3-5 weeks age, FCR for the first four weeks of production and egg production %, a positive improvement ($P \leq 0.05$) for FCR and egg production% for third four weeks of production.

Key words: soaked water barley, Faba bean (minor), quail production

Received:18/2/2019, Accepted: 3/9/2019

INTRODUCTION

Quail has characteristics that make it preferred among breeding animals due to its small size, rapid growth, resistance to many common broiler chickens diseases, high meat quality, high product prices, low nutrition and treatment costs, and rapid return of capital, so it is currently being raised in many countries (Mortazavi and Afsharmanesh, 2017). Nutrition is the largest part of total costs in poultry industry, so early thought of finding alternatives to feed, especially protein sources and lowest costs without causing any negative effects in production performance of birds (Abdel-Abbas and Al-Majma'i, 2007).

Barley (*Hordeum vulgare*) is a source of energy with limited used in poultry feed because it contains a high proportion of non-starch polysaccharides, especially β -glucan, which reduces feed utilization and thus reduces production (Ahmad, 2011) by reducing the digestibility of starches by blocking digestive enzymes from reaching starch granules during digestion (Senkoylu et al. 2004). Therefore, viscosity increases the gastrointestinal bird's tract and reduces nutrients speed passage and absorption in intestines, thus reducing the consumption of diet (Al-Kaisey et al., 2007), barley is a good alternative to corn in the diets (Kianfar et al., 2013). There are several ways to improve barley nutritional value as soaked in water, which positively affects its nutritional value by increasing the effectiveness

of β -glucanase enzyme and thus reducing the viscosity of barley (Svihus *et al.*, 1997).

Soybeans are important sources of protein in poultry diets but are often very expensive, so researchers have found alternatives to local that can be partially or entirely replaced (Koivunen *et al.*, 2014). Faba bean (*Vicia Faba* Var, Minor) is relatively high in protein (up to 26%), starch (30%) and a good source of lysine, the presence of some anti-nutrient factors (ANF) such as Vicine, Covicine and the low content of sulfuric acid, methionine and cysteine decreasing the use in poultry diets (Abdel-Abbas and Areaaer, 2014; Bosco *et al.*, 2013). Feeding broiler chickens on diets containing SWB resulted a significant effect on final live weight (Ahmad, 2011), similarly, treated barley (fermentation or germination) resulted an improvement in the body weight in quail (Kianfar *et al.*, 2013). Replacing FB minor FB minor (100% soy bean allowance) give insignificant lowest live weight in the 6 week old for broiler (Abdel-Abbas, and Al-Majma'i, 2007). A higher WG was obtained in broiler chickens when feeding on a diet containing SWB compared to other treatments (Ahmed, 2011). Barley treatment by heat resulted an improvement in the weight gain of broiler for 1-7 days age (Garci'a *et al.*, 2008).

The replaced FB minor (100% soy bean substitutes) also resulted an improvement in WG in broiler at 8 weeks age and during the cumulative period 2-8 weeks (Abdel-Abbas and Al-Majma'i, 2007). treated barley increased and improved FC by heating (Garci'a *et al.*, 2008) at 1-7 days broiler age, soaked water (Ahmad, 2011) in broiler, (fermentation or germination) in quail (Kianfar *et al.*, 2013) and germinating (Rasteh *et al.*, 2016) in hens layer, while the use of FB minor 100% substitutes for soybean resulted in lower FC compared with the rest of the treatments (Abdel-Abbas and Al-Mogama'i, 2007), on the other hand there are no significant affected for the use of FB minor in broiler FC (Koivunen *et al.*, 2014).

SWB has a positive and significant effect ($P \leq 0.05$) on this trait (Ahmad, 2011). when treated (fermentation or germination) decreased FCR (Kianfar *et al.*, 2013), increasing germinated barley in diet has improved FCR (Rasteh *et al.*, 2016). FCR was not affected by using minor, neither in broilers at 6 weeks of age (Abdel-Abbas and Al-Mogama'i, 2007) nor in hen layer (Koivunen *et al.*, 2014). Used of germinated barley has a significant increased on EP% in hen layer (Rasteh *et al.*, 2016), While the use of FB minor did not have an effect on same trait (Koivunen *et al.*, 2014).

MATERIALS AND METHODS

The study was carried out in the Poultry farms /Nineveh Research Department, using 756 unsexing quail birds, two weeks age, distributed on nine experimental treatments, 3 replicates /treatment, each containing 28 birds, the initial weight 63.8 g live weight, the experimental growth diets (Table 1) were given at the beginning of third week of age to the end of fifth week, then replaced by the production diets (Table 2).

