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THE EFFECT OF PARTIAL SUBSTITUTION PROTEIN OF LOCAL GRASS PEA SEED (*LATHYRUS SATIVUS* L.) REPLACING SOYBEAN PROTEIN ON PRODUCTION PERFORMANCE OF LAYING CHICKENS

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Abstract

This study was conducted in the field of poultry of the Department of animal production department in College of Agriculture - University of Diyala for the period from 22/1 to 13/5 2019 / to determine the effect of adding different levels of the local Grass pea seed protein to the diet on the productive qualities of egg lohman brown. A 22-week-old chicken was randomly distributed into five treatments and three replicates per treatment. The first treatment T_1 fed on a diet without adding (control), the second treatment T_2 fed on a diet supplemented with 25% of the local seed protein protein instead of protein soybean, the third treatment (T_3) fed on a regular diet added 25% of Seed protein local substitute for soybean meal protein and enzyme mixture by 0.1%, fourth treatment (T_4) fed on a diet with 50% of the local Grass pea seed protein substitute soybean protein, treatment fifth (T_5) fed on a diet added 50 % Of the local Grass pea seed protein instead of protein Soybean and a mixture of enzymes Kemen by 0.1%, divided the duration of the experiment amounting to 112 days in four equal intervals (28 days for each period). The results of the statistical analysis showed an improvement in the productive performance of the fed egg hens on a regular diet with 25% of the local seed protein protein instead of soybean protein (T_2), where there was a significant superiority ($0.05 \geq P$) in each proportion of egg production (HD%) and the cumulative number of eggs and feeding conversion efficiency compared to birds fed on the control diet (T_1), while there was no significant differences in the overall rate of egg weight, egg mass, daily feed consumption compared with the control diet T_1.

Key words : Grasspea, Kemin enzyme mixture, productive characteristics.

Introduction

There was a very big development in the methods and managements used to improve the quantity and quality of production, and in order to sustain the feeding of poultry, which is one of the most important aspects of the poultry industry and most influential in improving production and reducing the costs of making diets by providing balanced feeds that meet all the food needs of poultry and the introduction of feed materials These feeds are used to reduce feed costs, which account for 70-80% of production costs (Kamaran *et al.*, 2002; Karaoglu *et al.*, 2004; Esonu *et al*., 2004). Possible through Zia. The energy represented by the bird (Naji, 2006). By improving the nutritional value of these feedstuffs by adding artificially prepared enzymes (exogenous enzymes) by preparing them using many unsatisfactory organisms under very precise conditions of heat and acidity, the most important enzymes used over the past several years in the poultry industry is ß -Glucanases, Xylanases, galactosidases, phytases, proteases, lipases (Gracia *et al.*, 2003). The researchers noted that the use of some feedstuffs in diets, especially grains such as wheat, barley and oats, is reflected in a significant reduction in growth and poor conversion of diet into meat or b. They contain fibers in the range of 9-20% that can't be digested by birds due to the absence of enzymes capable of analyzing them in the gastrointestinal tract (Francesch and Geraert, 2009). To digest some nutrients or decompose anti-nutritional factors in feed ingredients, which improve the value of feed materials by increasing the digestibility of sugars, proteins and fats. Consequently the increase in the energy represented to about 18%, which leads to improved growth in addition to its positive role in the impact on the environment and the environment (Sheppy, 2001).

Also, most researchers have tended to use non-conventional feed alternatives with appropriate protein content and replace the main traditional feed sources in diets Fish, especially protein sources, and these alternatives need studies and evaluation in order to reach the possibility of substitution in whole or in part, and the earning, including soybean meal at the forefront of imported plant protein sources included in fish diets, and local alternatives used In fish diets such as improved sunflower percentage (Al-Ash'ab *et al.*, 1999), cespan seeds (Shamaa *et al.*, 2000) and diet pea. Lathyrus sativus seeds can be used as a plant protein source containing (30% -27%) and are widely grown legume plants. In Southeast Asia and South Africa, Ramachandran (*et al.*, 2005) has been used as a local seed of anthrax by Ani *et al.*, (2009) for the purpose of improving its nutritional value by adding 0.1% kimin enzyme mixture when used as a substitute for soybean meal in broiler diet.

