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EFFECT OF AGE AND VITAMIN E WITH SELENIUM ADMINISTRATION ON TESTICULAR WEIGHT, SOME HEMATOLOGICAL AND BIOCHEMICAL PARAMETERS OF NEW ZEALAND WHITE RABBIT BUCKS

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ABSTRACT: Thirty six New Zealand White (NZW) rabbit bucks were divided into three experimental groups were used to assess effect of age and administration of vitamin E with selenium on some testicular traits, hematological and biochemical parameters. Group 1: young age (4-5 months), Group 2: middle age (9-10 months) and Group 3: old age (20-24 months). Each group was divided into two subgroups (treatment and control). Treated group was subcutaneously injected with vitamin E and selenium weekly for twelve weeks, while the other was given saline solution and served as control. Blood samples were collected at 6^{th} and 12^{th}weeks of experiment. Some hematological and biochemical parameters were determined in blood serum. At the end of experiment (12^{th}weeks), animals were slaughtered and the two testes and the epididymis of each buck were weighed.

The obtained results showed that hematological parameters were not significantly affected by age except for hemoglobin and white blood cells values. Vitamin E and selenium insignificantly increased red blood cells count, hemoglobin, packed cell volume and white blood cells count and decreased neutrophils (N), lymphocytes (L) and N/L ratio. Age had a significant effect on total protein, glucose and cholesterol. Vitamin E and selenium did not affect blood biochemical parameters. In addition, age of bucks had significant effects on body weight, testes weight and sperm output. Vitamin E and selenium had significant effects on total motile sperm per gram testis.

Generally, administration of vitamin E and selenium improved testes weight and sperm output. Middle age bucks were superior in most studied parameters than young and old age groups. Treatment of young group with vitamin E and selenium improved their total sperm output to comparable levels of that observed in control old and middle groups which could enhance their earlier usage in rabbit farms.

Key words: Rabbit Age- Vitamin E- Selenium- Blood.

INTRODUCTION

Environmental conditions and age of animals are two important factors affecting productive and physiological performance of rabbits (Askar and Ismail, 2012). Exposure to hyperthermia caused several physiological and reproductive disorders through disturbances in oxidative status, enzymatic reactions, blood metabolites and hormonal secretions (Marai et al., 2002 and Khalil et al., 2015). There is a negative relationship between the high ambient temperature and the fertility (Ahmed, Nagwa et al., 2005), growth and reproductive traits (Marai et al., 2002). Also hot conditions stimulate excessive production of oxidative free radicals (Bernabucchi et al., 2002). Alleviation of harmful effects of high ambient temperature has been done by many workers with different methods such as vitamin administration (AL-Zafry and Medan, 2012). Some of these studies have been used Vitamin E and Selenium to improve reproductive performance of farm animal under normal or hot climate conditions (AL-Zafry and Medan, 2012; El-Sheshtaw, et al., 2014).

Vitamin E and Selenium have been used to improve reproductive performance of farm animals (El-Sheshtawy, et al., 2014). Mahmoud et al. (2013) reported that vitamin E is an important antioxidant, and is a free radical scavenger on the cell membrane. Moreover, selenium constitutes a necessary part of glutathione peroxidase which protects the cell structures from free radicals and is considered an antioxidant for cellular membrane lipids (Gutierrez et al., 2008). Vitamin E and Se have a synergistic effect and they affect many biological processes such as metabolism (Awadeh et al., 1998). Cheah and Yang (2011) showed in mammals that vitamin E enhance development of male reproductive organs and also important to keep the male reproductive organs healthy. Akpa et al. (2013) suggested that increase in age may result into an increase in body and testicular size. There are many studies on blood parameters of domestic animals, few data are available about hematological and biochemical values in rabbits treated with antioxidants.

The present study aimed to investigate the effect of age and supplementation with vitamin E with selenium on body weight, some hematological and biochemical parameters and testicular weights and sperm output of NZW rabbit bucks during summer condition in Egypt.

