EFFECT OF DIFFERENT LEVELS ADDITION OF BETA-GLUCAN TO THE DIET IN SOME QUALITATIVE CHARACTERISTICS OF SACRAFICE BROILER (ROSS 308)

Fadhil .R.Al-Khafaji Firas .H.Al-Bawi [(1)] Hanan Turky AL-Sadiq
AL-Qasim Green University
Republic of Iraq

ABSTRACT

This study was conducted at the Poultry farm / Department of Animal Production, College of Agriculture/University of Al_Qasim Green. The field work of this study was performed during the period from 31/10/2016 until 5/12/2016 and then followed by the laboratory work. The project of this study was aimed to show the effect of β-Glucan on some qualitative characteristics in broiler chicken. 195 of chicks were used and educated in cages 1×1.5 m. Chicks were randomly divided into 5 treatments and by 3 replicates per treatment and each treatment was included 13 chicks. β-Glucan was used in concentration (0 , 40 , 80 , 120 , 160) gm/100kg diet for treatments (T1 , T2 , T3 , T4 , T5) respectively from age 1_35 days. The most important results of this study could be summarized by the following:

1) High significant superiority ($P<0.01$) in dressing percentage for the sacrifices of T4 and T5 treatments and significant superiority ($P<0.05$) in breast piece weight in comparison with other β-Glucan and T1 control treatment at age of 35 days, while T5 had gave the best results generally about thigh piece weight.

2) Significant superiority ($P<0.05$) in the weight of birds liver for β-Glucan treatment compared with T1 control treatment birds.

INTRODUCTION

β-Glucan are polysaccharides of glucose that can be produced by many prokaryotic and eukaryotic organisms. This group of compounds has several beneficial properties and because of that they have found a wide variety of uses in human and in veterinary medicine, pharmaceutical, cosmetic and chemical industries as well as food and feed production (1,2). The properties of various β-Glucan beneficial for food industry are discussed elsewhere (3) . β-Glucan belong to a group of biologically active natural compounds called biological response modifiers. These substances represent highly conserved structural components of cell walls in yeast, fungi, grain and seaweed. As they are not found in animals, these carbohydrates are considered to be classic pathogen-associated molecular patterns (PAMPs), and are recognized by the innate immune system (4) .

They are classified as biological response modifiers and because of their biological activities they can be used in human and veterinary medicine and pharmacy.

[(1)] Adapted research from Msc thesis of third

Additionally, β-Glucan show interesting physicochemical properties and therefore could be applied in food and feed production as well as in cosmetic and chemical industries. Immunomodulation by β-Glucan, both in vitro and in vivo, inhibits cancer cell growth and metastasis and prevents or reduces bacterial infection (5) . also dietary β-Glucan lowers blood cholesterol, improves glucose utilization by body cells and also helps wound healing (6,7,8) . β-Glucan work, in part, by stimulating the immune mechanism to fight a range of foreign challenges and could be used as an adjuvant, in combination with anti-infective or antineoplastic agents, radiotherapy, and a range of topical agents and nutrients (9) . The structure of β-Glucan depends on the source they are isolated from. Native β-Glucan molecules can be linked and branched in several ways. Biological properties of different β-Glucan molecules are dependent on their molecular structure, Some authors claim that the β-(1-3),(1-6)-glucan derived from yeast Saccharomyces cerevisiae produce the highest biological effects (10,11) .

MATERIALS AND METHODS

This experiment was conducted in the farm of poultry of Agriculture College/ Al_Qasim Green University during the period from 31/10/2016 until 5/12/2016 . And been obtained on chicks from Al_Anwar company. Then, chicks had transferred to the farm of agriculture college. Average of chicks was 41gm. Chicks had breaded by breading ground from 1day to 35 days. Chicks had breaded in a hall , that was divided by barriers.

On mattress ground. Mattress ground was a sawdust and it's thickness was 5 cm . Water had presented free (*adlibitum*) and contains sugar in first days and multivitamins in all days with using of continuous lighting system

Chicks had weighted when it were 1 day old. It was 195 chicks. Then, it had transferred to cages. Cage' s area was 1×1.5 m. It contain of a plastic Billy for eating and drinking.

Chicks had distributed on 5 treatments randomly. Every treatment included 3 repeaters, repeaters had included 13 chicks.

β-Glucan had added to diet according to follow treatments:

1. T1: control treatment without any addition.
2. T2: 40 gm β-Glucan / 100kg feed.
3. T3: 80 gm β-Glucan / 100kg feed.
4. T4: 120 gm β-Glucan / 100kg feed.
5. T5: 160 gm β-Glucan / 100kg feed.

A purity of β-Glucan 100% and it's a powder form, prepared from ALHECH company USA.

