

Effect of sesame seeds on blood physiological and biochemical parameters in broiler breeder hens

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Abstract

The study was carried out to investigate the effect of employing sesame seeds in broiler breeder diet on some physiological parameters. 30 Cobb breeder hens (36 week age) were divided into 3 groups (10 hens each). The 1st group was reared on standard ration (control), the 2nd group was reared on standard ration and given orally Sesame seeds capsules daily (250 mg/kg) and the 3rd group was reared on standard ration and given orally Sesame seeds capsules daily (500 mg/kg). The treatment continues for 4 weeks period. Results showed a significant increase in the RBCs, Hb and PCV in the 2nd and 3rd group compared with the control group. This was accompanied by a significant decrease in MCV and MCH. Significant increase in the MCHC in the 3rd group compared with other groups after 2 and 4 weeks of treatment was noticed. Sesame seeds treatments for 4 weeks also caused a significant increase in the WBC count in the 2nd and 3rd group as compared with control. Hormonal Assay revealed that sesame seeds treatment with tow doses has no effects on plasma levels of LH hormone (4.94 and 4.48 miu/ml) compared with control (3.93 miu / ml), but the sesame seeds treatment (500 mg/kg) causes a significant increase in plasma levels of FSH (0.88 miu / ml) compared with the control (0.64 miu/ ml). Sesame seeds treatment, also, increased the egg weight, shell weight and yolk weight and it reached the levels of significantly in the 3rd group (66.15, 7.33 and 20.65 g) respectively as compared with control (61.48, 6.86 and 18.66 g), respectively. It is concluded that, sesame seeds treatment enhanced erythropoiesis, FSH activity and some productive parameters.

Keywords: Sesame seed; Erythropoiesis; Breeder hens.

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تأثير بذور السمسم في بعض الصفات الدموية والكيموحيوية في أمهات فروج اللحم

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الخلاصة

أجريت هذه الدراسة للبحث في تأثيرات استخدام بذور السمسم في علائق أمهات فروج اللحم على بعض الصفات الفسلجية والكيموحيوية، جرى تقسيم ٣٠ دجاجة بياضة نوع Cobb بعمر ٣٦ أسبوعاً إلى ٣ مجاميع (١٠ دجاجات/ مجموعة). المجموعة الأولى: ربيت على العليقة القياسية (مجموعة سيطرة)، المجموعة الثانية: ربيت على عليقة قياسية وأعطيت كبسولات بذور السمسم يوميا بالفم وبجرعة ٢٥٠ ملغم / كغم من وزن الجسم، والمجموعة الثالثة ربيت على عليقة قياسية وأعطيت كبسولات بذور السمسم يوميا بالفم وبجرعة (٥٠٠ ملغم / كغم من وزن الجسم)، واستمرت المعاملة لفترة ٤ أسابيع. بينت النتائج وجود ارتفاع معنوي في العدد الكلي لخلايا الدم الحمر وتركيز الهيموكلوبين وحجم خلايا الدم المرصوفة في المجموعتين الثانية والثالثة مقارنة مع السيطرة، وترافق هذا مع انخفاض معنوي في معدل حجم الكرية ومعدل هيموكلوبين الكرية، وارتفاع معنوي في نسبة معدل هيموكلوبين الكرية

في المجموعة الثالثة مقارنة مع السيطرة والمجموعة الثانية بعد ٢ أسبوع و٤ أسبوع من التربية. بينت الدراسة الهرمونية أن العليقة المحتوية على بذور السمسم بجرعته لم يكن لها تأثير في مستوى الهرمون اللوتيني لبلازما الدم (4.48 miu / ml, 4.94 miu / ml) مقارنة مع عليقة السيطرة (3.93 miu / ml), لكن العليقة المعاملة ببذور السمسم (٥٠٠ ملغم / كغم وزن جسم) رفعت معنويًا ($0.05 \geq$) مستوى الهرمون المحفز للجريب في بلازما الدم (0.88 miu / ml) مقارنة مع عليقة السيطرة (0.64 miu / ml). أدت المعاملة ببذور السمسم إلى رفع وزن البيضة، وزن القشرة ووزن الصفار معنويًا في المجموعة الثالثة (66.15 غم، 7.33 غم و 20.65 غم)، على التوالي مقارنة مع معاملة السيطرة (61.48 غم، 6.86 غم و 18.66 غم)، على التوالي. وقد استنتج من الدراسة أن إعطاء بذور السمسم في العليقة عزز عملية بناء الخلايا الحمر ونشاط الهرمون المحفز للجريب وبعض الصفات الإنتاجية.

Introduction

Plant seeds and herbs are used for treatments of diseases in the folk medicine. Their use was increased in many fields due to their safety and its low side effects as compared with chemical drugs (1). In animals researches, many plants were used to improve the health condition and production of animals, as Oak leaves (2), olive leaves (3) and Thymus (4). Sesame is an ancient oilseed and is one of the oldest cultivated plants in the world, It is a popular food in many Asian countries (5). Sesame seeds are rich in compounds with powerful antioxidant properties (6), it belongs to its lignan which consists of about 1.5 % of the sesame seeds or oil, the majority of which are sesamin and sesamol (5, 7). Sesame seed consumption appears to increase plasma gamma-tocopherol and enhance vitamin E activity which in turn prevent cancer and heart diseases (8). Animal studies provided some scientific evidence for its antiaging effects (5). Intestinal microflora convert lignans into Enterolactone and Enterodiols agents which are responsible for its estrogenic activity (9).

