EFFECT OF IN-OVO NANO-SELENIUM INJECTION ON PRODUCTIVE PERFORMANCE, BLOOD PARAMETERS AND PLASMA CONSTITUENTS OF IMPROVED BALADI CHICKENS

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ABSTRACT:

This study was carried out in the poultry experimental unit, poultry production department, Faculty of agriculture, Fayoum university. It amid to study the effect of in ovo injection by selenium nano particles on body weight, body weight gain, feed intake, feed conversion, carcass traits, plasma protein constituents, plasma lipid constituents, and some blood parameters at the 7 week of age of improved Baladi chicken raised in an semi open house during the period from April to July.

A total number of 525 fertile improved Baladi eggs with an average weight of 51.30g±0.81 were used. Before incubation, eggs were randomly divided into seven groups. The first group was non-injected eggs, considered as control(T_1), the second group was injected into air sac with 0.1 ml sterile water with volume of 0.1 ml/egg (T_2), the third group was only punctured (T_3) while the fourth (T_4), fifth (T_5) , sixth (T_6) and seventh (T_7) groups were injected into air sac with consentration of 0.05, 0.075, 0.1 and 0.2 µg SeNPs respectively . All eggs were normally incubated at 37.5 ºC and 65% relative humidity in an automatic incubator. Egg injection procedure was carried out at day 10 of incubation. At the 18^{th} day of incubation, all eggs were transferred to the hatcher and kept till hatching at 36.5°C and 80% RH. The hatched chicks from the seven groups were brooded in suitable floor pens with chopped wheat straw litter. Then Chicks were housed in galvanized wire cage batteries for 7 weeks of age.

Results obtained could be summarized as follows:

1- Finally body weight, Body weight gain were significantly increased in treated groups compared by control groups.

2- Feed consumption increased but feed conversion ratio improved in selenium nano particles treatments compared by control.

3- SeNPs injection of improved Baladi chicken increased carcass%, liver% and gizzard%.

Key words: Nano, nano selenium, body weight, feed conversion, plasma protein, plasma lipid.

INTRODUCTION:

Nano is the mean of ‘Dwarf’ in Latin language and the conception of nano-technology was first time presented by Noble Laureate Physicist in 1952 called Richard P. Fennan in South California ***(Kakade, 2003)***. Nanotechnology means a technology of experimenting and controlling with particles, called nano-particles that are shown in the scale of nanometers (a billionth of a meter). It is believed as a possible technology to improve animal health and other areas of

animal production ***(Sekhon, 2012).*** There are various types of nanoparticles such as silver nanoparticles, salicylic acid, glutamine and essential oils can be used as novel antimicrobial agents in extending the shelf life of different food products**.**

Selenium (Se) discoverd, as an element, was made in 1817 by the Swedish chemist, Jöns Jakob Berzelius, through what was, at that time, an elegant analytical process (***Oldfield, 2006).***

In chickens, previous reports indicated that deficiency of Se is significantly associated with the depression of body weight ***(Yoon et al., 2007)***. On the other words, There are many beneficial influences of selenium on feed consumption, where increased Se levels increased broiler weight, faster growth, higher yielding of broilers and reduced mortality in poultry compared with untreated group ***(Jianhua et al., 2000 and Singh et al., 2006)***. Selenium was sufficient to maintain good performance by the broilers, but additional Se appeared to be necessary to optimize growth ***(Upton et al., 2008).***

Khazraie and Ghazanfarpoor (2015) showed that the food usage rate from 21 to 32 days old in Nano selenium users group had a meaningful increase ($p\leq 0/05$). But this quality from 32 to 42 days old not have any meaningful difference. However, ***El-Deep et al. (2016),*** recorded that it could be observed that FCR was remarkably improved ($p\leq 0/05$) when diets were supplemented with nano-Se under both environmental conditions. Also, ***Yang et al. (2012)*** reported that selenium enhances the metabolism of thyroid hormones, which are important for normal growth and development.