Materials and Methods

This study was conducted in the field of poultry of the Department of Animal Production, College of Agriculture _ University of Diyala for the period from 22-1 to 13-5-2019, where 180 hens of Lohmman brown (23 weeks old) were randomly distributed on 15 ground cages The area of each cage 1.5× 2 m by 12 chickens per cage, and after three weeks of breeding as a period for the adaptation of chickens distributed chickens randomly on five treatments and three cages per treatment. The treatments were as follows: -

- First treatment (control): fed on a regular diet free from addition.
- Second treatment: fed on a regular diet plus 25% of the seed protein Gross pea instead of protein soybean.
- Third treatment: fed on a regular diet with the seeds of Gross pea by 25% instead of protein soybean and mixture of enzymes (Kemin) by 0.1%.
- Treatment IV: fed on a regular diet added 50% of the Gross pea seed protein Gross pea instead of protein soybean.
- Fifth treatment was fed on a regular diet plus 50% of the Gross pea seed protein instead of protein soybean and mixture of enzymes Kemin by 0.1%. The duration of the 56- day trial was divided into two equal periods of 28 days per period, in order to calculate the studied traits.

The 20-week-old chickens were received in good health and completed all required vaccines, most recently the triple oil vaccine (IB, ND, EDS) conducted at the end of the growth phase, as well as re-vaccinated with a vaccine mixed against Newcastle disease and bronchitis spray method at the age of 23 weeks. Laying chickens were reared in a hall divided into ground cages. Their chemical composition is calculated according to NRC schedules (1994).

Grass pea seeds were obtained from one of the poultry feed offices in Diyala province and was analysis in afnan company in Erbil, only the Netherlands passes the sample on the device in Iraq and the analysis takes place in the Netherlands. The results of the Gross pea analysis of three models are as follows.

Studied productive qualities

The duration of the 56day trial was divided into two equal intervals of 28 days per period in order to calculate the productive and egg quality traits for each duration.

Egg production ratio

Eggs were collected twice a day at 12 noon and 5 pm each day for the duration of the experiment (8 weeks) and according to the rate of egg production based on Hen Day Production (H.D%) according to the equation mentioned by Fayad and Naji (1989).

Egg Weight

Egg weights were recorded every seven days for (4 weeks) of each period of the experiment individually for each repeater using a sensitive balance read to the nearest two decimal places and then extracted the average

Weight of eggs (gm).

Egg Mass Egg Mass

The mass of eggs produced per chicken (g / day / chicken) was calculated according to Fayad and Naji (1989).

Feed Consumption

The amount of diet consumed per week was calculated by weighing the amount of diet remaining at the end of the week and subtracting it from the amount of feed provided at the beginning of the week.

Feed Conversion Ratio

Efficiency of the required feed conversion at the end of each week was calculated according to the equation mentioned by Fayyad and Naji (1989).

The cumulative number of eggs

The cumulative number of eggs per chicken during each period.

Statistical analysis

Statistical analysis was performed using Complete Randomize Design (CRD) to analyze data between transactions for each period, while the general rate data

used the design of Randomized Complete Block Dezign according to Al-Rawi and Abdul Aziz (1980), and to test the significance of the differences. Among the coefficients, the Duncan's multiple range test (Duncan, 1955) was used at a significant level of 0.05, and the Statistical Analysis Software (SPSS, 2001) was used to analyze the data.

Results and Discussion

The results of table 3 showed a significant effect ($P \leq 0.01$) in all treatments of the addition of seed protein protein compared to the control treatment in the first period with a significant effect ($P < 0.01$.). With the control treatment, it was observed in the first period of the experiment a significant superiority (($P < 0.01$) for the addition factors, and the treatment of the addition of local hormone seeds and without the enzyme Quimin T_2 highest

Table 1: Components of the production diets of layers.