Table (1) Percentage of diet composition that using in experiment and chemical composition of it

Feed materials	Primary diet %	Finally diet %
Yellow maize	30	40
Wheat	28.25	24
Soybeans gain (48%protein)	31.75	24.8
Protein concentration (1)	5	5
Sun flower oil	2.9	4.4
Limestone	0.9	0.6
Di calcium phosphate DCP	0.7	0.9
Salt	0.3	0.1
Mixture of vitamins and minerals	0.2	0.2
Total	100	100
Calculated chemical analysis (2)		
Crop protein (%)	23	20
Calculated represented energy (kilo calories/kg feed)	3027	3195.3
Lysine (%)	1.2	1.1
Methionine (%)	0.49	0.46
Cestin (%)	0.36	0.32
Methionine + cestin	0.85	0.78
Calcium	0.85	0.76
Available phosphorus	0.45	0.49
C/P %	131.61	159.77

1) The type of protein concentration SPECIAL W 5_BROCON:- Chinese origin. every kg from it consists of 40% crop protein, 3.5%fat, 1%fiber, 6% calcium, 3%available phosphorus, 3.25% lysine 3.5% methionine, 3.90methionine+cestin, 2.2%sodium, 2100 kilo calorie/kg represented energy ، 200000international unit vitamin A, 4000 international unit vitamin D3, 500 mg vitamin E, 30 mg vitamin K3 , 15 mg B1,B2 vitamin, 150 mg B3 ، 20 mg B6, 300 mg B12, 10g folic acid, 100 micrograms biotin, 1mg iron, 100mg copper, 1.2mg manganese, 800mg zinc, 15 mg iodine, 2mg selenium, 6mg cobalt, 900mg anti oxidation (BHT).

2) According to chemical analysis of diet NRC (12).

The following health and preventive program used :

Table (2) The health and preventive program that used in this experiment

Age/day	Vaccine or antibiotic used
1	Newcastle vaccine B1 by heavy spraying
3-5	Antibiotic + vitamins
10	Newcastle vaccine (Lazota family) in drinking water.
20	Newcastle vaccine (Lazota family) in drinking water.

STUDING TRAITS

Qualitative characteristics of sacrifices

1) **Dressing percentage**

Chickens had taken at 35 days from all of treatments , it had included 3 male chicks and 3 female chicks from every treatment , It was homogeneous weights, almost . Chicks had weighed individually. Then it had slaughter and removal feathers, foot and head. Then it had extracted the internal giblets from sacrifices according to the method that referred to Al_Faiadh and Naji (13). Next , the sacrifice had washed by water. Then , it had weighed individually to extract the percentage of starvation based on live body weight with giblets that eatable or possible to eat is include heart, liver and gizzard according to the following:

$$\text{Dressing percentage} = \frac{\text{sacrifice weight (gm) with giblets}}{\text{live body weight (gm)}} \times 100$$

2) **The relative weight of a sacrifices cut**

After giblets extraction and sacrifice were weighed and cutting it according to the method that referred to Al_Faiadh and Naji (13). Then, cutting that special of every sacrifice individually, then cutting weight rate had calculated from sacrifice weight according to the equation of the following:

The relative weight of sacrifice

$$\text{cut\%} = \frac{\text{sacrefice cut weight (gm)}}{\text{cleaning sacrifice weight (gm)}} \times 100$$

Note that , sacrifice cut consisting of essential cut. Essential cut including the breast muscle and thighs, while the secondary cut including that back, neck and wings. As for giblets including heart, gizzard and liver.

STATISTICAL ANALYSIS

Data had analyst by Complete Random Design (CRD) that used to study the effect of studying treatments in different characteristics and compared the significant differences among of means by Duncan (14) poly limit test.

RESULTS AND DISCUSSION

The effect of different levels addition of β-Glucan to diet in sacrifice cut percentage, dressing percentage and internal bowels in broiler

Table (3) and (4) had shown the effect of different treatments in

sacrifices cut percentage, dressing percentage and internal bowels at fifth week end. Table (3) had shown a significant superiority ($p<0.01$) for T4 and T5 treatments comparison with T1 control treatment in dressing percentage. And didn't get a significant differences among of T1, T2 and T3 treatments. Also among of T2, T3, T4, and T5 treatments. Regarding to chest piece, T4 and T5 treatments had superiority significantly compared with T1 control treatment. While, there were non-significant differences among of T1, T2 and T3 treatments. Also, among of T2, T3, T4, and T5 treatments. So , the weight of thigh piece , T5 treatment had superiority significantly ($p<0.01$) on T1,T2 and T4 treatments. Also, there were a significant superiority for T3 treatment on T1 control treatment. While, there were a non-significant differences between T4 and T5 treatments, Also among of T2, T3, and T4 treatments. So, among of T1,T2 and T4 treatments. Regarding to a secondary cut weight (wings, nick and the back part of the body) did not record any significant differences had mentioned in all of treatments And about internal bowels in table (4) there were a non-significant differences among of different treatments in heart and gizzard weight. While, liver weight had recorded a significant superiority ($p <0.05$) for T2,T3,T4 and T5 treatments comparison with T1 control treatment and there were a non-significant differences among of β-Glucan treatments.