The present study aimed to evaluate the Sesame seeds effects on blood picture and some biochemical parameters in broiler breeders.

Materials and methods

The plant material was consisted of Sesame seeds (*Sesamum indicum*) which belongs to the Family Pedaliaceae.

The study was carried on 30 Cobb layer hens (36 weeks age) and were divided into 3 groups (10 hens each). The treatment continued daily for 4 weeks period. The 1st group was reared on standard ration (control) and given empty capsules (placebo). The 2nd group was reared on standard ration and given orally Sesame seeds capsules daily (250 mg / kg b.wt) for 4 weeks, the 3rd group was reared on standard ration and given orally Sesame seeds capsules daily (500 mg / kg b.wt).

Blood samples were collected on the 14th and 28th days of treatment periods from the wing vein. The blood was divided into 2 parts, one with anticoagulant (EDTA) and

used for the examination of blood picture, the other part was used to separate the serum which used for hormonal assay (LH and FSH). Eggs also collected at the end of 4 weeks treatment and subjected to few measurements.

Blood was used for determination of : Total red blood cells count (RBC) and Total white blood cells count (WBC), according to (10), Hemoglobin concentration (Hb), Packed cell volume (PCV), Mean corpuscular volume (MCV), Mean corpuscular hemoglobin (MCH), and the Mean corpuscular hemoglobin concentration (MCHC), according to (11).

Serum : was used to determine leutenizing hormone (LH) concentration by Enzyme immunoassay test kit (Manobind Inc), Based on quantitative tests of a solid phase Enzyme – Linked Immunosorbent assay (ELISA).

Eggs : eggs were subjected to the following : egg weight, yolk weight, shell weight and shell thickness.

One way analysis of variance, was used for data analysis and specific groups differences were determined using Duncan's multiple range test (12) at $P \leq 0.05$ significant level.

Results

The Sesame seeds in breeder diet enhances the erythropoiesis as shown by a significant increase in the RBC count, Hb and PCV compared with the control group, and it was reflected in the significant decrease in the MCV and MCH, and the significant increase in the MCHC, after 2 weeks of treatment, (Table 1) and after 4 weeks of treatment (Table 2). Sesame seeds treatment for 4 weeks also caused a significant increase in the total leucocytes count as compared with the control group (Table 2).

Sesame seeds treatment (500 mg / kg b.wt) caused a significant increase in egg weight, shell weight and yolk weight as compared with the control group (Fig 1 and 2) respectively.

The hormonal study revealed that the LH plasma levels were not affected by Sesame seeds treatment, while the FSH plasma levels were significantly ($P \leq 0.05$) increased compared with the control group (Fig.1 and Fig.2), respectively.

Discussion

Sesame seeds effects which enhances the blood picture represented by the increase in RBC, Hb and PCV, may be related to Sesame lignans which have an antioxidant and health promoting activities. (6), also Sesame ingestion significantly increased the time for erythrocyte hemolysis due to the reduction of the thiobarbituric acid – reactive substances (13). In animals studies.(14) showed feeding Sesame lignans to rats resulted in a significant increase of γ - tocopherol levels in blood and liver, and a significant decrease in lipid peroxidation, which prevents the free radical damaging to the cell membrane and prevents it's hemolysis further more, (15) showed that the increase in prooxidant elements reduced the activity of γ Aminolevulinat dehydrates (γ - AIA-D), which in a sulfhydryl containing enzyme, (16) explain that γ - AIA – D is an essential enzyme for the biosynthesis of physiologically important protein as hemoglobin and

cytochromes. The significant decrease in MCV and MCVH may belongs to the presence of negative correlation with the RBC, Hb and PCV (17), and the significant increase in the MCHC may belongs to the positive correlation with the Hb concentration (17). On the other hand, (18) showed that Sesame seeds increases FSH levels due to increasing the sex hormone binding globulin, (SHBG) plasma levels.(19) revealed that the increase in SHBG tends to decrease the plasma free estradiol level in women, this will reduces the negative feed back effects of estradiol on FSH release from the anterior pituitary, so that FSH level will continue at a high levels Increased FSH activity in the Sesame seeds treated groups may enhance the ovarian follicle maturation which is illustrated by the significant increase in yolk weight, As a result, a significant increase in the egg weight was recorded and it's well known that as the egg weight increase, the shell weight will increase also. In conclusion, Sesame seeds treatment in laying hens will improve some physiological and productive parameters.

Table 1: Effect of feeding sesame seeds on some blood parameters in broiler breeder hens after 2 weeks of treatment.