Faixova et al. (2007) found that RBCs count was increased by Se supplementation ($P < 0.01$) in lambs by use Se-yeast, while WBCs count was increased in lambs given basic diet ($P < 0.05$). Whereas, Red blood cells count and Hb were significantly ($P\leq 0.05$) higher for layers fed diets contained sodium selenite as compared with those fed organic Se ***(Hassan et al., 2009).*** In addition, It is important for example that neutrophils provide a high oxidizing intracellular environment to kill phagocytized bacteria, but it is essential that neutrophils regulate the balance between reactive oxygen metabolites (superoxide [O_2-] and hydrogen peroxide [H_2O_2]) in order not to damage the cell leading to it's death (***Silvestre et al.,*** **2007**).

MATERIALS AND METHODS:

A total number of 525 fertile improved Baladi eggs (Saso with Golden Montazah) with an average weight of 51.30g±0.81 were used. Before incubation, eggs were randomly divided into seven groups. The first group was non-injected eggs, considered as control(T_1), the second group was injected into air sac with sterile water with volume of 0.1 ml/egg (T_2), the third group was only punctured (T_3) while the fourth (T_4), fifth (T_5) , sixth (T_6) and seventh (T_7) groups were injected with 0.1 ml water into air sac of 0.05, 0.075, 0.1 and 0.2 µg SeNPs respectively . All eggs were normally incubated at 37.5 ºC and 65% relative humidity (RH). Egg injection procedure was carried out at day 10 of incubation. Thus, the wide end of each egg (location of air cell) was disinfected by ethyl

alcohol. The point site of injection was punctured by hard and thin stylus and the tested material was injected into the air sac of each egg by using graded syringe and the punctured site was sealed with non-toxic wax stick. At the 18th day of incubation, all eggs were transferred to the hatcher and kept till hatching at 36.5°C and 80% RH. The hatched chicks from the seven groups were brooded in suitable floor pens with chopped wheat straw litter. Then Chicks were housed in galvanized wire cage batteries (30 chick per treatment divided into 3 replicates as 10 chicks per each) for 7 weeks of age . The following measurements were recorded:

Experimental diets:

Chicks were fed using two-phase feeding system, chicks received the starter diet from 0-4 weeks of age (21% crude protein and 2950 Kcal/Kg) and the grower diet from 5-7 weeks (17.5% crude protein and 3000 Kcal/Kg) of age

Growth performance parameters:

Live performance measurements, for each feeding period, were measured and/or calculated in terms of live body weight (LBW), body weight gain (BWG), feed intake (FI) and feed conversion ratio (FCR).

3.8.4 Feed conversion ratio (FCR):

The FCR was calculated for each bird under each treatment by using the following formula:

FCR = FC (g)/bird during a certain period / BWG (g)/bird during the same period

Slaughter Test:

At the end of the experiment (7 weeks of age), 42 birds (6 birds/treatment) with BW similar to the treatment mean were randomly taken for slaughtering. Feed withdrawal overnight then individually weighed and slaughtered by cutting the jugular veins and carotid arteries of both sides of the neck just caudal to the larynx, to determine carcass characteristics.

Carcass Parameters:

Carcass weight:

Carcasses were eviscerated manually and individually reweighed after the removal of head, neck, shanks, viscera and giblets (liver, heart and gizzard) to obtain the dressed weight. Dressing percentage was then calculated relatively to LBW by using the following equation:

Dressing % = [(Carcass weight+Giblets weight)/ (Pre-slaughter weight)] × 100.

Carcass % = (Carcass weight/LBW) × 100.

Giblets weight:

Edible giblets (liver, heart and empty gizzard) were carefully separated, accurately weighed and proportionated to the live BW.

Blood Parameters:

On the end of the trial, individual blood samples, of about 5 ml, from randomly 42 birds (6 birds/treatment) were immediately taken during slaughtering into heparinized tubes.

