J. Agric. Sci. Mansoura Univ., 27 (7): 4589 - 4598, 2002

ONSET OF PUBERTY, SEMEN PRODUCTION AND BLOOD CONSTITUENTS IN CROSSBRED MALE LAMBS AS AFFECTED BY DIETARY YEAST CULTURE ADDITION

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ABSTRACT

Twenty-one crossbred ram lambs (1/2 Romanove x 1/2 Rahmani) at four months of age and 21.2 kg live body weight were assigned to equal three groups to study the effect of yeast culture supplementation on growth rate, onset of puberty (first ejaculation with motile spermatozoa), post-pubertal semen characteristics and semen storability at 5°C and some blood constituents. The experimental lambs were fed as follows: the first and second group (G_1 and G_2) were given basal ration supplemented with yeast culture (YC) at a rate of 0.05 and 0.025% of live body weight, respectively, while the third group (G_3) was fed the basal ration only. Blood samples were taken and body weight was recorded every 15 days interval throughout the experimental period (6 months). The results of this study cleared that supplemented YC to G_1 and G_2 significantly increased body weight and daily gain compared with the control (G_3). Also, G_1 and G_2 reached puberty 27 and 22.5 days earlier and markedly heavier compared with G_3. The percentages of motile and live spermatozoa and sperm cell concentration were greater in G_1 and G_2 but lower values of sperm abnormalities than in G_3. The survival rate of spermatozoa were 55.4, 55.5 and 37.5% for G_1, G_2 and G_3, respectively. Blood RBCs and Hb value were higher in G_1 and G_2 but lower in WBCs than in G_3. The addition of YC had slightly effect on serum total protein, albumin and globulin. On the other hand, GOT and GPT concentration were higher in control than YC-treated animals but differences were not significant. The superior effect of YC may be due to its improving effect on both puberty and blood parameters.

Keywords: Ram lambs, yeast culture, puberty, semen, blood parameters.

INTRODUCTION

It is well known that the efficiency of reproduction is markedly affected by live body weight and nutritional status of farm animals (Ferrell, 1993). Many investigators reported that dietary supplement of yeast culture (YC) have been increased live body weights, average daily gain and food conversion efficiency (Adams *et al.*, 1981). Abd El-Momin *et al.* (2002) found that ewe lambs fed diets supplemented with YC reached puberty 13 to 17 days earlier than those fed the control diet without additives. As well as, Kovacs *et al.* (1998) demonstrated that YC supplementation improved blood constituents and thus metabolic rate either in calves or in lambs. Increase nutrient intake is associated with increase in testicular weight, secretory output of the accessory sex glands, sperm concentration, gonadotrophin and testosterone concentrations (Cupps, 1993). Hotzel *et al.* (1995) concluded that the effect of nutrition on testis and body weight growth is partly independent on changes in the secretion of GnRH. The data available in the literatures concerning the effect of YC on animal reproduction is still limited.

The aim of this study was to determine the influence of dietary supplementation of yeast culture (YC) in onset of puberty, semen quality and some blood constituents in crossbred male lambs.

MATERIALS AND METHODS

Animals and management:

This study was carried cut at Mehallet Mousa Station, Animal Production Research Institute, Ministry of Agriculture. Twenty one crossbred male lambs (1/2 Romanove x 1/2 Rahmani) averaged 21.2 kg live body weight were used from about 4 to 10 months of age. All animals were kept under similar management and feeding conditions allover the whole experimental period. They were fed according to NRC (1988) requirements.

Treatments:

The lambs were randomly divided into three similar groups each of seven and housed in three separate semi open pens. The first and second group (G_1 & G_2) were supplemented with 0.05 and 0.025% yeast culture (YC) per kg of live body weight , respectively, for six months. While the third group (G_3) was used as a control without YC addition.

Experimental procedure:

All animals were subjected to observation to detect changes in sexual behaviour once every 10 days from the beginning of the experiment till the occurrence of puberty (first successful ejaculation with motile spermatozoa). Semen was collected by means of artificial vagina once weekly for a period of 9 weeks. The following criteria were considered for semen evaluation: ejaculate volume (ml)-was recorded directly using graduated collecting tube; mass motility (%)-a drop of raw semen was microscopically examined at 200 x magnification directly after collection on a percentage score basis (Malrose and Laing, 1970); percentage of live and abnormal spermatozoa were performed using 5% nigrosin staining technique (Bishop *et al.*, 1954) and sperm cell concentration was determined using Neubauar Haemocytometer. Pooled semen samples for each group were diluted by egg yolk citrate extender (containing: 2.9 gm sodium citrate dehydrate, 0.04 g citric acid, 1.25 g fructose, 20 ml egg yolk, 500 mg streptomycin and 100,000 IU penicillin/ml) then were refrigerated at 5°C and were examined for sperm motility at 2, 24, 48 and 72 hrs.

