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The effect of sex and slaughter age on some blood traits in ROSS 308 broilers

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Abstract

This experiment was conducted at the agricultural department in the ministry of science and technology to study the effect of sex and slaughter age on some blood traits in ROSS 308 broilers. One Hundred Eighty One day old ROSS 308 broilers were fed the starter diet to the age of 28 day. Then sexed, males and females were separated and fed the grower diet to the age of slaughter. 20 birds were slaughtered 5 male and 5 females at the age of 42 days and another 5 males and 5 females at the age of 49 days. The level of the glucose, cholesterol, triglyceride, VLDL, total protein, globulin, albumin and uric acid, ALT, GPT in the blood serum were measured. Results showed that the interaction between sex and age of slaughter had no effect on any of the measured traits. Both sex and age of slaughter had no significant effect on level of the glucose, cholesterol, triglyceride, VLDL, total protein, globulin, albumin, Alanine transaminase ALT, Creatine kinase CK in the blood serum. While males recorded higher uric acid than females. Females had a significantly higher cholesterol and triglyceride than females. Birds at 42 days of age had cholesterol significantly higher than those at 49 days of age. Interaction between sex and age had no effect on blood traits. Sex did not had effect on protein level but it affected fats and its components.

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Introduction

Many changes had taken place in the last few decades in the marketing trends of broilers which led to changes in the ages and the preferable sex complying with the needs of consumers (Abdullah and Matarneh, 2010). The effects of age and sex on broiler's performance were studied by many researchers (Young *et al*, 2001; Lopez *et al*, 2011; Beg *et al* 2016). Anyway, the physiological effects of sex and age on broiler's health and blood traits are important as well as their effects on performance.

Sex and age both are of the most influential factors on broiler's performance, product quality and it's health and immunity. They are effectual on blood physical and biochemical traits which is reflected directly on the flock health and performance (Cahaner *et al.*, 2008). Selection programs concentrate on the highest productivity and the best feed conversion ratio but it can lead to behavioral changes and serious immune problems for broilers (Rauw *et al.*, 1998).

The bird's natural biochemical values can be used to evaluate both of their health and performance. Some variation in the physiological values are noticed in birds which is attributed to the varied methods used in measurement and the seasonal effects on the values of biological traits of the birds (Schmid and Forstner, 1986). For example there is a recorded seasonal variation of total protein, aspartate amino transferase AST and lactate dehydrogenase LDH levels in broiler's blood. Creatine kinase CK is increased in the muscles by physiological stress (Xie *et al.*, 2015). The changes in blood traits caused by age is a huge physiological detour can be clearly seen in many variables such as alkaline phosphatae ALP and total cholesterol (Holt, 1998). To investigate the theory age and sex effect on biochemical blood traits, this experiment was conducted to study the effect of sex and the age of slaughtering on some blood traits of ROSS 308 broilers.

Materials and methods

Study area

This experiment was carried out in Animal science department in the Ministry of science.

One hundred eighty one day-old broiler chicks (Ross 308), were housed in fully closed house, weighted individually. Feed and water were available *ad libitum*. Wood shavings were used as litter. Starter (1-28 days of age) and finisher (28-49 days of age) diets were formulated according to the requirements of the NRC (1994) (Table 1). The animal welfare blood sampling was supervised and licensed by ethical committee in Animal science department- Ministry of science. Continuous lighting program (23 hours lightning: 1 hour darkness) was used. birds were separated into two groups males and females at the age of 28 days each group contains 9 replicates each replicate contains 10 birds with two slaughtering ages 42 and 49 days of age, 5 ml³ of blood was collected from the brachial vein of 10 birds per group (10 males, 10 females) at 42 and 49 days of age for hematological tests using evacuated tube.

Table 1. The experimental diets.

Ingredients	Starter %	Finisher %
Corn	60	65
Soybean meal(48.5 %)	35	30
Premix *	4	4
Vegetable oil	1	1
Total	100	100
Calculated chemical analysis**		
Crude protein %	22.08	20.07
Metabolizable energy (kcal/kgm)	2954	2999.5
Lysine	1.22	0.97
methionine	0.51	0.59
Met + cys	0.38	0.39
Calcium	0.75	0.73
phosphor	0.55	0.54

*premix made by Al- Waha company. Syrian made. contents: DCP, Met, choline chloride, vitamins + minerals, calcium carbonate, antioxidant, antifungal, antioxidia, salt.

**NRC

Studied blood traits

The serum was analyzed for total triglyceride, very low density lipoprotein (VLDL), total protein, glucose, uric acid, albumin, globulin, cholesterol, triglycerides, phosphor, GPT, ALT were measured, using kits from Biocon© company (Franey, J. and Elias, 1969).

Statistical Analysis

Data were analyzed using ANOVA factorial design followed by Duncan multiple range test between treatment means (Duncan, 1955) with the aid of SPSS 11.0 statistical software (Spss, Inc, Chicago, IL,2001).

Results and discussion

Results showed no effects for the interaction between the sex and the age of slaughtering on all of the studied traits in this experiment. It's obvious in table (2) that no significant effects were noticed for both of the sex and the age of slaughtering on glucose, total protein, and albumin levels. While the sex had a significant effect on uric acid level in males blood which was higher than females, at the same time the age of slaughtering had no effect on it.

