Effect of sorghum and methionine supplementation in productive performance and the quality of hatching eggs of two quail strains

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Accepted on:8/6/2014

Summary

The aim of the present study was to identify the effect of corn replacement by sorghum and supplementation of methionine during growing and laying periods in productive performance and egg quality of two strains of quail (brown and black). Four hundred and eighty quails (240 of each strain) were used in this study. Birds were reared on floor letter in semi opened house distributed into four treatments each with three replicates (20 birds in replicate). Experimental treatments were as follows: T1: fed on yellow corn ration (Control), T2: fed on ration in which 50% of corn replaced by sorghum , T3: fed on ration in which 50% of corn replaced by sorghum and supplemented with 0.2% methionine and T4: fed on ration in which 50% of corn replaced by sorghum and supplemented with 0.4% methionine . Statistical analysis of data showed no significant differences (P≤0.05) between treatments and strains in live body weight, average weekly weight gain, feed consumption, feed conversion ratio dressing percentage and mortality rate. After sexual maturity age no differences were observed between the treatments and strains in egg production HD%, egg weight, feed conversion ratio, egg shape index, shell weight, shell thickness, albumin height, yolk dimension, yolk height, blood glucose, blood triglyceride, blood total protein, blood hemoglobin, ALT and AST enzymes concentration in serum through out of the experimental period which was lasted for 99 days. In conclusion, the results revealed the possibility of 50% sorghum replacement instead of yellow corn without any passive effects on productive performance which reduce the productive costs.

Keywords: Grain Sorghum, Tannin, quail strain, Blood parameters, Egg quality.

Introduction

The poultry nutrition constitute about 65-70% of the total cost of poultry production. Because of that the development of poultry industry depends to large extent on the availability of feed stuffs that are used or can be made suitable for use in poultry nutrition. Yellow corn and soybean meal are the two major ingredients used in poultry nutrition. The availability of these two feed ingredients in some areas like Iraq is very costy. This has made poultry nutritionists in Iraq to search for local alternative low cost feed ingredients. Sorghum was available to cultivate especially in northern lraq in areas which are not suitable for yellow corn. One negative characteristic of sorghum is the presence of tannins which lower its nutritional value for non-ruminant animals by reducing protein retention, digestibility of dry matter and metabolic rate of gross energy (1). Also it is negatively affecting the animals performance and digestibility of feed (2).Tannin limit activities of some enzymes and microorganisms by forming complexes with nutrients and prevent their adsorbtion in the digestive system (3 and 4). Inhibition of digestive enzyme activity has also been reported (5 and 6).

Methionine is an essential nutrient for poultry. In addition, this amino acid provides methyl groups, which are needed for several metabolic reactions such as the synthesis of carnithine and creatine (7). Methionine is considered to be the first limiting amino acid in broilers fed Practical corn-soybean meal diets were meet the lysine and methionine requirement for broiler chicks. If the corn or soybean meal were replaced in the ration, adequate dietary supplementation with lysine or methionine were needed to support optimum growth and carcass yield of fast-growing commercial broilers (8).

Materials and Methods

The experiment was carried out on 480 quails (*Coturnix coturnix*) belongs to two strains (Black and Brown) 240 birds/strain.

Treatments were conducted for two periods, the 1st period (7weeks) from 1day untill 49days of age, the 2nd period (7weeks) from 50 days age till 99 days of age. The rations were calculated according to (9) and were given *ad Libitum* with free excess drinking water .The sorghum content of tannin was determined according to (10) and the tannin values was 0.158% (the sorghum used was with low tannin content). (Table, 1).

The quails (1day old) were distributed in 4 treatments, three replicates each (20 quail's\ replicate) and reared on floor letter in semi opened house. The experimental treatments were as following:T1 : fed on standard ration (60% corn) as Control group.T2: fed on ration in which 50% of the corn was replaced by sorghum.T3: fed on ration in which 50% of the corn was replaced by sorghum and supplemented with 0.2% methionine T4: fed on ration in which 50% of the corn was replaced by sorghum and supplemented with 0.4% methionine. In the 1st period the evaluated parameters were: Live body weight (LW), weight gain (WG), Feed consumption (FC), Feed conversion ratio (FCR). After the end of 1st period (age of 49 days) 2 birds from each replicate (6 birds/treatment group) were slaughtered ,blood collected and divided into two parts, the first part was collected in EDTA tubes and used for determination of packed cell volume (PCV%) and hemoglobin (Hb/100 ml blood), the 2nd part in plain tube and used to separate serum which stored at (-20 C), Then used for determination of glucose (mg/dl), triglyceride (mg/100ml), total protein (mg/100ml), Aspartate amino transferase: AST (u/l) and Alanin amino transferase ALT(u/l). The carcasses of birds were used to determine the dressing percentage. In the 2nd period the productive parameters were recorded as: egg production HD%, egg weight (g), feed conversion ratio (kg feed / kg egg). At the last week of treatments egg were collected from each group and used to determine the egg quality characters as: egg shape index, shell weight (gm), shell thickness (mm), albumin height (mm), yolk height (mm), yolk diameter (mm), mortality of birds were recorded in both periods. Blood glucose (mg/100ml), blood triglyceride (mg/100ml), blood total protein (mg/100ml), blood hemoglobin (gm /100 ml), and assay of alanin and aspartate amino transferase in serum (ALT, AST) concentration (unit /ml). Data were analyzed by using the completely randomized design as described by (11 and 12) program were used in analysis data .The means in the difference were tested for statistical significance using Duncan's multiple range test as described by (13).