Barley treatment: black barley use from the local market, soaking in water (2 liters of water : per 1 kg barley) for 24 hours at room temperature,

Table (1): Experimental growth quail diets from third week of age to the end of fifth week.

Treatments Ingredients	1	2	3	4	5	6	7	8	9
	0 SB 0 FB	0 SB 10 FB	0 SB 20 FB	10 SB 0 FB	20 SB 0 FB	10 SB 10 FB	20 SB 20 FB	10 SB 20 FB	20 SB 10 FB
yellow corn	50	50	50	45	40	45	40	45	40
Barley	0	0	0	5.9	11.8	5.9	11.8	5.9	11.8
Wheat	8	8	5.2	7	6.45	6.5	2	4.5	3.5
Soybeans	30	27	24	30	30	27	24	24	27
FB (Minor)	0	4.2	8.4	0	0	4.2	8.4	8.4	4.2
Protein	5	4	5	5	5	4	5	5	5.5
Yeast	2	2	2.5	1.35	1	2	2.3	2	2
Premix	1	1	1	1	1	1	1	1	1
Oil	2	1.8	1.9	2.5	2.75	2.4	3.5	2.2	3
Limestone	2	2	2	2	2	2	2	2	2
Chemical analysis									
M. E.	2903	2910	2916	2904	2902	2918	2900	2911	2916
Crud protein	21	21	21	21	21	21	21	21	21
Energy / Protein	135	138	137	137	137	138	139	137	136

SB=SWB = Soaked Water Barley, FB minor = Faba Bean (Minor).

Then dried using sunlight (Ahmad, 2011) indirect for three days, then grind and use in the composition of the diets, the values of the nutrients were calculated for each treatment. The FB minor that was obtained from Agricultural Crops Division/ Nineveh Research Department, was grinded and used in the composition of diets according to experimental treatments. The ratio of barley and FB minor in treatments were as follows:

- 1st treatment: 0%SWB - 0% FB minor
 2nd treatment: 0%SWB - 10% FB minor ⁽¹⁾.
 3rd treatment: 0%SWB - 20% FB minor ⁽²⁾.
 4th treatment: 10%SWB ⁽³⁾ - 0% FB minor
 5th treatment: 20%SWB ⁽⁴⁾ - 0% FB minor
 6th treatment: 10%SWB - 10% FB minor
 7th treatment: 20%SWB - 20% FB minor
 8th treatment: 10%SWB - 20% FB minor
 9th treatment: 20%SWB - 10% FB minor

⁽¹⁾ Calculated 10% of soy protein, substituted for 4.2% FB minor of the total diet (31.8% crude protein and 2700 kcal representative energy).

⁽²⁾ Calculated 20% of soy protein, substituted for 8.4% FB minor of the total diet (31.8% crude protein and 2700 kcal representative energy).

⁽³⁾ Calculated 20% of the corn energy replaced with barley energy, which represents 11.8% barley of the total bush (10.7% crude protein and 28820 kcal representative energy).

⁽⁴⁾ Calculated 10% of the corn energy replaced with barley energy, which represents 5.9% barley of the total bush (10.7% crude protein and 28820 kcal representative energy)

Birds were sexed and the excess male were isolated. WG / bird, FC and FCR g food /g weight were studied at fifth weeks age. On the other hand food FCR g food/g eggs, EP%, fertilized eggs%, and hatching of total eggs% were studied for the 1st four, 2nd and 3rd weeks of production.

Statistical Analysis: Experimental data was analyzed by factorial Randomized Complete Design (C.R.D) with two factors SWB and FB minor (3×3), to find out the effects of factors and their interactions on the studied traits, the means were compared by using the Duncan test (Al-Rawi and Khalaf Allah, 2000) using statistical program (SAS, 2000).

Table (2): Experimental Production quail diets from the beginning of six week to the end of the experiment.