Plasma were individually separated by centrifugation at 3000 rpm for 10 minutes, transferred into a clean Ependorf vials and stored in a deep freezer at approximately -20 °C for later analysis.

Plasma constituents were determined calorimetrically, on individual bases, by using Spectrophotometer (model, GBC906 AA) and suitable commercial diagnostic kits (Stambio, San Antonio, Texas, USA) following the same steps as described by ***Allain et al. (1974)*** for cholesterol, ***Fassati and Prencipe (1982)*** for triglycerides.

Red blood cells (RBC's) count:

The RBCs count was determined by using hemocytometer according to ***Perkins (2009)***.

Hemoglobin (Hb)%:

The Hb analyzed colorimetrically according to ***Van Kampen and Zillstra (1983)***.

Hematocrit (Ht%):

Hematocrit was measured by capillary tubes, the opposite end of the tubes were sealed, and then centrifuged for 10 minutes at 3,000 rpm according to ***Bauer (1970)***.

Mean corpuscular volume (MCV):

The MCV was calculated using the following formula as reported by ***Perkins (2009)***.

MCV (fL; 10^{-15}L) = (Ht% / RBCs count [10^6/ µL]) X 10

Mean corpuscular hemoglobin (MCH):

The MCH was calculated using the following formula according to ***Perkins (2009)***.

MCH (pg; 10^{-12} g) = (Hb (gm/dL) / RBCs count [10^6/ µL]) X 10

Mean corpuscular hemoglobin concentration (MCHC):

The **MCHC** was calculated by using the following equation according to ***Perkins (2009)***.

MCHC (%) = (Hb (gm/dL) / Ht %) X100

RESULTS AND DISCUSSION

Effect of in-ovo injection by different levels of SeNPs on growth performance:

Body weight (BW):

It clearly noted from the present results that in-ovo injection during incubation with SeNPs significantly (P≤0.05) increased live body weight at last day of experiment as shown in **Table (1)**. The chicks that injected by 0.1 µg Se NPs was the highest body weight at day old, 4 and 7 weeks the values were 38.53, 411.31 and 975.41g, respectively, compared by control, 33.71, 340.65 and 800.26g respectively. These results are consistent with ***El Said (2015)*** who found that final body weight of treatment groups was significantly (P≤0.05) increase and ***Konkov et al (2015)*** who indicated that increase live body weight in all groups compared with the control, and the optimal concentration of nano selenium is 0.001 microgr/kg of a bird weight. Also, ***Khazraie and Ghazanfarpoor (2015)*** recorded that using dietary 0.2 mg/Kg Nano selenium made a meaning full weight increase in chickens by 21 to 32 days old in comparison with control group (p<0/05).

Body weight gain (BWG):

In-ovo injection during incubation with SeNPs increased body weight gain at 7 weeks of age as shown in **Table (2)**. The chicks of T_6 that injected by 0.1 µg Se NPs was the highest body weight gain during day old-7 weeks period where recorded 936.91g compared by control that recorded 766.56 g. These results are in agreement with ***Tabeidian et al., (2015)*** who found a significant increase in body weight gain by SN supplementation at 0.5 mg/kg compared to other treatments. Also, ***Bagheri et al., (2015)*** showed an increase in final average weight gain of groups supplemented with Nano-Se compared with the two other groups. Whereas, ***Wang (2009)*** showed that compared with the control, Se supplementation remarkably improved daily weight gain .However, no significant difference was observed between sources of se, when compared three treatments that showed that average daily gain, gain/feed for Nano Se group reached a plateau at the Se concentration of 0.15–1.20 mg/kg. However no significant different was found between the two sources of se.