Table, 1: Composition and analyses of the experimental growing and Laying rations for quail, according to the nutritional requirements of NRC (1994).

Treatments / Ingredients %	Control		Sorghum Replacemen		Laying ration	
	Starter	Finisher	Starter	Finisher	Control	Replacement
Yellow Corn	60	60	30	30	60	30
Sorghum	-	-	30	30	-	30
Wheat	-	9	-	9	10	10
Premix (40% Protien)	15	10	15	10	10	10
Soybean Meal (44%Protien)	24	20	24	20	16	16
Dicalcium Phosphate	0.3	0.3	0.3	0.3	3.3	3.3
Sodium Chloride	0.7	0.7	0.7	0.7	0.7	0.7
Total	100	100	100	100	100	100
Calculated Analysis						
Metabolizable Energy(Kcal/Kg)	2875	2975	2845	2947	2909	2891
Crud Protien %	22.00	19.45	22.09	19.61	17.73	17.76
Ether Extraction %	3.40	3.395	3.265	3.170	3.098	2.798
Lysine %	1.360	1.1069	1.366	1.0949	1.358	1.268
Methionine %	0.8118	0.6155	0.8028	0.6065	0.6390	0.6150
Tannin %	-	-	0.0474	0.0474	-	0.0474

Results and Discussion

Table (2) showed no differences between the treatments and strains in live body weight, weight gain and Feed Consumption .This result may be due to that the sorghum used in these treatments were low in tannin and the adaptation of birds on harm effect of tannin in sorghum on digestive tracts, therefore no effects were observed. Also the diets used were isocaloric and isonitrogenous. These results agreed with (14-16) who reported no differences in body weight and weight gain. (17 and 18) observed no differences in feed consumption for birds replaced corn by sorghum in ration. Also no difference was observed between the treatments and strains when the diets supplemented with methionine .The absence of difference is due to the diets methionine in ration according NRC. These results agreed with (19-21) who didn't observe differences between treatments due to supplementation of different levels of methionine to diet.

Table (3) showed no differences in feed conversion ratio, dressing percentage and mortality rate between treatments or strains .This may be due to that the percentage of sorghum replacement 50 % didn't reach a harmful level, in addition to the adaptation of birds on low tannin percentage in sorghum. These results were in agreement with (22 and 23) in feed conversion ratio and with (8) in dressing percentage also (24) in feed conversion ratio and dressing percentage and mortality.

Table, 2: Effect of treatments in live weight, weight Gain, Feed Consumption for quail at 99 days old

Treatments	Brown Strain			Black Strain		
	Body weight (gm)	Weight gain (gm)	Feed consumption (gm)	Body weight (gm)	Weight gain (gm)	Feed consumption (gm)
T1	231.5	223.5	854.5	232.5	224.5	840.9
T2	229.3	221.3	861.3	234.6	226.6	838.1
T3	223.8	215.3	851.5	236.1	228.1	841.8
T4	237.7	229.7	862.5	233.9	225.9	853.1
Means	230.6	222.4	857.4	234.3	282.8	843.5

Table, 3: Effect of treatments in Feed Conversion ratio (Kg feed /Kg gain) Dressing percentage and Mortality rate

Treatments	Brown Strain			Black Strain		
	F C R (Kg /Kg)	Dressing %	Mortality rate %	F C R (Kg /Kg)	Dressing %	Mortality rate %
T1	3.822	77.68	4.29	3.744	77.35	4.29
T2	3.891	76.84	5.71	3.698	76.54	2.86
T3	3.954	77.91	4.29	3.690	76.82	5.71
T4	3.754	76.85	2.86	3.743	77.67	2.86
Means	3.855	77.32	4.29	3.719	77.09	3.93

Table, 4 revealed the absence of differences between treatments or strain in H.D% egg production, egg weight and feed conversion ratio. These effects may be due to the fact that the replacement of sorghum ration was isocaloric and that the tannin of the sorghum had no effects on the absorbed nutrients from intestine, Also it had no effects on the metabolizable energy, and no effects of sorghum tannins on egg production and egg quality depends on the composition of the diet and in particular, the protein content (25). The diets used were isonitrogenous. These results were agreed with (26). Table (5) showed no differences between treatments and strains in egg shape index and shell weight and thickness as well as the egg quality parameters and blood picture (Hb and PCV) in black and brown quail strains because the sorghum tannin was low and thus didn't affect the amino acids and some minerals availability, so cation-anion balance of blood

didn't change and HCO3 availability and shell thickness didn't reduce (27). In conclusion, the study revealed that the possibility of the 50% corn replacement by sorghum alone or with different levels of methionine didn't affect adversely the productive parameters.

