Effects of dietary supplementation with vitamin E on some reproductive and physiological parameters in advanced age White Leghorn cockerels

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Advanced age male chickens exhibit a noticeable deterioration in semen characteristics and reproductive ability (Kelso *et al*. 1996). Vitamin E has been demonstrated to improve the semen quality and fertility of cockerels (Al–Hakeem 1999). This study evaluated the effects of a dietary vitamin E supplement on seminiferous tubule diameter (STD), seminiferous tubule lumen (STL), germinal cell thickness (GCT), testosterone concentrations in blood plasma (TB) and seminal plasma (TS), and vitamin E concentration in blood plasma (EB), seminal plasma (ES) and liver (EL).

Sixty–week old white Leghorn cockerels (n = 64) were allocated to four standard diets (ME, 3044 kcal/kg diet; CP, 17.54%; Ca, 3.2%; Available P, 0.9%) supplemented with 0 (T_1), 300 (T_2), 450 (T_3) and 600 (T_4) mg vitamin E/kg of feed. Sixteen birds were allocated to each treatment diet and diets were fed for 16 weeks. All birds were kept in individual cages and routine managements operations were applied. Histological parameters, testosterone and vitamin E concentrations were measured by visopan screen microscope, radioimmunoassay (RIA) and high performance liquid chromatography (HPLC) methods respectively. Data were subjected to analyses of variance using the SAS program.

T_3 and T_4 had no significant effect on STD, STL and GCT, however T_2 significantly decreased STL and significantly increased GCT (Table 1). In contrast the concentrations of TB, TS, EB, ES and EL were significantly increased (P<0.05) in T_2, T_3 and T_4 in comparison with T_1 (Table 1). There is considerable evidence that the hormone testosterone is correlated with testicular function, development and fertility (Whittow, 2000). It can be concluded that a supplement of 300 mg vitamin E/kg diet was sufficient to induce a significant improvement in STL, GCT, TS, TB, EB, ES and EL in advanced age cockerels and may therefore have a positive effect on reproductive efficiency in these birds.

Table 1 Reproductive and blood characteristics of White Leghorn cockerels given a diet supplemented with four different levels of vitamin E.

	Treatments (vitamin E mg/kg diet)			
Characteristics	**0 (T_1)**	**300 (T_2)**	**450 (T_3)**	**600 (T_4)**
Seminiferous tubule diameter (µm)	252 ± 9.8[a]	272 ± 15.8[a]	237 ± 23.2[a]	253 ± 16.9[a]
Seminiferous tubule lumen (µm)	143.8 ± 11.7[a]	68.8 ± 7.0[b]	117.5 ± 15.5[a]	131.3 ± 13.7[a]
Germinal cells thickness (µm)	110.5 ± 12.9[b]	203.8 ± 18.0[a]	136.8 ± 27.7[b]	122.5 ± 26.5[b]
Seminal plasma testosterone (ng/ml)	0. 20 ± 0.08[a]	0.58 ± 0.09[c]	0.50 ± 0.06[b]	0.60 ± 0.07[c]
Blood plasma testosterone (ng/ml)	1.4 ± 0.6[a]	4.2 ± 0.5[c]	2.9 ± 0.5[b]	3.6 ± 0.6[bc]
Blood plasma vitamin E (ng/ml)	0.73 ± 0. 28[d]	2.25 ± 0.44[c]	2.43 ± 0.36[b]	2.60 ± 0.21[a]
Seminal plasma vitamin E (ng/ml)	195 ± 40[d]	475 ± 43[b]	738 ± 39[a]	386 ± 28[c]
Vitamin E in liver (µg/g)	6.4 ± 0.9[d]	32.3 ± 4.0[c]	40.6 ± 3.8[b]	45.7 ± 3.6[a]

[a,b,c,d]Values in the same row having different superscript are different (P< 0.05)