Treatments Ingredients	1	2	3	4	5	6	7	8	9
	0 SB 0 FB	0 SB 10 FB	0 SB 20 FB	10 SB 0 FB	20 SB 0 FB	10 SB 10 FB	20 SB 20 FB	10 SB 20 FB	20 SB 10 FB
yellow corn	45	45	45	40.5	36	40.5	36	40.5	36
Barley	0	0	0	5.3	10.6	5.3	10.6	5.3	10.6
Wheat bran	6	6	5.5	4.7	5	5	4.4	5	4.5
Wheat	12.75	12	11.3	13.5	12	12	10	11	10
Soybeans	26	23.4	20.8	26	26	23.4	20.8	20.8	23.4
FB	0	3.7	7.4	0	0	3.7	7.4	7.4	3.7
Protein	1.75	3	2.5	2	2	2	2.7	2.5	2.5
Yeast	0.75	0.5	0.7	0.5	0.5	0.5	0.5	0.5	0.5
Premix	1	1	1	1	1	1	1	1	1
cooking oil	4.25	2.9	2.8	3.5	3.9	3.6	3.6	3	4
Limestone	3	3	3	3	3	3	3	3	3.8
Chemical analysis									
M. E.	2899	2903	2901	2913	2908	2925	2914	2896	2904
Crud protein	19	19	19	19	19	19	19	19	19
Energy /Protein	153	150	152	153	152	154	153	152	153

SB=SWB = Soaked Water Barley, FB minor = Faba Bean (Minor).

RESULTS

Results in table (3) showed a significant effect ($P \leq 0.05$) of WSB 10% and 20% 101.20 and 100.54 compression to control treatment 85.80 g/bird. While a significant ($P \leq 0.05$) decreasing WG for FB minor 10% and 20% 98.83 and 88.06 comparing with control 100.47 g/bird. The lowest significant ($P \leq 0.05$) WG for (20%SWB–0% FB minor) interaction 62.34 g / bird, where is the highest WG for (20%SWB–0% FB minor) 102.38g/bird. Generally the increasing in SWB concentration led to significant ($P \leq 0.05$) improving in WG, despite the existence of the FB minor. Table (3) showed no significant differences between the control and SWB treatments 10% and 20% (381.90, 384.14 and 384.79) g / bird, respectively. Also there are no significant differences between control and FB minor 10% and 20%, 380.61, 380.96 and 389.43, respectively, FC increased with the increasing of SWB and FB minor concentration in interaction. SWB treatments have a significant

superior ($P \leq 0.05$) on control, this trail improved by using SWB 3.69 and 3.83 while 4.67 for control. Whereas the FB minor treatments 10% and 20% led to increase FCR value with significant ($P \leq 0.05$) differences with control means (3.68, 3.86 and 4.65). The best interaction results are (10% SWB with 10% and 20% FB minor) which had a significant differences ($P \leq 0.05$) with control treatment.

Table (4) showed a significant improved ($P \leq 0.05$) for SWB treatments 10% and 20% 4.54 and 4.57 compared to control treatment 4.96. whereas 20% FB minor treatment 4.98 had a significant difference ($P \leq 0.05$) with control 4.57. The only significant difference ($P \leq 0.05$) appeared between 0% SWB -20% FB minor 6.03 with other interactions and control 4.72. The reason for the high value of FCR may due to ANF in FB minor, so, the bird will try to meet its dietary requirements by increasing the amount of feed consumed. The 2nd four weeks of egg production, no significant effect appeared for SWB treatments 10% and 20% compared the control treatment, but simple mathematic increase note with the increasing of SWB 3.74 and 3.76 g food / g egg. A significant decrease ($P \leq 0.05$) was found for 20% FB minor treatment. The interaction between SWB and FB minor levels showed a significant differences ($P \leq 0.05$) between (0% SWB – 20% FB minor) which had less mean 3.05 g food/g egg compared with (10% SWB–0% FB minor), (20% SWB –0% FB minor) and control. The results of FCR for the 3rd four weeks of egg production showed in the same table, SWB treatments had no significant affect on this trait, whereas FB minor treatments had a significant improvement ($P \leq 0.05$), the best significant results for interaction was (0% SWB – 20% FB minor) 2.61 g food / g egg compared to the control treatment.

Table (5) showed a significant superior ($P \leq 0.05$) for SWB treatments 10% and 20% to control (63.15%, 62.48% and 55.34%), FB minor had a significant ($P \leq 0.05$) decreased for 20% FB minor treatment 54.97% compared to 10% FB minor and control 61.52% and 64.48% respectively, mathematical improved can note for 10% FB minor to control. There are significant differences and improvement ($P \leq 0.05$) for (10% SWB –0% FB minor) 66.58% and (0% SWB – 10%FB minor) 67.43% compared to control 56.87% on the other hand a significant decreased ($P \leq 0.05$) was found for (0% SWB – 20% FB minor) 41.73% compared to control. Same table showed no significant differences between SWB 10% and 20% and control (81.93, 81.38 and 78.03)% for egg production% in the 2nd four weeks of production, also, FB minor 10% and 20% compared to control (81.37 , 81.16 and 78)% had the same effect. Same results were appeared in interaction that is mean no significant differences appeared between them. At the 3rd four weeks of egg production a significant differences ($P \leq 0.05$) appeared between 20% SWB 91.53% and 10% SWB 81.18% and control 86.48%, as well a significant ($P \leq 0.05$) superior for FB minor treatments 10% (88.03%) and 20% (88.48%) compared to control (82.62%). A significant differences ($P \leq 0.05$) between control and interactions treatments 20% SWB – 10% FB minor and 20% SWB – 20% FB.