Diets					Ingredients
5	4	3	2	1	
12.6	12.70	35	35	52	corn
43	43	26.1	26.2	15	wheat
11	11	16.5	16.5	22	soybean meal
21	21	10.50	10.50	0	Gross pea
1.8	18	0.8	0.8	0	oil
2.5	2.5	2.5	2.5	2.5	bremix
8	8	8	8	8	Dicalcium
0	0	0.5	0.5	0.5	Dicalcium phosphate
0.1	0	0.1	0	0	chemin enzymes
Chemical analyses of diets					
15.86	15.86	15.84	15.84	16	Protein %
2736	2736	2725	2725	2726	Energy k cal/kg
0.86	0.86	0.84	0.84	0.82	Lysine%
0.35	0.35	0.37	0.37	0.39	Methionine%
3.46	3.46	3.58	3.58	3.58	Calcium%
0.48	0.48	0.51	0.51	0.47	Phosphor %
3.54	3.54	3.34	3.34	3.18	Crude fiber %
172.5	172.5	172	172	170.31	Energy/protein
7.20:1	7.20:1	7:1	7:1	7.61:1	Ca/p
0.57	0.57	0.60	0.61	0.64	Methionine + cysteine

* Kg Premix Intra Co contains 400,000 IU vitamin A, 120,000 IU vitamin D3'800 mg vitamin E, 80 mg vitamin K3, 60 mg vitamin B1, 240 mg vitamin B2, 400 mg vitamin B3, 200 mg vitamin B6, 0.8 Vitamin B12 mg, 1,200 mg vitamin PP, 40 mg folic acid, 4 mg biotin, 14,000 mg choline. ** The chemical composition values of feedstuffs were calculated according to the reports of the US National Research Council (1994, NRC).

- The chemin used is a penta-enzyme composition of a Belgian origin containing

1,4 β-xylanase 20000 U/g . α-amylase 400 U/g . 1,3 β-glucanase 2350 U/g .

1,4 β-glucanase 4000 U/g . Bacillolysin 450 U/g .

Table 2: Chemical composition of Gross pea.

Ingredients	%
Protein	25.73
Oil	2.60
Moisture	9.80
Ash	5.47
Fibers	2.93

values in the proportion of egg production, reaching (86.19%) during the first period 25 The second period (29-26 weeks) was (87.92%) compared with the control treatment T_1 which recorded the lowest values as it reached 69.12% and 85.99%, respectively, and from the same table, the effect of additive factors on egg production rate during the production periods caused a significant ($P \leq 0.01$) effect on the overall rate of egg production. Also, in the third period (33-30 weeks) there was no significant differences, while in the fourth period (34-37 weeks) there was a significant decrease ($P \leq 0.05$) in T_3 treatments. T_4 compared to the rest of the treatments in the experiment was the superiority of the T_2 treatment. These results were consistent with the findings of Rubaie *et al.*, 2017.

It is noticed from table 4 that there was no significant effect on the treatments during experiment periods 1, 2, 4, and 3, and in the overall rate throughout the experiment in the weight of eggs on the treatments of substitution of the seed protein with and without the addition of chemine enzyme.

The results in table 5 showed that there were significant differences between the experimental factors in the mass of eggs produced (g / chicken / day) during the second production period. T_2 recorded the highest values and in the fourth period significant differences ($P \leq 0.01$). T_3 recorded the lowest values and did not show significant differences in the overall rate among all the experiment treatments. (2015) by adding β-glucanase or Man-Mannanase enzyme in broiler diets.

The results in table 6 showed that there were significant differences ($P \leq 0.01$) between the treatments in the cumulative egg production (egg / chicken / 28 days) during the production periods of the experiment compared with the control treatment, and in the first period significantly exceeded T_2.

($P \leq 0.01$) in the cumulative number of eggs if recorded, 6.03 eggs / hen / 28 days compared with the control treatment recorded the lowest values of 4.83 eggs / hen / 28 days, and in the second period significantly exceeded T_1, T_2 ($P \leq 0.01$) in The cumulative number of eggs on the rest of the experimental coefficients was 6.01 and 6.15, respectively, compared to the other

Table 3: Effect of replacing the soybean protein by Gross pea in the diet on the production ratio (H.D.%) (mean± standard error) of Lohman chickens during brown durations during production periods 22-37 weeks.