MATERIALS AND METHODS

Animals and experimental design

This experiment was carried out at the Rabbitry Experimental Farm belonging to Faculty of Agriculture, Suez Canal University, Ismailia, Egypt. Thirty six New Zealand White rabbit bucks were used. All animals were kept continuously under the same managerial and environmental conditions during the experimental period. Animals were divided into three experimental groups (12 bucks each): the 1st group aged from 4 to 5 months and weighed 1.92±0.03 (young age), the 2nd group aged from 9 to 10 months and weighed 2.36±0.07 (middle age) and the 3rd group aged from 20 to 24 months and weighed 3.41±0.13 (old age). Each group was divided into two subgroups (treated and control). All bucks were individually housed in galvanized wired cages, where feed and water were provided ad libitum. All groups were fed isonitrogenous and isocaloric commercial diet. The ingredients of the experimental diet contained clover hay, yellow corn, soybean meal, wheat bran, molasses, di-calcium-phosphate, lime stone, sodium chloride, premix and D-L, methionin. The diet contained 17% crude protein, 2.8% fat, 10% crude fiber and 2600 KCal digestible energy/kg diet. Treated bucks were subcutaneously injected with 50 mg vitamin

E (DL-α-Tochopherol acetate, Loba Chemie, India), and 0.1 mg selenium (Na Selenite, Loba Chemie, India) per kg live body weight according to Meshreky and Shaheed, 2003. All treated animals were injected once weekly for the 12 weeks (total injections = 12 times), while the controls were treated similarly and subcutaneously injected with saline solution. The experimental period lasted for 12 weeks during summer season (June, July and August, 2015).

Ambient temperature and relative humidity inside rabbitry were recorded daily during the experimental period by using digital thermo-hygrometer equipment. The temperature–humidity index (THI) was estimated according to thermal comfort level of an animal environment (Marai et al., 2002). It was measured according to the following equation: THI = dbºC- [(0.31 - 0.31 RH) (dbºC - 14.4)], where dbºC = dry bulb temperature in Celsius and RH = RH%/100.

Blood samples were collected at 6^{th} and 12^{th} weeks of experiment from the ear vein in heparinized tubes for determination of whole blood hematology and in non-heparinized tubes for serum biochemical parameters in the morning between 8:00-10:00 am. Whole blood was used to determine hemoglobin (Hb), packed cell volume (PCV), red (RBC) and white blood (WBC) counts and white blood cells differential count by conventional methods. Blood serum was obtained by centrifugation at 3000 rpm for 20 min. and stored at -20^{o}C until analysis. Total protein (TP), albumin (Alb), globulin (Glo) cholesterol (Cho), glucose (Glu), urea and creatinine (Crea) concentrations were measured spectrophotometric (T 80 UV/VIS Spectrometer, PG Instrument Ltd) in serum using SPECTRUM commercial kits (MDSS GmbH, Hannover, Germany).

Total motile sperm per ejaculate was calculated once weekly for successive 6 weeks (from 7^{th} to 12^{th} weeks of experiment) based on the data of semen ejaculate volume, initial motility and sperm cell concentration in the complementary study of the same authors (Yaseen et al. 2016). The motile sperm produced per gram testis were determined by dividing the total motile sperm by the testis weight. At the end of the12^{th} weeks of experimental period, three bucks from each subgroup were chosen randomly for slaughtering. Final (pre-slaughter) weight was recorded for all bucks. The two testes and epididymis were weighed after slaughtering.

Statistical Analysis:

Data were statistically analyzed using the General Linear Model (GLM) procedure of SAS (SAS, 2004). Differences among means were detected using Duncan's new multiple test (Duncan, 1955). Two-way analysis of variance was carried out for all traits using the following model:

$$Y_{ijk} = \mu + A_i + T_j + AT_{ij} + e_{ijk}$$

Where:

Y_i	Observation on the k^{th} individual from the i^{th} age in j^{th} treatment
μ	Overall mean
A_i	Fixed effect of the i^{th} age
T_j	Fixed effect of the j^{th} treatment
A	Interaction between i^{th} age and j^{th} treatment
e_{ij}	Random error associated with the ijk^{th} individual

RESULTS

The calculated mean value of THI 26.37 ºC during months of experiment. This value was classified as absence of heat stress during experimental period according to Marai et al. equation (2002). Marai et al., (2002) stated that THI value below 27.8 in rabbits is considered absence of heat stress. Therefore, results of the present experiment are mainly related to treatments.

Hematological parameters:

Results in Table (1) showed the effect of rabbit age and treatment with vitamin E and selenium on some hematological parameters of NZW rabbit bucks. Red blood cells count (RBCs), hemoglobin concentration (Hb), packed cell volume value (PCV), white blood cells count (WBCs), neutrophils (N), lymphocytes (L) percentages and N/L ratio were estimated in whole blood. Age did not affect RBCs, PCV, N, L and N/L.