No significant differences appeared for SWB, FB minor and their interactions treatments on this trait at 1st four weeks as shown in (table 6) mathematic decreased found with increasing FB minor concentration. At 2nd four weeks of production SWB 20% significant decreased compared to control (91.47% and 95.52%), also no significant differences were shown between FB minor treatments to control, a

mathematic reduced can note with increasing SWB and FB minor concentrations. Only significant differences between 20% SWB – 20% FB minor 88.28% to other interactions and control. 3rd four weeks of production a mathematic improved found with increasing concentration SWB and reduced with increasing FB minor treatments with no significant differences to control treatments. Least significant differences ($P \leq 0.05$) between 10% SWB – 10% FB minor to other interactions and control treatments.

1st four weeks results in table (7) showed a significant increased 10% SWB to control 61.13% and 50.93%, no significant effect for FB minor treatments on this trait but a mathematic reduced appeared with increasing FB minor concentration. The highest significant interaction to control for SWB 20% - 0% FB minor 67.78. At 2nd four weeks of production SWB 10% (85.03%) had a significant differences ($P \leq 0.05$) to SWB 20% (78.60%) and mathematic improved to control treatment (80.72%). The Hatch% reduced with increasing FB minor concentrations with no significant effect, interactions treatments between SWB and FB minor the significant difference ($P \leq 0.05$) was shown between (20% SWB - 20% FB minor) 74.03% and control 86.10%, (10% SWB - 0% FB minor) 86.50% and (10% SWB - 20% FB minor) 86.53%. at 3rd four weeks of production SWB 10% and 20% improved the hatch% 75.28% and 77.97% the significant difference between control and 20% SWB only, FB minor treatments had a negative and insignificant effect on the hatch% which reduced with increasing FB minor concentration compared to control 76.82% , 74.78% and 71.88%. Best results of interaction were 83.18% for (20% SWB - 20% FB minor) which significant superior ($P \leq 0.05$) on control 70.70% and (0% SWB - 20% FB minor) 63.48% which is the least value.

DISCUSSION

Results showed a significant WG for 10% and 20% SWB compared to control, this agree with (Svihus *et al.*, 1997; Abdel-Abbas; and Al-Mogama'i, 2007; Garci'a *et al.*, 2008 and Ahmed, 2011) in broiler, while the use of FB minor resulted in a significant decrease in weight gain which disagree with (Abdel-Abbas and Al-Mogama'i, 2007). Results showed no significant differences between the SWB, 10% and 20% and control, this results agree with (Garci'a *et al.*, 2008 and Ahmed, 2011) in broilers and (Rasteh *et al.*, 2016) in hens. Also, the levels of FB minor 10% and 20% had no significant effect on feed consumed which agree with (Koivunen *et al.*, 2014) in hens, who suggested that the hens needed to consume more feed to meet their nutrient requirements when FB minor is included in the diet. SWB 10% and 20% superior to control this results agree with (Ahmed, 2011 and Kianfar *et al.*, 2013), disagree with (Ratesh *et al.*, 2016). use of FB minor 10% and 20% led to a significant increase in the efficiency of feed conversion compared to control treatment. In addition, the efficiency of feed conversion based on egg production has improved this status by increasing the concentrations of SWB, and this value has improved overall by increasing the concentration of FB. In general, the percentage of eggs production four three production stages were improved significantly and mathematically by using (20%) SWB compared to control treatment. Whereas (20%) FB minor improved this trait at last two of production. Results of the statistical analysis showed increase in this trait using SWB 10% and 20% compared to control treatment for first and third periods only. As for effect of FB, it is noticed that the percentage of egg production is improved by increasing the concentration FB minor for three production periods. %: SWB

(10%) improved the first and second production periods, while in the 3rd period both 10% and 20% SWB improved Hatched%, FB minor 10% and 20% treatments decreased Hatched%. Improving eggs quality of current study agree with (Rasteh *et al.*, 2016) in hen and with (Koivunen *et al.*,2014) for FB minor negative results on eggs quality in hen.