Table, 4: Effect of treatments egg production, egg weight , feed convertion ratio.

Treatments	Brown Strain			Black Strain		
	Egg production HD%	Egg weight (gm)	F C R (Kg /Kg)	Egg production HD%	Egg weight (gm)	F C R (Kg /Kg)
T1	81.53	10.94	3.395	82.01	10.58	3.259
T2	81.24	10.86	3.549	81.68	11.10	3.437
T3	81.67	10.97	3.350	81.59	10.58	3.269
T4	81.16	11.06	3.453	81.70	10.79	3.542
Means	81.40	10.96	3.437	81.75	10.76	3.376

Table, 5: Effect of treatments in egg quality and some blood parameters for brown and black quail strain.

Parameters	Brown Strain				Black Strain			
	T1	T2	T3	T4	T1	T2	T3	T4
Egg Shape Index	1.35	1.31	1.36	1.32	1.34	1.33	1.36	1.32
Shell Weight (gm)	1.56	1.64	1.59	1.63	1.56	1.64	1.59	1.63
Shell Thickness (mm)	0.31	0.33	0.34	0.32	0.29	0.34	0.29	0.30
Albumin Height (mm)	3.96	3.91	3.87	3.82	3.85	3.90	3.89	3.84
YolkDiameter (mm)	20.13	20.25	20.83	20.61	20.34	20.71	20.65	20.53
Yolk Height (mm)	10.56	10.64	10.68	10.52	10.61	10.59	10.67	10.61
Glucose (mg/100ml)	211.5	217.6	218.4	214.8	214.7	215.7	216.9	215.7
Triglyceride mg/100ml	698.2	684.9	684.9	681.6	688.7	685.7	679.5	683.3
Total protein g/100ml	3.81	3.89	3.51	3.64	3.83	3.75	3.73	3.69
PCV volume%	44.26	43.95	44.27	44.67	44.52	43.87	44.61	44.73
Hemoglobin gm/100ml)	10.53	10.71	10.83	10.27	10.77	10.69	10.78	10.53
ALT(GPT) unit/ml	20.11	20.12	20.13	20.13	21.11	21.20	20.87	21.01
AST(GOT) unit/ml	120.8	121.2	121.1	121.2	121.2	122.1	121.9	122.3

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تأثير إستعمال الذرة البيضاء و الميثايونين في الاداء الانتاجي والصفات النوعية لبيض التفقيس لسلالتين لطائر السمان

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الخلاصة

هدفت الدراسة لمعرفة تأثير استعمال الذرة البيضاء والميثايونين في علائق طائر السمان خلال فترتي النمو وانتاج البيض في الاداء الانتاجي والصفات النوعية لبيض التفقيس لسلالتين من طائر السمان (البنية والسوداء). استعمال 480 فرخا"من طائر السمان (240 طائر من كل سلالة) وزعت على اربعة معاملات وفي كل معاملة ثلاثة مكررات وبواقع 20 طائرا" في كل مكرر وكانت معاملات الدراسة كما يلي: المعاملة الاولى (السيطرة) غذيت على عليقة تحتوي على ذرة صفراء، المعاملة الثانية غذيت على عليقة تم احلال 50% من الذرة الصفراء بالذرة البيضاء، المعاملة الثالثة غذيت على عليقة تم احلال 50% من الذرة الصفراء بالذرة البيضاء واضافة 0,2% ميثايونين، المعاملة الرابعة غذيت على عليقة تم احلال 50% من الذرة الصفراء بالذرة البيضاء واضافة 0,4% ميثايونين. أظهرت نتائج التحليل الاحصائي عدم وجود فروقات معنوية عند مستوى احتمال ($P\geq0,05$) بين المعاملات والسلالتين في وزن الجسم الحي، معدل الزيادة الوزنية الاسبوعية، كمية العلف المستهلكة، معامل التحويل الغذائي ونسبة التصافي ونسبة الهلاكات. وخلال الفترة بعد النضج الجنسي لم يلاحظ وجود فروقات معنوية بين المعاملات والسلالتين في نسبة انتاج البيض ، وزن البيضة، معامل التحويل الغذائي، دليل شكل البيضة، وزن القشرة، سمك القشرة، ارتفاع البياض، قطر الصفار، ارتفاع الصفار و تركيز الكلوكوز، الكليسيريدات الثلاثية، البروتين الكلي، الهيموكلوبين، تركيز انزيمي ALT و AST في بلازما الدم خلال فترة الدراسة التي استمرت 99 يوما. وبصورة عامة تستنتج الدراسة امكانية احلال 50 % من الذرة البيضاء محل الذرة الصفراء دون التأثير على الصفات الانتاجية مما يؤدي الى التقليل من تكاليف الانتاج .

الكلمات المفتاحية: الذرة البيضاء، التانين، سلالة السمان، مقاييس الدم، الصفات النوعية للبيض .