Feed consumption (FC):

Effect of in-ovo injection of nano Se at different levels on feed consumption of improved Baladi chickens (0-7 weeks) are presented in **Table (3)**. It is apparent that feed consumption were affected ($P \leq 0.05$) by nano Se levels. ***El Said (2015)*** reported that administration in ovo of Nano Se with different levels (20 and 40 ppb) at 7 and 14 days of incubation for each level increased feed consumption and feed conversion of Nano-Se groups compared to control. However, no significant differences between the two levels of Nano-Se or between two-injectiontimes.Also, ***El-Deep et al., (2016)*** Compared three dietary supplementations and they found dietary supplementation with Nano-Se (0.3 mg/kg diet) increase feed intake under high ambient temperature conditions.

Feed conversion ratio (FCR)

Effect of in-ovo injection of Se nano form at different levels on feed conversion ratio of improved Baladi chickens (0-7 weeks) are presented in **Tables (4**). It is apparent that feed conversion ratio were affected ($P \leq 0.05$) by nano Se, in which feed conversion ratio were improved in Nano Se treatments significantly ($P \leq 0.05$) compared to control. Similar results were observed in other studies, ***El-Deep et al., (2016)*** Compared three dietary supplementations and they found dietary supplementation with Nano-Se (0.3 mg/kg diet) improve feed conversion ratio under high ambient temperature conditions. And ***Wang (2009)*** showed that compared with the control, Se supplementation remarkably decreased feed conversion ratio. However, no significant difference was observed between sources of se,when they compared three treatment were fed with diets containing 0.2 mg/kg sodium selenite, 0.2 mg/kg nano-Se, and 0.5 mg/kg/ nano-Se, and the control groups were fed basal diets without Se addition. Also, ***Radwan et al., (2015)*** supplied two sources of Se (sodium selenite and Nano-Se) and 3 levels of each source (0.10, 0.25 and 0.40 ppm) and showed that the feed conversion ratio was significantly improved, by adding Nano-Se in layer diets. ***Bagheri et al., (2015)*** supplemented diets containing sodium selenite (SS), L-selenomethionine (L-Se-Me) and Nano-Selenium (Nano-Se) with levels 0.2 and 0.5 mg/kg for each treatment and showed that feed conversion ratio of

groups supplemented with Nano-Se have been decreased compared with the two other groups.

Carcass Parameters:

Dressing %, Carcass % and giblets weight %:

Dressing % and Carcass % were significantly affected by nano selenium injection groups compared by control groups, This may be due to an increase in final body weight in nano selenium groups compared by control groups, the highest mean was 81.161 and 64.796 (Dressing% and Carcass % respectively) for T_6 group.

Recorded data showed a significant differences (p≤ 0/05) in final weight of liver and gizzard and showed no significant differences (p≤ 0.05) in final weight of Heart and Gizzard **(Table 5)**. Same data were observed by ***El Said (2015*)** observed that relative weight of giblets had significantly increased in Selenium treated birds comparison with control treatment. The highest relative weights of these organs were observed in T_3 (40mg nano selenium) and T_2 (20mg nano selenium) groups. Also, ***Ozbal et al. (2008) and Kuchan and Milner (1992)*** recorded that Selenium was the co-factor and activator of 1,5'deiodinase that was a key enzyme of triiodothryonine (T3) synthesis, and T3 was the growth control components of animals particularly poultry by controlling the body's energy and protein assimilation, and thus could regulate animal growth and therefor increase carcass%. Also, The using of an organic resources of selenium (quail selenite sodium and Nano selenium) it wasn't observed any meaningful difference between different attendance among carcass percent, gizzard, heart and Liver percent in Nano selenium users group was decreased than the two groups, but it wasn't meaningful statistically (p≤ 0/05) (***Khazraie and Ghazanfarpoor, 2015)***.Whereas, The percentages of carcass weight were higher in Selenium treated birds. Yield of thigh was increased in Se treated birds compared to birds from the untreated group. The increase in yields of thigh weight appears to reflect improved growth in the SePs treated broilers and thus increases carcass weight ***(Upton et al.*, 2008)**.

plasma lipid constituents:

Results in **Table (6)** clearly show that *in ovo* injection with SeNPs was highly significant increase chick's plasma HDL concentration compared with control group. However, LDL concentration and L/H ratio was significantly decreased in chicks from SeNPs compared with control group. It is possible that egg treatments can cause metabolizable energy to be diverted from embryo development to effect associated with nutrient absorption, assimilation and utilization. This may explain inconsistent trends in plasma lipid measurements which obtained in the present study. This result agrees with ***El Said (2015)*** who noted that SeNPs treatments significantly decreased plasma level of total lipids, cholesterol and triglycerides. The pronounced reduction may be associated with increasing triglycerides metabolism as a source of energy in absence of other metabolites required for energy (VFA and glucose levels). Also, ***Radwan et al., (2015)*** found that Nano-Se significantly reduced total cholesterol and increased HDL-cholesterol to total cholesterol ratio in maternal hens (plasma and yolk).

Some blood parameters:

Results in **table (7)** shows no significant differences (p≤ 0/05) in red blood cells count but observed that white blood cells count significantly affected (p≤ 0/05) in nano selenium treated groups compared by control groups. Mean corpuscular hemoglobin (MCH) and Mean corpuscular hemoglobin concentration (MCHC), showed no significant differences (p≤ 0/05) **(Table 7)**, However hemoglobin and hematocrit recorded significant differences (p≤ 0/05) in nano selenium treated groups compared by control groups. ***Boostani et al. (2014)*** explain the effect of organic and non organic nano selenium and reported that the oxidative stress on blood attributes ox datively stressed birds recorded a higher basophil number compared to non-stressed birds ($P \leq 0.05$). MCV showed a significant difference among the experimental groups ($P \leq 0.05$). Within each rearing condition, however, no different were found among the treatment groups ($P \leq 0.05$). The number of total Hb, hematocrit, MCH and MCHC were not different among the experimental groups ($P \leq 0.05$). Organic and non organic nano selenium and oxidative stress effect on MCV. Also, ***Tabeidian et al., (2015)*** found that no significant different on antibody titers against Influenza virus, sheep red blood cell and Newcastle Disease between selenium-enriched yeast, sodium selenite and nano se. also, no significant different on the relative weight of bursa of Fabricius and spleen between sources of se. However, ***Mohapatra et al., (2014a,b)*** found that the hemoglobin content, total erythrocytes count (TEC) and PCV values showed no significant difference among sodium selenite and Nano-Se groups at 8 and 20 wks of age. In addition, ***Selim et al., (2015)*** found that adverse effect of adding sodium selenite in broiler diets on values of total erythrocytes count (TEC), hemoglobin (Hb) and hematocrit (Ht) of chicks at 40 days of age compared with Nano-Se supplemented group, while increasing level of supplementation of Nano-Se from 0.15 to 0.30 ppm did not change values of hematological parameters significantly. Neither supplemental Se sources nor levels change mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) or mean corpuscular hemoglobin concentration (MCH) among treatments. Also, ***Mohamed et al., (2016)*** Supplemented Nano seleniumto the diet resulted in a significant increase in hemoglobin concentration. However, no significant different on WBC, Eosinophils % and Monocytes % for Sinai chicks.

Table (1): Effect of in-ovo injection by different levels of SeNPs on body weight (g).

Treatments		Body weight (g)		
		Day old	4 - week	7 -week
Control	T_1	33.71 ^{e}	340.65 ^{c}	800.26 ^{c}
	T_2	35.83 ^{cd}	336.79 ^{c}	785.35 ^{c}
	T_3	35.40 ^{d}	333.65 ^{c}	782.15 ^{c}
SeNPs	T_4	37.90 ^{ab}	366.63 ^{b}	874.45 ^{b}
	T_5	38.21 ^{a}	371.88 ^{b}	882.11 ^{b}
	T_6	38.53 ^{a}	411.31 ^{a}	975.41 ^{a}
	T_7	36.80 ^{bc}	363.05 ^{b}	859.50 ^{b}
± SE		0.35	4.87	15.53

a, b, c,d Means in the same column with different superscripts are significantly different (p≤0.05). T_1: control, T_2: control (ddH_2O injection), T_3: control (pitted), T_4: 0.05 µSe NP, T_5: 0.075 µgSe NP, T_6: 0.1µgSe NP, T_7: 0.2 µgSe NP.