The reason of dressing percentage elevation and total of chest and thighs meat in β-Glucan treatments compared with T1 control treatment may be due to the role of β-Glucan as a fiber material. This material has delay food passage process to intestine. Therefore, allowing to digestive system enzymes to analyses and determine the greater amount of proteins (15,16) .

While, the cause of liver weight increased in β-Glucan treatments may be due to the role of β-Glucan in immune system strength and anti-inflammation materials (17,18). So to the role of β-Glucan as an anti-oxidation factor (19).

Table (3) The effect of different levels addition of β-Glucan to diet in sacrifice cut percentage, dressing percentage and internal bowels in broiler at age 35 days

treatment	mean±SE					
	Dressing%	Breast %	Thigh%	Wings%	Neck%	Back%
T1	73.82 ± 0.59 B	33.87 ± 0.38 B	27.76 ± 0.59 C	9.95 ± 0.06 A	5.66 ± 0.18 A	15.85 ± 0.06 A
T2	74.36 ± 0.69 AB	34.75 ± 0.26 AB	28.47 ± 0.22 BC	9.35 ± 0.13 A	5.24 ± 0.32 A	14.13 ± 0.06 A
T3	74.83 ± 0.83 AB	34.99 ± 0.44 AB	29.28 ± 0.43 AB	9.13 ± 0.05 A	4.45 ± 0.12 A	15.33 ± 0.12 A
T4	74.59 ± 0.64 A	35.34 ± 0.49 A	28.28 ± 0.17 BC	9.44 ± 0.24 A	5.93 ± 0.03 A	14.05 ± 0.06 A
T5	75.36 ± 0.85 A	35.78 ± 0.38 A	30.25 ± 0.11 A	8.16 ± 0.07 A	4.97 ± 0.25 A	14.11 ± 0.05 A
Significant level	**	*	**	NS	NS	NS

*,** vertically different letters pointed to significant differences among of treatments below probability level ($p<0.05$) ($p<0.01$) respectively. NS is mean non significant differences.

The treatments are T1 , T2 , T3 , T4 and T5 represent 0 , 40 , 80 , 120 and 160 gm β-Glucan /100 kg feed Respectively

Table (4) The effect of different levels addition of β-Glucan to diet in giblets percentage in broiler at age 35 days

Treatment	Mean±SE		
	Liver	Gizzard	Heart
T1	3.08 ± 0.03 B	2.37 ± 0.04 A	0.56 ± 0.01 A
T2	3.47 ± 0.13 A	2.47 ± 0.08 A	0.55 ± 0.01 A
T3	3.49 ± 0.08 A	2.56 ± 0.07 A	0.56 ± 0.01 A
T4	3.52 ± 0.07 A	2.55 ± 0.05 A	0.55 ± 0.02 A
T5	3.47 ± 0.08 A	2.41 ± 0.05 A	0.54 ± 0.01 A
Significant level	*	NS	NS

* vertically different letters pointed to significant differences among of treatments below probability level ($p<0.05$) . NS is mean non-significant differences.
The treatments are T1 , T2 , T3 , T4 and T5 represent 0 , 40 , 80 , 120 and 160 gm β-Glucan /100 kg feed Respectively

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تأثير إضافة مستويات مختلفة من البيتا كلوكان Beta-glucan إلى العليقة في بعض الصفات النوعية لذبيحة فروج اللحم (R0SS 308)

فاضل رسول الخفاجي فراس حسين الباوي [1] حنان تركي الصادق
جامعة القاسم الخضراء
جمهورية العراق

المستخلص

اجريت هذه الدراسة في حقل الطيور الداجنة لقسم الانتاج الحيواني - كلية الزراعة / جامعة القاسم الخضراء وللفترة من 2016/10/31 ولغاية 2016/12/5 . واجري بعد ذلك العمل المختبري. ويهدف البحث إلى معرفة تأثير البيتاكلوكان في بعض الصفات النوعية لفروج اللحم اذ استخدم 195 فرخ دجاج لحم وربيت في اقفاص ذات أبعاد 1×1.5 م . قسمت الافراخ عشوائيا إلى 5 معاملات بواقع 3 مكررات لكل معاملة وتضمن كل مكرر 13 فرخا ، استخدمت البيتا كلوكان بتراكيز (0_40_80_120_160) غم / كغم علف للمعاملات (T1_T2_T3_T4_T5) على التوالي من عمر 1_35 يوم . وتوصلنا في هذه الدراسة إلى النتائج الاتية :

1) حصول تفوق عالي المعنوية ($P<0.01$) لذبائح طيور المعاملتين T4 و T5 في نسبة التصافي وتفوق معنوي ($P<0.05$) في وزن قطعة الصدر مقارنة مع بقية معاملات البيتا كلوكان والسيطرة عند عمر 35 يوم بينما أعطت المعاملة T5 أفضل النتائج بشكل عام بما يخص وزن الفخذ.

2) حصول تفوق معنوي ($P<0.05$) في وزن كبد طيور معاملات البيتا كلوكان مقارنة مع طيور معاملة السيطرة .