The positive performance of poultry fed diet containing treated barley may be attributed to melting of β -glucan in water, or to activate internal enzymes in the grains that lead to the destruction β -glucan (Jacob and Pescatore, 2012), solubility of β -glucan leads to reducing viscosity. WG, feed consumption and feed conversion have a close relationship with the viscosity which is an important indicator of nutritional value of barley in poultry feed (Svihus *et al.*,1997; Ahmad, 2011 and Kianfar *et al.*,2013). Decreased performance in poultry fed FB minor is due to some antiviral compounds in FB, or may be due to lower amino acid methionine and systeine, Decrease egg production with increase in concentration of FB minor, may be due to containing Vicin compounds erythrocyte hemolysis, or, Vicin compounds may reduce the amount of raw material available to the granules and thus destroy them or destroy the ovaries (Koivunen *et al.*,2014).

Table (3): Effect of SWB and FB minor on weight gain, feed consumed and feed conversion ratio at 3-5 weeks age of quail.

	Weight Gain g / bird				Consumed feed				Feed Conversion Ratio			
	0% SWB	10% SWB	20% SWB	Average FB	0% SWB	10% SWB	20% SWB	Average FB	0% SWB	10% SWB	20% SWB	Average FB
0% FB	97.30 ±0 .57 b	101.3 ±0 .95 a	102,38 ± 1,23 a	100.47 ± 2.51 a	374,50 ± 4,00 b	396.43 ± 15.19 ab	370.90± 17.05 c	380.61± 16.89 a	3,85 ± 0.06b - d	3,56 ± 0.32d	3.62 ± 0.21d	3.68 ± 0.24c
10%FB	97.77 ±1 .03 b	100.90 ± 0.94 a	97.83 ±1 .21 b	98.83 ±1 .81 b	383.37 ± 12.60 bc	384.08 ± 26.76 b	375.43 ± 11.90 bc	380.96 ± 17.15 a	3.92 ± 0.13b c	3.81 ± 0.25b - d	3.84 ± 0.08b	3.86 ± 0.16b
20%FB	62.34 ±2 .57 c	100.43 ± 1.80 a	101.43 ± 1.60 a	880.06 ± 19.09 c	387.80± 4.46 a-c	371.93 ± 3.35 b c	408.58 ± 20.47 a	389.43 ± 19.19 a	6.23 ± 0.29a	3,70 ± 0.06b - d	4,030 ± 0.21 b	4.65 ± 1.18a
Average SWB	85,80 ±1 7.40 b	101.02 ± 1.30 a	100.54 ± 2.38 a		381.90± 9.30 a	384.14 ± 19.25 a	384.97 ± 23.24 a		4.67 ± 1.16 a	3.69 ± 0.24 b	3.83 ± 0.24 b	

The similar or common letters on the averages in the same category mean that there are no significant differences between these averages , according to the Duncan test.

The different letters on the averages within the same character have significant differences ($P \leq 0.05$) among those averages, according to the Duncan test

Table (4): Effect of SWB and FB minor treatments on feed conversion ratio g feed / g egg at 1st, 2nd and 3rd four weeks of production.

	1-4 weeks				5 - 8 weeks				9 – 12 weeks			
	0% SWB	10% SWB	20% SWB	Average FB	0% SWB	10% SWB	20% SWB	Average FB	0% SWB	10% SWB	20% SWB	Average FB
0% FB	4.72 ± 0.04 b	4.41 ± 0.21 b	4.58 ± 0.49 b	4.57 ± 0.31 b	3.79 ± 0.18 a-c	3.87 ± 0.50 a-c	4.27 ± 0.54 a	3.98 ± 0.45 a	3.21 ± 0.08 a-c	3.56 ± 0.28 a	3.30 ± 0.27 ab	3.36 ± 0.26 a
10%FB	4.13 ± 0.29 b	4.67 ± 0.38 b	4.73 ± 0.52 b	4.51 ± 0.46 b	3.48 ± 0.30 b-d	3.99 ± 0.25 ab	3.58 ± 0.38 bcd	3.69 ± 0.37 a	3.13 ± 0.33 a-c	3.21 ± 0.29 a-c	2.89 ± 0.42 b-d	3.08 ± 0.35 b
20%FB	0.03 ± 0.21 a	4.52 ± 0.50 b	4.41 ± 0.31 b	4.98 ± 0.84 a	3.05 ± 0.36 d	3.36 ± 0.42 d	4.41 ± 0.31 b-d	3.28 ± 0.38 b	2.61 ± 0.10 d	2.84 ± 0.15 c	2.92 ± 0.34 b- d	2.79 ± 0.24 c
Average SWB	4.96 ± 0.85 a	4.54 ± 0.36 b	4.57 ± 0.43 b		3.44 ± 0.41 a	3.74 ± 0.46 a	3.76 ± 0.55 a		2.98 ± 0.33 a	3.20 ± 0.38 a	3.04 ± 0.37 a	