The highest (Hb) (12.92g/100ml) was observed in middle age group and it was significantly higher (P<0.05) than that in the old age group (11.03 g/100ml) but did not differ significantly than that in young age group (12.62g/100ml). Also, WBCs were significantly higher than that in the middle age (11.02 $X10^3/mm^3$) than that in the young age ($6.98X10^3/mm^3$) but did not differ significantly than that in the old age ($7.62X10^3/mm^3$). However, administration of vitamin E and selenium did not show any variations in the studied hematological parameters.

The interaction effects between age (young, middle and old) and treatment were significant (P<0.05) in RBCs and Hb and insignificant in PCV, WBCs, N, L and N/L ratio (Table 1). There is no constant pattern between the interaction groups, where the highest value of RBCs observed in the treated middle bucks, then the value of the young control bucks. And the lowest values were detected in the old control animals. The same results were obtained for the hemoglobin value, the highest value was found in the middle treated group and the lowest value in the old treated group.

Blood biochemistry:

Results in Table (2) showed the effect of age and treatment with vitamin E and selenium on studied serum biochemical parameters of rabbit bucks. Variation in total protein, albumin, globulin, glucose, cholesterol, creatinine and urea were detected between groups. Age had significant (P<0.05) effect on total protein, glucose and cholesterol but had insignificant effect on albumin, globulin, creatinine and urea. The middle age had higher (P<0.05) value of total protein (6.77 g/dl) than the old age (6.07g/dl) but insignificantly than the young age (6.44g/dl). For glucose, also, the young age recorded higher (P<0.05) value than other groups. Furthermore, the young age had the highest (P<0.05) value of cholesterol (49.86mg/dl) than the other groups. However, treatment with vitamin E and selenium did not affect all studied blood biochemical parameters. There were significant (P<0.05) differences between the interaction groups in total protein, globulin, glucose, cholesterol and urea, but did not differ significantly in albumin and creatinine levels.

Body weight, testicular weights and sperm output:

Results in Table (3) showed the effect of age and administration of vitamin E and selenium and their interaction on body, testes and epididymis weights and semen output. There were significant (P<0.05) differences among the three groups in initial body weights (old, 3.41; middle, 2.36 and young, 1.92kg) and final body weights (old, 3.19; middle, 2.85 and young, 2.67kg). The middle group had significantly (P<0.05) higher testes weight (5.37 g) than the others group (old, 4.42 and young, 4.55g). Epididymis weight was not affected by age. The age had significant effect (P<0.05) on total motile sperm per gram testes per ejaculate (34.95 for old,

36.25 for middle and 27.73 X 10^6/ejaculate for young).

On the other hand, the results showed no significant differences between overall means of the treated and control animals in terms of body weight, testes and epididymis weight. However, administration of vitamin E and selenium had significant (P<0.05) effect on overall means of total motile sperm per gram testes of treated bucks than those in control.

There are significant differences between the interactions of age and administration of vitamin E and selenium. The old had the highest initial and final body weight and the young had the lowest values. The middle treated group had the highest value of testes weight (5.37g) and the old control had the lowest value (4.19g). Treatment improved epididymis weight (7.24g) in the old treated group compared to old control group which had the lowest value (4.83g) among all groups. The total motile sperm per gram testes was higher (40.03) in the middle treated group and the lowest value observed in young control group (21.19X10^6/ejaculate). Treatment markedly enhanced sperm output/ejaculate in young group when compared to its control.

DISCUSSION

Hematological parameters:

Blood pictures of animal might be influenced by several factors such as breeds, age, sex, nutrition, management physiological factors and disease (Carlson, 1996 and Merck Manual, 2012). In this study, age had significant effect (P<0.05) on Hb value and WBCs but not affect RBCs, PCV, neutrophils, lymphocytes and N/L. There are a significantly (P<0.001) effect of age on hematological parameters in rabbits (Chinike et al., 2006 and Daramola et al. (2005). Middle group had the highest values (12.92) of Hb and (11.02) of WBCs. Also, Addass et al. (2012) reported that age group had effect on PCV, RBC and WBC in chickens. In contrast, Ologunowa et al. (2011) reported that age had no effects on blood parameters. Vitamin E and selenium not appreciably affected hematological parameters (Table, 1). Treatment increased insignificantly RBCs, Hb, PCV and WBCs values. Treatment with E and Se insignificantly decreased N/L (neutrophil to lymphocyte ratio) and it is may be due to decreasing stresses effect on animals. The opposite trend was found in heat stressed rabbits where Khalil et al. (2015) reported that RBCs, WBCs, Hb, PCV values were insignificantly reduced, and lymphocyte was significantly (P<0.05) reduced, while, N/L ratio were increased (P<0.05). Therefore, administration of antioxidants such as vitamin E and/or selenium may participate in amelioration of stresses in rabbit breeding systems. Vitamin E had appreciable significant effect on lymphocytes % that consider a good indicator of increasing the immunity efficiency (Sedki et al., 2002 and Meshreky and Shaheed, 2003).

Changes in Hematological parameters are often used to determine stresses due to nutrition and other factors (Afolabi et al., 2010). Generally, insignificant differences in studied hematological parameters in healthy treated animals in different ages compared to controls might be attributed to the internal physiological homeostasis. Results of the present study were in consistence with Amao et al. (2012) who demonstrated that supplementation of Vitamin E did not have any significant (p>0.05) effect on Hb, PCV, RBC, WBC; although bucks that were supplemented had higher values for Hb, PCV and RBC and lower value for WBC than bucks not supplemented with vitamin-E

Interactions had a significant (P<0.05) effects on RBCs and Hb but did not affect appreciably PCV, WBCs, neutrophils, lymphocytes and N/L. Middle treatedgroup, mature age, revealedthe highest response to administration of vitamin E and selenium where it had the

highest values of RBCs (6.64 $x10^6/mm^3$) and Hb (14.0g/dl).

In general, the range of hematological indices in the current study agreed closely as reported in another studies (Olabanji et al., 2007 and Togun et al., 2007).

Blood Biochemical Parameters

Blood biochemical parameters are important diagnostic tools in veterinary medicine and reproduction traits. Serum biochemical parameters measured in rabbit bucks were comparable for the three age groups. However, significant ($P<0.05$) differences were detected between the groups in total protein, glucose and cholesterol. Serum biochemical parameter: TP, Alb, Glob, Chol, Glu, Urea and Creat values determined in the present experiment were in normal ranges and in agreement with several studies in rabbits such as Archetti et al. (2008) and Gbore and Akele (2010). Significant increase of serum proteins and glucose in middle and young ages compared with old were observed in the present results (Table, 2). This result may be due to improvement of anabolism and consequently blood metabolites in young bucks as described by Balicka-Ramsisz et al. (2006).

Vitamin E and selenium insignificantly increased total protein, albumin and cholesterol and decreased glucose, creatinine and urea. Decreasing creatinine and urea in treated bucks may be attributed to the healthy condition of animals and good functions of kidneys and liver whichcould be attributed to the vitamin E and selenium injection.Similar results were reported by El-Masry et al. (1994) who showed that selenium and vitamin E decreased glucose and cholesterol, increased albumin and total protein but did not affect the globulin levels. However the effect of vitamin E and selenium on urea, total protein, albumin and globulin was not significant. Furthermore, treated rams (vitamin E and Se) showed higher ($P<0.05$) values of total protein, albumin, globulin, glucose and cholesterol in comparison with the control group (Mahmoud et al., 2013). Generally, the increase in the most blood metabolites could be ascribed to improvement of metabolism efficiency by vitamin E and Se. Togun et al. (2007) stated that blood constituents changed in response to the physiological conditions and health of animals.

Interactions between age and administration of vitamin E and selenium have significant effect ($P<0.05$) on all studied biochemical parameters except for albumin and creatinine. As mentioned before, the response of bucks to vitamin E and selenium depended on their age. Middle treated age had a highest value of serum total protein and lowest of urea. This finding may be due to improvement of protein anabolism and decrease of catabolism.

Body, testes and epididymis weights:

The present study aimed to assess effect of age and treatment with vitamin E and selenium on body, testes and epididymis weights and sperm out (Table, 3). The results showed significantly effect of age on initial and final body weights; however body weights of old age group were decreased during the period of experiment. The present results agree with Akpa et al. (2013) who reported that the increase of body weight occurred with advancement of age which is associated closely with breed and morphological characters.