Body weight and blood sampling:

Body weight and blood samples were carried out once biweekly on all experimental animals throughout the whole study period. Red (RBCs), white (WBCs) blood cell counts and haemoglobin (Hb) concentration were determined in heparinized blood. Plasma samples were assayed for total protein, albumin activity of glutamic oxaloacetic transaminase (GOT) and glutamic pyruvic transaminase (GPT) according to Varoley (1976). Globulin was calculated by subtracting albumin from total proteins. Plasma concentration of testosterone was assayed by radioimmunoassay (RIA) technique.

Statistical analysis:

The data were subjected to General linear Models Procedure Adapted by SPSS (1997) for User's Guide.

RESULTS AND DISCUSSION

The present results in Table (1) indicated that the lambs fed 0.05% YC (G_1) had a marked ($P < 0.05$) heavier body weight and faster daily gain than those fed 0.025% YC (G_2), Moreover, values for both rations were higher than those fed control diet (G_3). These results came in consistent with that reported by Zygoyiannis *et al.* (1997) and Abd El-Momin *et al.* (2002). This increase may be related to increase digestive tract size, increase viable cell count and thus increase rate of forage degradation, ability to digest, absorb and metabolism (Chademana and Offer, 1990). Also, lambs supplemented with YC (G_1 and G_2) expressed first mounting with erection 24 to 18 days younger and 5.5 to 5.1 kg live body weight heavier ($P < 0.05$) when compared with that in control lambs. The value of testosterone concentration at first sexual behaviour was significantly ($P < 0.05$) higher in lambs given 0.05% YC followed by those fed 0.025% YC, while the lowest value in control lambs.

Table (1): Daily gain, age at puberty and testosterone concentration (ng/ml) as influenced by YC supplementation.

Traits	Treatments		
	0.05% YC (G_1)	0.025% YC (G_2)	Control (G_3)
Number of lambs	7	7	7
Initial weight (kg)	21.25±0.85	21.75±0.47	20.50±.66
Final weight (kg)	45.13±1.74^a	38.4±1.07^b	36.3±1.49^b
Daily gain (g)	132.7^a	92.5^b	87.8^b
Age at 1st mounting with erection (days)	202.1±12.6^a	208.2±7.4^a	226.6±13.4^b
Weight at 1st mounting with erection(kg)	32.3±1.1^a	31.9±0.63^a	26.8±1.23^b
Testosterone conc. (ng/ml)	1.27±0.06^a	0.94±0.3^b	0.53±0.22^b
Age at puberty (day)	223.8±8.4^a	228.3±9.6^a	250.8±11.2^b
Body weigh tat puberty (kg)	36.3±1.23^a	36.2±0.66^a	30.3±1.1^b
Testosterone conc. (ng/ml)	2.70±0.42^a	1.87±0.76^b	1.45±0.62^c

a, b, c between treatments for each trait, with different superscripts are significant at ($P < 0.05$).

In our study, lambs treated with 0.025% YC and control lambs took 4.7 to 27 days longer to reaching puberty than the lambs fed 0.05% YC. In the meantime the weight at puberty averaged 36 kg for both YC-supplemented groups compared to about 30.3 kg for the control group. These findings are in agreement with that reported by Abd El-Momin *et al.* (2002) who found that ewe lambs fed YC were reached puberty 13to 17 days earlier and 1.5 to 7.5 kg heavier body weight than those fed on control diet. He added also, the delay puberty in lambs fed control diet may be attributed to restrict the response of the pituitary to LHRH and therefore a decrease in the secretion of LH.

The mean values of increases in testosterone concentrations (Table, 1) due to treatment were 86.2 and 29% for the G_1 and G_2 when compared to the control group, respectively. The present results are in agreement with that found by Perez-Clariget *et al.* (1998) who concluded that improved nutrition accelerated the testicular growth and increased secretion of testosterone in

response to discharges of LH in corriedale rams. the role of feed intake appears to be in an increased sensitivity of the hypothalamus to the negative feedback of gonadal steroid hormones (Amann and walker, 1983 and Cupps, 1993). The low values of testosterone concentrations in the present control lambs may be caused by reduced gonadotrophin concentrations and/or reduced response of the testes to gonadotropins (Mann and Lutwak-Mann, 1981).