Table 2. The effect of sex and age of slaughter on blood glucose, uric acid, total protein, and albumin levels.

Trait factor	Glucose mg/dl	Uric acid mg/dl	Total protein gm/dl	Albumin gm/dl
Sex				
Male	383	25.5 a	3.29	1.67
Female	388	23.9 b	3.21	1.63
Age of slaughter				
42 days	284	25.8 a	3.28	1.68
49 days	287	25.3 a	3.27	1.64
Sex	N.S	**	N.S	N.S
Age	N.S	N.S	N.S	N.S
Sex – age interaction	N.S	N.S	N.S	N.S

The results in table 3 showed no effects for the sex or the age of slaughtering on the blood levels of globulin and VLDL. The sex and the age of slaughtering had significant effect on blood levels of cholesterol and triglycerides, which were higher in females blood compared to males, cholesterol increased at 42 days of age and triglycerides increased at 49 days of age. In table 4 there were no significant effect for the sex or the age of slaughtering on phosphor, Creatine kinase CK and Alanine transaminase ALT blood levels.

Total protein is one of the basic traits in recognizing the bird's body status. it's known that plasma proteins plays an important role in preserving blood osmotic pressure, it's also the instant for the essential amino acids that may be needed for protein synthesis and it's contributes minerals and hormones transportation.

Albumin participates in tissue building and rejuvenation at the rapid growing period for chicks (Yaman *et al.*, 2000; Filipovic *et al.*, 2007).

Table 3. The effect of sex and age of slaughter on blood globulin, cholesterol, triglycerides and very low density lipoprotein levels.

Trait factor	Globulin gm/dl	Cholesterol mg/dl	Triglycerides mg/100 ml	VLDL mg/100 ml
Sex				
Male	1.62	120.7 c	42.85 d	8.57
Female	1.59	135.0 a	44.28 c	8.85
Age of slaughter				
42 days	1.60	130.0 b	45.71 b	9.14
49 days	1.63	129.5 c	48.00 a	9.60
Sex	N.S	**	**	N.S
Age	N.S	**	**	N.S
Sex – age interaction	N.S	N.S	N.S	N.S

Table 4. The effect of sex and age of slaughter on blood levels of phosphor, Creatine kinase CK and Alanine transaminase ALT.

Trait Factor	Phosphor mg/100 ml	CK IU/L	ALT IU/L
Sex			
Male	4.67	6.77	7.76
Female	4.69	6.72	7.71
Age of slaughter			
42 days	4.71	6.78	7.72
49 days	4.71	6.76	7.73
Sex	N.S	N.S	N.S
Age	N.S	N.S	N.S
Sex – age interaction	N.S	N.S	N.S

In our current study the sex and the age of slaughtering had no effect on blood levels of total protein, albumin and globulin, these results didn't agree with those of Meluzzi *et al* (1992) and Rajman *et al* (2006) who noticed increased blood protein with aging by 20- 30 % when comparing 14 days of age with 42 days of age. This disagreement between the current study and these previous studies is because of the variation of the ages studied for blood proteins and the short period between 42 and 49 days of age in the current study. The results of the current study agrees with the results of Filipovic *et al* (1992) and Silva *et al* (2007) who didn't record any significant differences for blood albumin levels in varied ages of broiler.

Uric acid is the main product of protein metabolism, it's also an essential antioxidant in the body (Sturkie, 2000, Jurani *et al.*, 2004). Any alterations in protein metabolism will alter the uric acid concentration in the blood. Broiler's males had a higher uric acid concentration in the current study comparing to females because of the higher muscular activity in males (Sturkie, 2000) which is affirmed by Harr (2002) who recorded lower blood uric acid in females before sexual maturity.

The increment of blood triglycerides at 42 days of age comparing to 49 days of age in our study agrees with the results of Kececi and Col (2011) who found an increment in blood triglycerides of young birds. The significantly higher cholesterol concentration at the age of 42 days is caused by high need for energy at this stage for the rapid body development (Almeida *et al.*, 2006). No differences were recorded for glucose concentrations in the current study agrees with the results of Ritchie *et al.* (1994) who noticed higher blood glucose in the older birds. It doesn't agree with sturkie (2000) who affirm the increment of males blood glucose compared to females, while it agrees with the results of Coles and Campbell (1986) and Abdi- Hachesoo *et al* (2011) who didn't record any significant differences for blood glucose level between the two sexes or between ages. Blood phosphor level didn't differ between sexes or ages in this study don't agree with Oguz *et al.* (2000) results, who found significant differences for blood phosphor level between ages of broilers, while Harr (2002) affirm that the results of blood minerals varies according to laboratory methods, breed and genetic line. The levels of blood GPT and ALT enzymes wasn't significantly different in the current study, this result agrees with that of Meluzzi *et al* (1992) and Albokdaim *et al* (2012). Also, no differences were noticed in our study for the levels of VLDL, this agrees with what mentioned by Krasnodebs Depta and Koncicki (2000) and Sarikhan *et al.* (2009).

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