The similar or common letters on the averages in the same category mean that there are no significant differences between these averages, according to the Duncan test.

The different letters on the averages within the same character have significant differences ($P \leq 0.05$) among those averages, according to the Duncan test.

Table (5): Effect of SWB and FB minor treatments on percentage of egg production at 1st, 2nd and 3rd four weeks of production.

	1-4 weeks				5 - 8 weeks				9 – 12 weeks			
	0% SWB	10% SWB	20% SWB	Average FB	0% SWB	10% SWB	20% SWB	Average FB	0% SWB	10% SWB	20% SWB	Average FB
0% FB	56.87 ± 3.55 c	66.58 ± 0.45 ab	61.13 ± 9.48 a-c	61.52 ± 6.72 a	79.40 ±0.65 a	77.28 ± 6.60 a	79.73 ± 6.25 a	78.00 ± 4.89 a	81.90 ± 0.65 c	76.92 ± 7.99 d	89.23 ± 6.84 a-c	82.68 ± 7.63 b
10%FB	67.43 ± 1.71 a	63.58 ± 7.27a-c	62.43 ± 5.83 a-c	64.48 ± 5.43 a	83.13 ±6.34 a	78.93 ± 7.24 a	82.06 ± 3.24 a	81.375 ± 5.62 a	88.13 ± 3.38 a-c	84.68 ± 7.20 b-d	91.28 ± 1.65ab	88.03 ± 5.09 a
20%FB	41.73 ± 3.65 d	59,30 ± 2.65 bc	63.88 ± 0.99 a-c	54.97±10.30 b	81.63 ±4.25 a	77.89 ± 3.35 a	84.00 ± 3.85 a	81.167 ± 4.35 a	89.40 ± 7.56 a-c	81.93 ± 6.59 c	94.10 ± 2.41 a	88.48 ± 7.51 a
Average S W B	55.34 ± 11.39 b	63.15 ± 5.11 a	62.48 ± 5.95 a		81.38 ± 4.31 a	78.03 ± 5.45 a	81.93 ± 4.57 a		86.48 ± 5.53 b	81.18 ± 7.39 c	91.53 ± 4.41 a	

The same or common letters on the averages within one adjective mean that there are no significant differences between these averages, According to the Duncan test.

The different letters on the averages within the same character have significant differences ($P \leq 0,05$) among these averages, according to the Duncan test.

Table (6): Effect of SWB and FB minor treatments on fertilized eggs percentage at 1st, 2nd and 3rd four weeks of production.

	1-4 weeks				5 - 8 weeks				9 – 12 weeks			
	0% SWB	10% SWB	20% SWB	Average FB	0% SWB	10% SWB	20% SWB	Average FB	0% SWB	10% SWB	20% SWB	Average FB
0% FB	81.70± 12.25 a	87.77±1 1.01 a	89.98 ± 4.71 a	86,50 ± 9.67 a	96.66 ± 2.74 a	95,50 ± 3.18 a	92.10 ± 4.12 ab	94.76 ± 3.68 a	95,70 ± 0.57 ab	98.80 ± 0.85 a	94.98 ± 1.25AB	96,50 ± 1.93 a
10%FB	81.15 ± 9.83 a	84.43 ± 8.32 a	79,98 ± 7,22 a	81.85 ± 7.96 a	96.68 ± 2.69 a	93,28 ± 2.74 a	94.03 ± 1.91 a	94.6 ±2, 714 a	96.60 ± 2.49AB	89.43 ± 5.17 c	96.53 ± 3.41AB	94.18 ± 4.95 a
20%FB	82.20 ± 6.86 a	76.68 ± 13.59 a	76,68 ± 50,55 a	78.52 ± 13.63 a	93.23 ± 2.57 a	95,50 ± 1.70 a	88.28 ± 4.09 b	92.33 ± 4.13 a	92.63 ± 3.89 b	95.10 ± 1.96 ab	94.20 ± 5.10a-c	93.98 ± 3.66 a
Average SWB	81.68 ± 8.96 a	82.96 ± 11.22 a	82.21 ± 13.05 a		95.52 ± 2.95 a	94.76 ± 2.61 a	91.47 ± 4.05 b		94.98 ± 3.01 a	94.44 ± 4.97 a	95.23 ± 3.42 a	

The similar or common letters on the averages in the same category mean that there are no significant differences between these averages, according to the Duncan test.