Testes weight differed significantly among the groups. Akpa et al. (2013) reported in goats that age has a pronounced effect on testis size. They stated that there is a close relationship between weights of testes at a constant age and increased reproductive efficiency. Shamsuddin et al. (2000) and Rahman (2007) reported a significant effect of age on the testicular measurements in Red Sokoto goats. On contrarily, as shown in table (3), differences in epididymis weight depending on buck's age did not significant. Sperm produced per

gram testes per ejaculate was better significantly in middle age (36.25) then in old (34.95) and young age (27.73X 10^6/Ejac./g testes). However, the young was significantly lower compared with the other groups; its value was in acceptable range reviewed.

However, there is a close relationship between testicular size and sperm production (Mahmoud 2002), the sperm output of young group in the present study was relatively lower than the old age. It may be due to the differences among them in semen quality which mainly attributed to testicle size is still developing in the young buck and have reached maturity in the adult (King, 1993).

Administration of Vitamin E and Selenium affect initial and final body, testes and epididymis weights numerically but not significantly, while affect significantly on sperm output. The current results are partially agreed with Kamel (2012) who concluded that feed supplemented with Selenium significantly increased bucks body weight. Also, Cheah and Yang (2011) reported that vitamin E is important to maintain the male reproductive organs healthy and the survival of spermatids. Vit E promotes development of reproductive organs by increasing epididymis weight, seminiferous tubules diameters, spermatogenic cells and interstitial cell density. Initial, final body weight among Ossimi rams treated with vitamin E and selenium did not differ significantly compared with control groups (Mahmoud et al., 2013).

Interactions between age and administration of vitamin E and selenium had significant ($P<0.05$) effect on studied traits. It is may be attributed to the response of bucks to vitamin E and selenium depends on the age. tudy

Concerning body weight, young bucks are more sensitive to the administration of vitamin E and selenium than older animals which decreased in body weight gain during the experimental period. The present results are in consistence with Selim et al. (2008) who reported that supplementation with vitamin E enhanced the growth performance, anti-oxidant status and immunity traits of rabbits. Also, many studies concluded that live body weight gain was affected by vitamin E supplementation (Meshreky and Shaheed, 2003 and Corino et al., 2007), while others (Dal Bosco et al., 2004 and Botsoglou et al., 2004) do not find growth enhancement due to administration of vitamin E. Kumar et al. (2009) reported that supplementation of selenium can enhance growth rates in lambs.

CONCLUSIONS

No adverse effects of vitamin E and selenium treatment on hematology and biochemical parameters of NZW rabbit bucks were observed in the present study. However, a pronouncing effect of treatment was declared on treated rabbit testes parameters and semen production. Therefore, we could put together these results and recommend giving injection of vitamin E and selenium to young rabbit bucks approaching puberty and sexual maturity in order to enhance their use in commercial breeding programs.

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Table (1): Some hematological parameters of NZW rabbit bucks as affected by age and administration of vitamin E with selenium (Mean ± SE)

Classes	Complete Blood Count						
	RBCs ($10^{6/}mm^3$)	**Hb (g/100ml)**	**PCV (%)**	**WBCs ($10^{3/}mm^3$)**	**Neutrophils (%)**	**Lymphocytes (%)**	**N/L (%)**
Age							
Old	5.46±0.20	11.03±0.4	35.7	7.62±0.90	24.97±2.44	65.22±3.25	41.71±
Middle	6.11±0.31	12.92±0.6	41.2	11.02±1.6	27.87±4.55	61.16±5.57	52.82±
Young	5.69±0.31	12.62±0.6	41.7	6.98±0.85	29.89±1.83	58.87±2.94	48.11±
Treatme							
Control	5.71±0.25	11.97±0.5	39.2	8.37±0.83	30.16±2.03	61.99±3.11	47.84±
Vitamin	5.82±0.21	12.40±0.4	39.7	8.70±1.22	26.23±2.93	62.03±3.93	45.03±
Interacti							
Old *	5.54±0.39^{ab}	11.25^{b}±0.	42.8	7.65±1.16	25.43±4.25	65.95±4.07	41.40±
Old *	5.39±0.15^{b}	10.80^{b}±0.	34.5	7.58±1.49	24.50±2.82	64.48±5.45	42.02±
Middle *	5.59±0.39^{ab}	11.83^{ab}±0.	37.8	10.42±1.6	33.84±2.66	61.85±7.22	55.56±
Middle	6.64±0.41^{a}	14.00^{a}±0.	44.7	11.62±2.9	27.42±7.47	60.47±9.17	49.17±
Young *	6.02±0.63^{ab}	12.83^{ab}±1.	43.9	7.05±1.24	32.16±2.08	57.42±4.28	49.76±
Young	5.42±0.21^{b}	12.40^{ab}±0.	32.9	6.90±1.26	27.05±2.85	60.68±4.38	46.46±

a,b,c Denote significant difference between means in each category within a row at ($P<0.05$).