Postpubertal semen physical characteristics in the different groups for a 9-weeks period are shown in Table 2. Significant differences among treatments ($P < 0.05$) as well as among weeks within each treatment were found in almost all seminal characteristics examined. Lambs given YC produced semen in greater quantity (volume, percentage of motile spermatozoa, percentage of live spermatozoa and sperm concentration x 10^7/ml) but lower in percentage of abnormal spermatozoa than unsupplemented lambs. Most of the mean values for the semen characteristics of treated groups (Table 2) lie within range reported by previous studies (Mann and Lutwak-Mann, 1981), Evans and Maxwell, 1987 and Chemineau *et al.*, 1991). Reports on the effect of feed supplementary on ram semen characteristics were contradictory (Solomonov, 1971). Ortiz *et al.* (1997) found that semen volume, sperm motility, sperm cell concentration and percentage of abnormal spermatozoa were linearly decreased after one month of locoweed feeding. Mohammed *et al.* (1986) found that sperm concentration and the total number of ejaculate were significantly increased in Awassi rams fed diet consisted of concentrate fed only.

All semen parameters were improved ($P < 0.05$) significantly with age advance in all treated lambs (Table 2). The overall mean values of the increases in ejaculate volume, sperm motility %, live spermatozoa % and sperm cell concentration due to advances in age were 48.3, 4.70, 53.8 and 195%, respectively, while sperm abnormality decreased by 204.9%. These findings are in agreement with that reported by previous workers (Colas *et al.*, 1975 and Galal *et al.*, 1978).

The survival rate of semen in different groups is summarized in Table (3). The overall mean sperm motility were 37.5, 55.5 and 55.4 for control, 0.025 and 0.05% YC groups, respectively. The difference was only significant between treatments and control samples. From Table (4), it is apparent that in all treatments, sperm motility decreased as time increased. The mean sperm motility obtained from YC treated groups was superior and improved the survival of spermatozoa during semen storage at 5°C throughout the 3 days when compared to control samples. This finding agree with that reported by Azawi (1994) and Maxwell and Watson (1996) who found that processing and storage of ram semen lead to reduce sperm motility and membrane integrity.

Lambs given yeast culture had higher values of RBCs and Hb but lower values for WBCs as compared to control group (Table 4). Moreover, the count of RBCs and Hb value were higher in G_1 than G_2 by 0.62 and 5.51% respectively, while the third group recorded the lowest values. Results from this study were supported by Kovacs *et al.* (1998), who found that the concentrations of RBCs and Hb were significantly higher in Suffolk ewes fed

YC addition. This might be due to their release from spleen and/or to change in erthyrocyte stimulating factor release which is governed by the relationship between the oxygen demand of tissue and the amount of oxygen carried by the blood (Shaffer *et al.*, 1981). On the other hand, RBCs and WBCs concentrations were linearly decreased from the beginning of the experiment to the end but Hb values increased by 13.24%. In the same trend, Macouly *et al.* (1995) observed that the average concentration of blood haemoglobin slightly increased with increasing age of the animals. This increase may be due to high activity of young animal and iron deficiency can be caused by increase in this parameter or due to the reaction of pituitary-adrenal cortical glands during the early life (Parmer *et al.*, 1978).

Table (2): Semen physical characteristics as influenced by YC supplementation.