The different letters on the averages within the same character have significant differences ($P \leq 0,05$) among these averages, according to the Duncan test.

Table (7): Effect of SWB and FB minor treatments on egg hatch percentage at 1st, 2nd and 3rd four weeks of production.

	1-4 weeks				5 - 8 weeks				9 – 12 weeks			
	0% SWB	10% SWB	20% SWB	Average FB	0% SWB	10% SWB	20% SWB	Average FB	0% SWB	10% SWB	20% SWB	Average FB
0% FB	51.67 ± 1.35 b	60.00 ± 8.16 a-c	67.78 ± 4.15 a	59.81 ± 8.40 a	86.10 ± 5.55 ab	86.50 ± 2.94 a	79.60 ± 2.22a-c	84.07 ± 4.80 a	70.70 ± 0.57 b	76.58 ± 8,28 b	83.18 ± 4.33 a	76.82 ± 7.23 a
10%FB	45.45 ± 3.16 a-c	64.48 ± 3.16 ab	54.43 ± 1.60 a-c	57.78 ± 5.53 a	77.63 ± 8.13 b	82.08 ± 2.92 a-c	82.18 ± 3.90a-c	80.63 ± 4.80 a	76.53 ± 4.01 ab	75.43 ± 9.32 ab	72.40 ± 7.24 b	74.78 ± 6.76 a
20%FB	46,68 ± 15,13 c	58.90±1 5.93 a-c	52.23 ± 11.01 b	52.60± 13.85 a	78.43 ± 8.33a-c	86.53 ± 0.24 a	74.03 ± 6.97 c	79.66 ± 5.42 a	63.48 ± 4.66 c	73.83 ± 8.18 ab	78.33 ± 6.56 ab	71.88 ± 8.83 a
Average SWB	50.93 ± 8.77 b	61.13 ± 9.82 a	58.14 ± 9.49 ab		80,72 ± 80,72ab	85.03 ± 3.08 a	78.60 ± 5.60 b		70.23 ± 6.44 b	75.28 ± 7.87ab	77.97 ± 7.23 a	

The similar or common letters on the averages in the same category mean that there are no significant differences between these averages, according to the Duncan test.

The different letters on the averages within the same character have significant differences ($P \leq 0.05$) among these averages, according to the Duncan test

تأثير استخدام مستويات مختلفة من الشعير المنقوع بالماء والباقلاء العلفية كبديل جزئي عن الذرة الصفراء وكسبة فول الصويا في علائق النمو والانتاج لطائر السمان

فراس خليل إبراهيم

سمير حميد مجيد

سالم ذنون يونس

مالك محمد شكري

قسم بحوث نينوى – دائرة البحوث الزراعية

Email: firmas_kahlil@yahoo.com

الخلاصة

تم تنفيذ الدراسة في وحدة الدواجن / شعبة بحوث الثروة الحيوانية / قسم بحوث نينوى، باستخدام 756 طائر سمان غير مجنس وبعمر اسبوعين، وزعت على تسع معاملات تجريبية وبواقع 3 مكررات لكل معاملة يضم كل مكرر 28 طير وبوزن ابتدائي 63,8 غم وزن حي، اعطيت العلائق التجريبية النمو والانتاج على حسب مرحلة نمو الطيور وعلى حسب نوع المعاملة. النتائج: ظهر تحسن معنوي ($0,05 > A$) لمعاملي الشعير المنقوع 10% و 20% على الصفات (الزيادة الوزنية غم / طائر وكفاءة التحويل الغذائي) وكفاءة التحويل الغذائي غم علف / غم بيض والنسبة المئوية لانتاج البيض للأسابيع الأربعة الأولى من الانتاج والنسبة المئوية للفقس من البيض الكلي للأسابيع الأربعة الأولى والثانية والثالثة من الانتاج، وحسابياً في بقية الصفات. أما مستويات الباقلاء العلفية 10% و 20% فكان لها تأثيراً سلبياً ومعنوياً ($0,05 > A$) على (الزيادة الوزنية غم / طائر وكفاءة التحويل الغذائي) عند عمر 3-5 أسابيع وكفاءة التحويل الغذائي للأسابيع الأربعة الأولى من الانتاج والنسبة المئوية لانتاج البيض للأسابيع الأربعة الثالثة من الانتاج. وتحسناً معنوياً وإيجابياً ($0.05 > A$) لكفاءة التحويل الغذائي والنسبة المئوية لانتاج البيض للأسابيع الأربعة الثالثة من الانتاج.