Table (2): Serum biochemical parameters of NZW rabbit buck as affected by age and administration of vitamin E and selenium (means±SE).

Classes	Total Protein (g/dL)	Albumin (g/dL)	Globulin (g/dL)	Glucose (mg/dL)	Cholesterol (mg/dL)	Creatinine (mg/dL)	Urea (mg/dL)
Age							
Old	6.07±0.22	3.23±0.12	2.84±0.24	80.33±2	38.43±5.85^{ab}	0.85±0.04	34.23±1.7
Middle	6.77±0.27	3.30±0.12	3.47±0.26	90.18±3	29.84±4.33^{b}	0.86±0.05	34.11±2.5
Young	6.44±0.21	3.34±0.09	3.10±0.22	95.82±3	49.86±6.44^{a}	0.92±0.06	34.92±1.8
Treatme							
Control	6.37±0.17	3.15±0.10	3.22±0.19	90.90±3	38.40±4.13	0.90±0.04	37.00±1.7
Treated	6.49±0.22	3.44±0.07	3.05±0.21	86.54±2	40.41±5.36	0.85±0.04	31.69±1.4
Interacti							
Old *	6.22±0.27	3.10±0.20	3.12±0.38	81.05±5	43.51±9.60^{ab}	0.85±0.05	32.90±2.0
Old *	5.92±0.35	3.37±0.13	2.56±0.30	79.61±3	33.35±6.81^{b}	0.85±0.07	35.56±2.9
Middle *	6.54±0.27	3.14±0.17	3.41±0.30	93.79±3	29.76±5.14^{b}	0.82±0.08	41.00±3.6
Middle *	7.25±0.52	3.58±0.14	3.67±0.50	84.29±5	32.37±8.45^{b}	0.90±0.07	26.58±2.6
Young *	6.45±0.24	3.19±0.15	3.25±0.24	98.10±6	35.72±5.33^{b}	1.02±0.07	37.30±2.4
Young *	6.31±0.34	3.44±0.10	2.87±0.36	93.53±4	60.99±10.86^{a}	0.81±0.08	31.39±1.9
Mean	6.43±0.14	3.29±0.06	3.13±0.14	88.78±2	39.38±3.34	0.88±0.03	34.42±1.1

a,b,c Denote significant difference between means in each category within a row at ($P<0.05$).

Table (3): Body, testes and epididymis weights and sperm output as affected by age and administration of vitamin E with selenium

Classes	Body Weight (kg)		Testes Weight (g)	Epididymis Weight (g)	Total Motile Sperm Output per ejaculate (X 10^6)	Total Motile Sperm per gram of testis per ejaculate (X 10^6)
	Initial	Pre-slaughter				
Age Groups						
Old	3.406±0.13^a	3.189±0.08^a	4.42±0.19^b	6.03±0.48	153.79±9.0^b	34.95±1.99^a
Middle	2.360±0.07^b	2.849±0.07^b	5.37±0.26^a	5.69±0.25	194.65±14.4^a	36.25±2.68^a
Young	1.923±0.03^c	2.666±0.04^b	4.55±0.16^b	5.78±0.14	113.39±9.9^c	27.73±2.12^b
Treatment						
Control	2.562±0.17	2.852±0.08	4. 63±0.20	5.55±0.26	132.50±9.3^b	28.83±1.91^b
Treated	2.563±0.16	2.951±0.07	4.94±0.19	6.12±0.24	172.63±9.8^a	34.85±1.89^a
Interactions						
Old * Control	3.405±0.22^a	3 .150±0.12^a	4.19±0.13^b	4.83±0.54^b	135.81±13.9^{bc}	33.40±3.25^{ab}
Old * Treatment	3.407±0.17^a	3.228±0.12^a	4.64±0.35^{ab}	7.24±0.36^a	168.70±11.1^b	36.36±2.40^{ab}
Middle * Control	2.359±0.11^b	2.754±0.13^b	5.35±0.41^a	5.88±0.51^b	170.37±19.7^b	31.85±3.69^{ab}
Middle * Treatment	2.361±0.11^b	2.944±0.06^{ab}	5.38±0.36^a	5.50±0.07^b	215.47±20.3^a	40.03±3.78^a
Young * Control	1.923±0.04^c	2.650±0.08^b	4.36±0.24^b	5.94±0.05^b	92.32±11.3^c	21.19±2.60^c
Young * Treatment	1.922±0.05^c	2.681±0.09^b	4.74±0.19^{ab}	5.61±0.26^b	132.59±15.3^{bc}	27.95±3.22^{bc}