Treatments	Parameters						
	RBCs Million/ mm ³	Hb gm / 100 ml	PCV %	MCV micron	MCH picogram	MCHC %	WBCs Cell / mm ³
Control	2.07 c ± 0.04	10.66 c ± 0.17	30.16 b ± 0.74	145.41 a ± 3.49	51.55 a ± 1.47	35.42 b ± 0.96	20100.0 a ± 235.23
Sesame 250 mg /kg b.wt	2.42 b ± 0.06	12.23 b ± 0.23	33.66 a ± 0.21	139.31 a ± 3.31	51.81 a ± 1.54	36.30 b ± 0.80	20633.33 a ± 270.39
Sesame 500 mg /kg b.wt	3.14 a ± 0.08	14.46 a ± 0.35	32.83 a ± 0.83	104.75 b ± 3.13	46.50 b ± 1.66	44.20 a ± 1.83	2006.67 a ± 138.24

* All values are expressed as mean ± SE, 6 animals / group.

* Means with different superscripts are statistically ($P \leq 0.05$) different.

Table 2: Effect of feeding sesame seeds on some blood parameters in broiler breeder hens after 4 weeks of treatment.

Treatments	Parameters						
	RBCs Million/ mm ³	Hb gm / 100 ml	PCV %	MCV micron	MCH picogram	MCHC %	WBCs Cell / mm ³
Control	2.06 c ± 0.06	10.83 c ± 0.18	28.83 b ± 0.30	140.38 a ± 3.79	53.81 a ± 1.10	39.20 b ± 1.51	16183.33 c ± 70.31
Sesame 250 mg /kg b.wt	2.58 b ± 0.08	12.53 b ± 0.21	32.83 a ± 0.79	127.91 b ± 5.29	49.65 b ± 1.35	38.28 b ± 1.41	19516.67 b ± 16.86
Sesame 500 mg /kg b.wt	3.47 a ± 0.08	15.06 a ± 0.43	34.00 a ± 0.44	97.96 c ± 1.76	43.85 c ± 0.80	44.26 a ± 1.06	20600.00 a ± 13.90

* All values are expressed as mean ± SE, 6 animals / group.

* Means with different superscripts are statistically ($P \leq 0.05$) different.

Table 3: Effect of sesame seeds on some egg parameters in laying hens.

Treatments	Parameters			
	egg weight, g	shell weight, g	shell thickness, mm	yolk weight, mm
Control	61.48 ± 1.39 b	6.86 ± 0.21 b	0.42 ± 0.01 a	18.66 ± 0.80 b
Sesame 250 mg /kg b.wt	63.56 ± 1.37 ab	6.68 ± 0.13 b	0.39 ± 0.03 a	19.53 ± 0.55 ab
Sesame 500 mg /kg b.wt	66.15 ± 1.21 a	7.33 ± 0.08 a	0.42 ± 0.02 a	20.65 ± 0.38 a

Values are mean ± SE, 6 animals / group. Means with different superscripts are statistically (P ≤ 0.05) different.

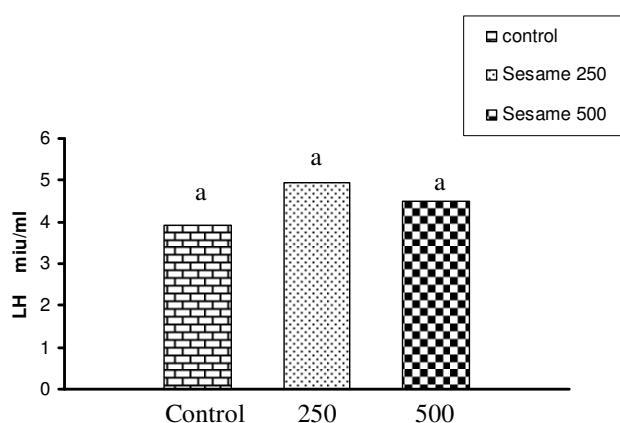


Fig. 1: Effect of Sesame treatment (250 and 500 mg/kg) on LH level (miu/ml) in serum of broiler breeder hens.

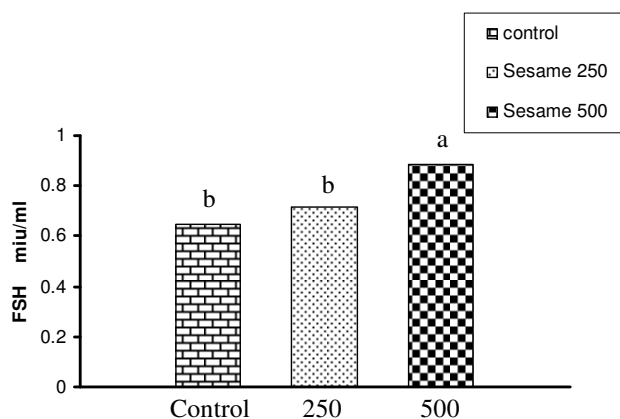


Fig. 2: Effect of Sesame treatment (250 and 500 mg/kg) on FSH level (miu/ml) in serum of broiler breeder hens.

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