Treatments	Addition percentage%		Duration periods				General mean
	Grosspea	Chemin	1	2	3	4	
T_1	0	0	69.12±5.10b	85.99±3.03b	88.29±1.78	89.05±2.79a	83.1125±2.342b
T_2	10.50	0	86.19±2.05a	87.92±1.12a	87.00±1.23	86.31±1.20abc	86.854±0.819a
T_3	10.50	0.1	78.37±4.13ab	75.60±2.80c	81.16±2.59	81.29±1.58c	79.106±1.677b
T_4	21	0	69.24±3.35b	78.47±2.05c	86.31±1.93	83.13±1.72bc	79.287±1.7038b
T_5	21	0.1	61.63±2.25b	80.68±2.60bc	86.41±2.01	86.80±1.00ab	81.379 ±1.543 b
Significant level			**	**	N.S	*	**

- every period 28 day
- different letters in same Column refer to significant different between treatments in ($P \leq 0.05$)
- * refer to significant different between treatments in ($P \leq 0.05$)
- ** refer to significant different between treatments in ($P \leq 0.05$)
- N.S refer to no significant different

Table 4: Effect of replacing the soybean protein by Grossbea in the diet on the eggs weight (mean± standard error) of Lohman chickens during brown durations during production periods 22-37 weeks.

Treatments	Addition percentage%		Duration periods				General mean
	Grosspea	Chemin	1	2	3	4	
T_1	0	0	61.33±1.11	64.56±0.71	65.29±0.55	66.32±0.51	64.37±0.52
T_2	10.50	0	61.66±0.57	64.25±0.88	64.99±0.70	65.26±0.82	64.04±0.48
T_3	10.50	0.1	61.34±1.48	64.24±0.64	64.76±0.39	65.02±0.71	63.83±0.56
T_4	21	0	60.71±0.70	64.36±0.70	66.21±1.27	66.56±0.47	64.46±0.61
T_5	21	0.1	59.89±0.88	63.89±0.50	66.78±0.55	65.84±0.57	64.09±0.57
Significant level			N.S	N.S	N.S	N.S	N.S

- every period 28 day.
- N.S. refer to no significant different.

Table 5: Effect of replacing the soybean protein by Gross pea in the diet on the eggs mass (gm/ hen /day) (mean± standard error) of Lohman chickens during brown durations during production periods 22-37 weeks.

Treatments	Addition percentage%		Duration periods				General mean
	Grosspea	Chemin	1	2	3	4	
T_1	0	0	42.74±3.59	1.63±55.3ab	1.32±57.67	1.63a±58.91	1.653±53.665
T_2	10.50	0	418.30±47.67	0.90a±56.47	56.54±1.02	1.04ab±56.19	120.69±160.218
T_3	10.50	0.1	2.99±48.49	1.80c±48.53	1.63±52.53	1.07b±52.67	1.169±50.554
T_4	21	0	2.38±42.18	1.66 ±50.53bc	0.62±57.12	1.31ab±55.38	1.395±51.303
T_5	21	0.1	1.78±42.99	1.92±51.62bc	1.62±57.75	0.86a±57.22	1.334±52.395
Significant level			N.S	**	N.S	**	N.S

- every period 28 day.
- different letters in same Column refer to significant different between treatments in ($P \leq 0.05$).
- * refer to significant different between treatments in ($P \leq 0.05$).
- ** refer to significant different between treatments in ($P \leq 0.05$).
- N.S. refer to no significant different.

treatments which recorded the lowest values. In the third and fourth period, significant differences ($P \leq 0.05$) were found in the cumulative egg count between the hormone replacement agents with and without chemine enzyme compared with the control treatment recorded. 6.18, 6.23, respectively. For the overall rate of cumulative egg production we observe a highly significant superiority ($P \leq 0.01$). In the cumulative egg production of T_2 on the rest of the transactions recorded a cumulative production of 6.07. It is noted from the results in table 7 that there were no significant differences between all treatments during the experimental periods, the general rate in daily feed intake. This result was consistent with Chimote *et al.*, (2009) when the enzyme mixture was added in the Japanese quail diets. At the end of the trial period (15-20 weeks).

(Table 8) showed significant differences ($P \leq 0.05$) between the additive coefficients in feed conversion efficiency (gm feed / gm eggs) compared with the control

Table 6: Effect of replacing the soybean protein by Gross pea in the diet on the cumulative eggs (28 day/ hen /egg) (mean± standard error) of Lohman chickens during brown durations during production periods 22-37 weeks.