a,b,c Denote significant difference between means in each category within a row at ($P<0.05$).

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الملخص العربي

تأثير العمر والمعاملة بفيتامين هـ والسيلينيوم على وزن الخصيتين وبعض قياسات الدم الخلوية والبيوكيميائية في ذكور الأرانب النيوزيلندي الأبيض

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هدفت هذه الدراسة إلى بحث تأثير العمر و الحقن بفيتامين هـ بالاضافة إلى السيلينيوم على وزن الجسم وبعض المقاييس الخلوية والكيميائية للدم ووزن الخصيتين وكمية السائل المنوي المنتجة في ذكور الأرانب النيوزيلندي الأبيض. تم استخدام 36 من ذكور الأرانب النيوزيلندي الأبيض قسمت إلى ثلاث مجاميع لتقييم تأثير العمر و الحقن بفيتامين هـ مع السيلينيوم على بعض الصفات الخلوية والمقاييس الخلوية والكيميائية للدم. 1). مجموعة الذكور الصغيرة (4-5 شهر) 2). مجموعة الذكور المتوسطة (9-10 شهر) 3). مجموعة الذكور الكبيرة (20-24 شهر). تم تقسيم كل مجموعة إلى تحت مجموعتين (معاملة وكنترول). المجموعة المعاملة تم حقنها بفيتامين هـ والسيلينيوم أسبوعياً لمدة 12 أسبوع بينما المجموعة الثانية تم حقنها بمحلول ملحي كمجموعة مقارنة. تم جمع عينات الدم من الحيوانات في الأسبوع السادس والأسبوع الثاني عشر من التجربة. تم تقدير بعض المقاييس الخلوية في الدم بالاضافة إلى تقدير المقاييس البيوكيميائية في سيرم الدم وتم وزن الخصيتين والبربخ بعد ذبح الحيوانات في نهاية التجربة.

تشير النتائج المتحصل عليها إلى أن المقاييس الخلوية للدم لم تتأثر معنوياً بالعمر ما عدا الهيموجلوبين وعدد كرات الدم البيضاء. أدت المعاملة بفيتامين هـ والسيلينيوم إلى زيادة غير معنوية لكرات الدم الحمراء والهيموجلوبين والهيماتوكريت وعدد كرات الدم البيضاء ونقص غير معنوي في الخلايا البيضاء المحببة المتعادلة والكريات اللمفية ونسبتهما (N/L). العمر كان له تأثيراً معنوياً على كمية البروتين الكلية والجلوكوز والكوليسترول في الدم بينما المعاملة بفيتامين هـ والسيلينيوم لم تؤثر على المقاييس البيوكيميائية للدم. تشير النتائج إلى وجود تأثيرات معنوية للعمر على وزن الجسم ووزن الخصيتين وكمية السائل المنوي المنتجة. المعاملة بفيتامين هـ والسيلينيوم أثرت بصورة معنوية على كمية الحيوانات المنوية الحية المنتجة لكل جرام من الخصية.

الاستنتاج: المعاملة بفيتامين هـ والسيلينيوم حسنت من وزن الخصيتين وكمية السائل المنوي المنتجة. كانت مجموعة الذكور متوسطة العمر متفوقة في معظم القياسات المدروسة عن الذكور الصغيرة والكبيرة. وإنه من الجدير بالذكر أن معاملة الذكور الصغيرة بفيتامين هـ والسيلينيوم قد حسنت من إنتاجها من السائل المنوي لتقارب مستوى الذكور المتوسطة الغير معاملة والكبيرة ولذلك يمكن استخدمها مبكرا في تربية الأرانب.