Table (2): Effect of in-ovo injection by different levels of SeNPs on body weight gain (g).

Treatments		Body weight gain (g)		
		Day old – 4 weeks	4 - 7 weeks	Day old - 7 weeks
Control	T_1	306.95 ^{c}	459.60	766.56 ^{c}
	T_2	300.99 ^{c}	448.65	749.55 ^{c}
	T_3	298.25 ^{c}	448.59	746.75 ^{c}
SeNPs	T_4	328.73 ^{b}	507.82	836.55 ^{b}
	T_5	333.68 ^{b}	510.23	843.90 ^{b}
	T_6	372.81 ^{b}	564.10	936.91 ^{a}
	T_7	326.25 ^{a}	496.46	822.70 ^{b}
± SE		4.84	14.17	15.53

a, b, c,d Means in the same column with different superscripts are significantly different ($p \leq 0.05$). T_1: control, T_2: control (ddH_2O injection), T_3: control (pitted), T_4: 0.05 µSe NP, T_5: 0.075 µgSe NP, T_6: 0.1µgSe NP, T_7: 0.2 µgSe NP.

Table (3): Effect of in-ovo injection by different levels of SeNPs on feed consumption (g).

Treatments		Feed Consumption (FC)		
		Day old – 4 weeks	4 - 7 weeks	Day old - 7 weeks
Control	T_1	700.42 ^{c}	1192.53 ^{ab}	1892.95 ^{b}
	T_2	667.85^{e}	1125.93 ^{cd}	1793.78 ^{c}
	T_3	667.46^{e}	1115.57 ^{d}	1783.03 ^{c}
SeNPs	T_4	693.14 ^{d}	1243.31 ^{a}	1936.45 ^{a}
	T_5	693.29 ^{d}	1168.47 ^{bcd}	1861.76 ^{b}
	T_6	742.01 ^{a}	1183.70 ^{abc}	1925.71 ^{b}
	T_7	718.18 ^{b}	1195.71 ^{ab}	1913.88 ^{b}
± SE		2.32	21.74	23.19

a, b, c,d,e Means in the same column with different superscripts are significantly different ($p \leq 0.05$). T_1: control, T_2: control (ddH_2O injection), T_3: control (pitted), T_4: 0.05 µSe NP, T_5: 0.075 µgSe NP, T_6: 0.1µgSe NP, T_7: 0.2 µgSe NP.

Table (4): Effect of in-ovo injection by different levels of SeNPs on feed conversion ratio (g).

Treatments		Feed conversion ratio (FCR)		
		Day old – 4 weeks	4 - 7 weeks	Day old - 7 weeks
Control	T_1	2.29 ^{a}	2.63 ^{a}	2.49 ^{a}
	T_2	2.23 ^{a}	2.54 ^{ab}	2.40 ^{ab}
	T_3	2.24 ^{a}	2.51 ^{ab}	2.40 ^{ab}
SeNPs	T_4	2.12 ^{bc}	2.45 ^{ab}	2.31^{bc}
	T_5	2.08 ^{cd}	2.29 ^{ab}	2.21 ^{c}
	T_6	1.99 ^{d}	2.13 ^{c}	2.07^{d}
	T_7	2.21 ^{ab}	2.43 ^{ab}	2.34^{bc}
± SE		0.04	0.06	0.04

a, b, c,d Means in the same column with different superscripts are significantly different ($p \leq 0.05$). T_1: control, T_2: control (ddH_2O injection), T_3: control (pitted), T_4: 0.05 µSe NP, T_5: 0.075 µgSe NP, T_6: 0.1µgSe NP, T_7: 0.2 µgSe NP.