Treatments	Addition percentage%		Duration periods				General mean
	Grosspea	Chemin	1	2	3	4	
T_1	0	0	4.83±0 .35B	6.01±0.21ab	6.18±0.12a	6.23±0.19a	5.82± 0.163b
T_2	10.50	0	6.03± 0.14A	6.15±0.078a	6.09±0.08ab	6.04±0.084abc	6.07± 0.057a
T_3	10.50	0.1	5.48±0.28Ab	5.29±0.19C	5.68±0.18b	5.69±0.11c	5.54± 0.12b
T_4	21	0	4.84± 0.23B	5.49±0.14C	6.04±0.1ab	5.81±0.12bc	5.55± 0.12b
T_5	21	0.1	5.01±0.15B	5.64±0.18bc	6.04±0.14ab	6.07±0.06ab	5.63± 0.11b
Significant level			**	**	*	*	**

- every period 28 day.
- different letters in same Column refer to significant different between treatments in ($P \leq 0.05$).
- * refer to significant different between treatments in ($P \leq 0.05$).
- ** refer to significant different between treatments in ($P \leq 0.05$).
- N.S. refer to no significant different.

Table 7: Effect of replacing the soybean protein by Gross pea in the diet on the feed intake (gm/ hen /day) (mean± standard error) of Lohman chickens during brown durations during production periods 22-37 weeks.

Treatments	Addition percentage%		Duration periods				General mean
	Grosspea	Chemin	1	2	3	4	
T_1	0	0	108.60±1.53	114.99±0.00	115.00±0.00	115.00±0.00	113.39±0.63
T_2	10.50	0	111.72±1.01	115.10±0.00	115.00±0.00	115.00±0.00	114.18±0.37
T_3	10.50	0.1	112.20±1.28	114.22±0.78	115.00±0.00	115.00±0.00	114.105±0.46
T_4	21	0	111.05±1.28	115.10±0.00	115.00±0.00	115.00±0.00	114.012±0.46
T_5	21	0.1	110.41±1.32	115.10±0.00	115.00±0.00	115.00±0.00	113.85±0.498
Significant level			N.S	N.S	N.S	N.S	N.S

- every period 28 day.
- N.S. refer to no significant different.

Table 8: Effect of replacing the soybean protein by Gross pea in the diet on feed conversation (mean± standard error) of Lohman chickens during brown durations during production periods 22-37 weeks.

Treatments	Addition percentage%		Duration periods				General mean
	Grosspea	Chemin	1	2	3	4	
T_1	0	0	2.83±0.22b	2.10±0.07b	2.01±0.05	1.97±0.06b	2.22±0.0900a
T_2	10.50	0	2.11±0.06a	1.96±0.08a	2.04±0.04	2.05±0.04ab	2.04±0.0334b
T_3	10.50	0.1	2.45±0.21ab	2.39±0.01c	2.21±0.07	2.19±0.04a	2.31±0.0718a
T_4	21	0	2.71±0.15b	2.22±0.13abc	2.03±0.05	2.09±0.05ab	2.26±0.0742a
T_5	21	0.1	2.61±0.08b	2.26±0.08bc	2.01±0.06	2.00±0.03a	2.22±0.0560a
Significant level			*	*	N.S	*	*

- every period 28 day.
- different letters in same Column refer to significant different between treatments in ($P \leq 0.05$).
- * refer to significant different between treatments in ($P \leq 0.05$).
- ** refer to significant different between treatments in ($P \leq 0.05$).
- N.S. refer to no significant different.

treatment. In the first period of the experiment, there was a significant effect ($P \leq 0.05$) on the treatment of substitution T_2, where the best dietary conversion efficiency was recorded compared to the rest of the treatments in the experiment. The fourth period of the experiment T_5 recorded the best feed conversion efficiency in addition treatments, although it recorded lower conversion efficiency compared to the control treatment T_1. On the other hand, T_2 recorded the best overall rate of dietary conversion efficiency. Studies have shown that the enzyme mixture used can improve the digestion of non-starchy carbohydrates (NSP). It increases the availability of energy and amino acids of the bird and reduces the viscosity of the small intestine, improves the digestion of feed materials and the level of nutrients in the feed, which increases the level of energy and protein in the feed and improves the efficiency of food conversion and thus has a positive effect on the performance of birds (Choct and Hughes, 2000).

Muhammad *et al*., (2015) found that the addition of Çä-Mannanase enzyme to broiler diets at levels (0, 50, 80, 110MU / ton feed) with reduced energy level in the diet resulted in significant superiority in vivo weight rate, weight gain and feeding efficiency during 42 day education.

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