الكلمات المفتاحية: الشعير المعامل بالماء، الباقلاء العلفية، انتاج السمان

تاريخ استلام البحث: 2019/2/18، تاريخ القبول: 2019/9/3

REFERENCES

- Abdul-Abass , M. H. and A. H. Areaaer (2014). Effect of using chemically treated *vicia faba* bean in the diet in broiler carcass properties. *The Iraqi Journal of Agricultural Sciences – 45(4)(Special Issue): 400-408*.
- Abdul-Abass, M.H. and R.I. AL-Mjamaii (2007). Use germination as a mean to improve the nutritional value of broad bean used in broiler diet. *Iraqi Poultry Sciences 2(3):80-93*.
- Ahmed , S. M. (2011). Effect of β -glucanases addition, hulling and water soaking for the barley on performance of broiler chickens. *Journal of Koya University 20:1-11*.
- Al- Rawi , K. M. and A. M. Khalaf-Allah. (2000). Design and Analysis of Agricultural Experimental, Mosul University, Iraq.
- Al-Kaisey, M. T.; M. A. Mohammad ; S. M. Abou-Tubik ; M. K. Al-Fadhli and M. M. Abdul-Abass. (2007). Effect of germination in improving the feed value of two local barley cultivars in broiler chick diets. *Mesopotamia Journal of Agriculture 35 (2): 75-83*.
- Bosco, A. D. ; S. Ruggeri ; S. Mattioli; C. Mugnai; F. Sirri and C. Castellini . (2013). Effect of (Faba Bean *Vicia Faba* Var, Minor) inclusion in starter and growing diet on performance, carcass and meat characteristics of organic slow- growing chickens. *Italian Journal of Animal Science 12(4): 472-478*.

- García , M.; R. La´zaro ; M. A. Latorre; M. I. Gracia; and G. G. Mateos . (2008). Influence of enzyme supplementation and heat processing of barley on digestive traits and productive performance of broilers. *Poultry Science*. 87(5):940–948.
- Jacob, J. P. and A. J. Pescatore (2012). Using barley in poultry diets - A Review. *The Journal of Applied Poultry Research* 21 :915–940.
- Kianfar, R. ; H. Moravej; M. Shivazad and M. Taghinejad-Roudbaneh (2013). Effect of enzyme addition, germination, and fermentation on the nutritive value of barley for growing Japanese quails. *Journal of Animal and Feed Sciences*. 22:165–171.
- Koivunen, E. ; P. Tuunainen ; E. Valkonen; L. Rossow and J. Valaja (2014). Use of faba (*Vicia faba*) in diets of laying hens. *Agricultural and Food Science*. 23 : 165-172.
- Mortazavi, F. and M. Afsharmanesh (2017). Evaluation the effect of feeding method (dry-wet) on Japanese quail performance. *Journal of Novel Applied Sciences*. 6 (1): 1-6.
- Rasteh, M. R. ; B. Dastar; M. S. Shargh; S. Zerehdaran and O. Ashayerizadeh (2016). Effect of different levels of germinated barley on performance and egg quality in laying hen. *International Journal of Advanced Biological and Biomedical Research*. 4 (2): 117-125.
- Anonymous (2002). Statistical Analysis System. SAS institute Inc. Release 6.12 Tsozo, North Carolina state University of Cary, NC, U.S.A.
- Senkoylu, N. ; H. Akyurek and H. E. Samli (2004). Implications of β -glucanase and pentosanase enzymes in low-energy low-protein barley and wheat based broiler diets. *Czech Journal of Animal Science* 49 (3): 108–114.
- Svihus, B.; R. K. Newman ; C. W. Newman and O. I. Selmer (1997). Changes in extract viscosity, amino acid content, and soluble and insoluble β -glucan and dietary fibre content of barley during different high moisture storage conditions. *Animal Feed Science and Technology*. 64, 257–272.