Table (5): Effect of in ovo injection by four levels of SeNPs in post hatch on carcass Parameters %.

Treatments		Carcass Traits%				
		Dressing%	Carcass %	Edible Giblet		
				Liver%	Heart%	Gizzard%
Control	T_1	78.91±1.00 ^{ab}	62.55±0.96^{ab}	2.462±0.13 ^{a}	0.63±0.061	2.42±0.13 ^{ab}
	T_2	78.52±1.00 ^{ab}	63.95±1.06 ^{ab}	2.571±0.13 ^{a}	0.63±0.061	2.42±0.13 ^{ab}
	T_3	80.31±0.79 ^{ab}	63.78±0.89 ^{ab}	2.732±0.11 ^{a}	0.62±0.051	2.36±0.11 ^{ab}
SeNPs	T_4	79.62±0.92 ^{ab}	62.89±0.96^{ab}	2.531±0.12 ^{a}	0.66±0.055	2.42±0.12 ^{ab}
	T_5	77.82±0.92 ^{b}	62.35±0.96 ^{ab}	2.111±0.12 ^{b}	0.67±0.055	2.63±0.12 ^{a}
	T_6	81.16±0.92 ^{a}	64.79±0.96 ^{a}	2.379±0.12	0.65±0.055	2.73±0.12 ^{a}
	T_7	78.14±0.92 ^{b}	61.19±0.96 ^{b}	2.577±0.12 ^{a}	0.65±0.055	2.25±0.12 ^{b}

a,b,c,.. : Means is the same column within each item and having different letters are significantly different at $P \leq 0.05$. T_1: control, T_2: control (ddH_2O injection), T_3: control (pitted), T_4: 0.05 µSe NP, T_5: 0.075 µgSe NP, T_6: 0.1µgSe NP, T_7: 0.2 µgSe NP.

Table (6): Effect of in ovo injection by four levels of SeNPs in post hatch on plasma lipid constituents.

Treatments		Total lipids (mg/dl)	Cholesterol (mg/dl)	TG (mg/dl)	VLDL	HDL (mg/dl)	LDL (mg/dl)total	L/H Ratio
Control	T_1	646.19b	198.55a	79.68a	15.94	58.53c	124.08a	2.120a
	T_2	648.83b	197.02a	79.11a	15.82	58.32c	122.88a	2.117a
	T_3	687.79a	198.48a	74.49ab	14.89	58.36c	125.22a	2.146a
SeNPs	T_4	615.15c	145.00b	70.02bc	14.00	60.59b	70.40 b	1.162 b
	T_5	611.84c	144.60b	70.02bc	14.00	60.97ab	69.62 b	1.142 b
	T_6	609.81c	142.83b	66.77c	13.35	61.24 a	68.23 b	1.114 b
	T_7	605.75c	144.91b	65.34c	13.07	61.31a	70.53 b	1.150 b
± SE		3.46	0.98	1.92	0.093	0.16	1.08	0.02

a, b, c Means in the same column with different superscripts are significantly different ($p \leq 0.05$)T_1: control, T_2: control (ddH_2O injection), T_3: control (pitted), T_4: 0.05 µSe NP, T_5: 0.075 µgSe NP, T_6: 0.1µgSe NP, T_7: 0.2 µgSe NP.

Table (7): Effect of in ovo injection by four levels of SeNPs in post hatch on some blood parameters.

Treatments		RBCs (X106/mm3)	Hb (g/100ml)	Ht (%)	MCV (µm^3/cell)	MCH (pg/cell)	MCHC (g/100ml)
Control	T_1	4.378	11.40 ^{abc}	37.00 ^{b}	84.51 ^{c}	26.04	30.81
	T_2	4.277	11.87 ^{bc}	37.66 ^{b}	88.05 ^{c}	27.75	31.52
	T_3	4.272	11.77 ^{c}	36.83 ^{b}	86.21^{c}	27.55	31.96
SeNPs	T_4	4.291	11.95 ^{bc}	38.00 ^{b}	88.56 ^{c}	27.85	31.45
	T_5	4.234	12.47 ^{ab}	37.83 ^{b}	89.35 ^{c}	29.45	30.96
	T_6	4.286	12.80 ^{a}	40.16 ^{a}	93.70 ^{a}	29.86	31.87
	T_7	4.360	12.07 ^{ab}	39.16 ^{a}	89.82 ^{b}	27.68	30.82
± SE		0.34	0.12	0.39	0.15	0.09	0.07

a, b, c Means in the same column with different superscripts are significantly different ($p \leq 0.05$)T_1: control, T_2: control (ddH_2O injection), T_3: control (pitted), T_4: 0.05 µSe NP, T_5: 0.075 µgSe NP, T_6: 0.1µgSe NP, T_7: 0.2 µgSe NP.

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تأثير حقن البيض بالنانوسيلنيوم على الآداء الانتاجي وبعض صفات الذبيحة ومكونات الدم ومكونات البلازما

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الملخص العربي:

أجريت تجربة مزرعية لدراسة تأثير حقن البيض بالنانوسيلنيوم على الاداء الانتاجي والمناعي وبعض صفات الذبيحة ومعدل النفوق وقطاعات هستولوجية للدجاج البلدي المحسن. استخدم في هذا البحث عدد ٥٢٥ بيضة مخصبة بمتوسط وزن٣٠ ،٥١ جم تم الحصول عليها من امهات الدجاج البلدي المحسن . قبل التفريخ تم تقسيم البيض عشوائيا الى سبع مجموعات كما هو موضح بالجدول التالي :

المجموعه	نوع المعاملة
T_1	الكنترول
T_2	محقون بماء فقط
T_3	مثقوب فقط
T_4	٠.٠٥ميكرو جم نانوسيلنيوم
T_5	٠.٠٧٥ ميكرو جم نانوسيلنيوم
T_6	٠.١ ميكرو جم نانوسيلنيوم
T_7	٠.٢ ميكرو جم نانوسيلنيوم

حقن البييض في اليوم العاشر من التفريخ تحت ظروف معقمة في الغرفة الهوائية للبيضة وباستخدام ابر انسولين وبتعقيم مكان الحقن بكحول اثيلي وغلقت فتحات الحقن بشمع البرافين. تم تفريخ البيض في مفرخ اتوماتيكي في حرارة ٣٧.٥ □ م ورطوبة نسبية ٦٥ %.في اليوم الثامن عشر نقل البيض الى المفقس في حرارة ٣٦.٥ □م ورطوبة نسبية ٨٠ %.

أهم النتائج المتحصل عليها :

- زيادة وزن الجسم معنويا في نهاية فترة التجربة في مجموعات النانوسيلنيوم مقارنة بمجموعات الكنترول
-ظهرت فروق معنوية في معدل استهلاك العلف ومعدل التحويل الغذائي بين مجموعات النانوسيلنيوم ومجموعات الكنترول و المجموعه الخامسة كانت الافضل في معدل التحويل الغذائي مقارنة بالمجموعات الاخرى.
- اظهرت النتائج فروق معنوية في وزن الكبد والقونصة بين مجموعات النانوسيلنيوم ومجموعات الكنترول بينما لم تظهر اي فروق معنوية في وزن القلب بين مجموعات النانو سيلنيوم ومجموعات الكنترول
- حقن البيض بالنانو سيلنيوم ادى الى زيادة معنوية كبيره فيالبلازما HDL وإنخفاض معنوي في LDL ونسبة L/H في مجموعات النانوسيلنيوم مقارنة ب مجموعات الكنترول.