Treatments	Weeks									Overall mean ±SE
	1	2	3	4	5	6	7	8	9	
Ejaculate volume (ml)										
T1	0.6 ±0.05	0.6 ±0.07	0.7 ±0.1	0.5 ±0.03	0.7 ±0.1	0.8 ±0.1	0.8 ±0.1	0.8 ±0.1	0.96 ±0.01	0.72 ±0.05
T2	0.6 ±0.01	0.7 ±0.06	0.7 ±0.1	0.7 ±0.02	0.9 ±0.2	0.8 ±0.1	0.7 ±0.1	0.4 ±0.1	0.90 ±0.1	0.71 ±0.04
T3	0.7 ±0.02	0.64 ±0.13	0.8 ±0.1	0.6 ±0.1	0.7 ±0.2	0.6 ±0.1	0.7 ±0.1	0.6 ±0.1	0.8 ±0.1	0.68 ±0.04
Overall mean ±SE	0.64 ±0.07	0.64 ±0.06	0.7 ±0.1	0.6 ±0.01	0.7 ±0.1	0.73 ±0.08	0.8 ±0.09	0.6 ±0.08	0.98 ±0.09	0.7 ±0.02
Sperm motility (%)										
T1	79 ±10b	89 ±3.7b	89 ±6	88 ±5.8	86 ±6.6b	93 ±1.7b	92 ±2	94 ±1	89 ±6	89 ±1.8b
T2	76 ±16b	85 ±8.8b	90 ±1.2	90 ±2.9	91.6 ±1.7b	95 ±1.3b	93.8 ±1.3	93.8 ±1.3	95 ±1.1	90 ±3.2b
T3	30 ±12a	52 ±4.8a	75 ±15	73 ±10	73 ±14a	75 ±8.4a	75 ±12	80 ±10	88 ±7	69 ±4.3a
Overall mean±SE	A61.7 ±9.9	75.3 ±6.6	84.7 ±6	83.7 ±4.1	83.5 ±4.7	87.7 ±1.8	86.9 ±3.3	89.3 ±6.8	90.7 ±5.8	82.7 ±2.1
Sperm abnormality (%)										
T1	B8.7 ±1.7a	B6.2 ±1.2a	A4.8 ±0.1a	A4.2 ±0.96a	A4.2 ±0.6a	A4.8 ±0.9a	A3.4 ±0.7a	A3.6 ±0.8a	A2.4 ±0.24a	4.7 ±0.40a
T2	C9.3 ±1.9a	C8.5 ±1.3b	BC7.7 ±1.5b	B7.0 ±0.7b	B6.0 ±0.02a	B5.7 ±0.9a	B5.5 ±1.2a	A2.6 ±1.1a	A2.8 ±0.5a	6.1 ±0.53a
T3	C19.4 ±3.2b	B13 ±0.8c	B13 ±1.8c	B13.2 ±0.7c	B12 ±1.1b	A9 ±1.4b	AB10.8 ±1.6b	A8.2 ±1.8b	A7 ±1.3b	11.7 ±0.90b
Overall mean ±SE	C12.5 ±1.4	B9.2 ±1.1	AB8.5 ±0.8	Ab8.1 ±0.8	AB7.4 ±0.8	A6.5 ±1.1	A6.7 ±0.9	A4.8 ±0.6	A4.1 ±0.3	7.5 ±0.5
Live spermatozoa (%)										
T1	A76 ±17b	Ab89.6 ±2b	B91 ±0.9b	B92 ±1.4b	B92.4 ±1.1	B92 ±1.4	AB89 ±1.5	B91 ±1.5	B96 ±0.7	89.9 ±2.1b
T2	A74 ±18.5b	AB88 ±1.5b	B92 ±21b	B92 ±1.8b	B93 ±1.2	B92 ±1.3	B91 ±0.9	B90.8 ±1.8	b94 ±0.8	89.6 ±3.2b
T3	A33 ±15a	B69.5 ±18a	B71 ±17a	B77 ±14a	BC80 ±8.9	C87.8 ±25	C88 ±2.2	C85 ±1.1	C91.5 ±0.5	75.91 ±5.1a
Overall mean ±SE	A61 ±9.4	B82.4 ±9	B84.7 ±5.5	b87 ±7	B88.5 ±2.3	BC90.6 ±0.96	BC89.3 ±0.84	BC88.9 ±0.64	C93.8 ±0.31	85 ±2.2
Sperm concentration (x 107/ml)										
T1	A72 ±5.5	A99 ±8.1b	AB142 ±12b	AB141 ±14	BC183 ±17b	B180 ±0.8b	B176 ±24	BC187 ±24a	BC200 ±18b	153 ±9b
T2	A77 ±4	AB115 ±18b	AB127 ±3b	ABC148 ±16	ABC173 ±19b	BC174 ±12b	AB121 ±31	C195 ±12b	C201 ±8.9b	148 ±8b
T3	A31 ±11	A35 ±16a	AB51 ±9a	ABC100 ±17	BC115 ±25a	AB99 ±22a	C141 ±32	C134 ±19a	BC130 ±50a	93 ±10a
Overall mean±SE	60 ±6	83 ±8	107 ±10	130 ±12	157 ±14	151 ±10	146 ±17	172 ±19	177 ±32	131 ±6

a, b, c and A, B, C values within months and treatments respectively, for each character with the different superscripts are significant ($P < 0.05$).

Table (3): Storability of ram spermatozoa at 5°C as affected by YC-addition.

Duration of storage at 5°C	Control	0.025% YC	0.05% YC	Overall x ± SE
2 hrs	$^{C}61\pm4.8^{a}$	$^{C}85.3\pm3.2^{b}$	$^{C}84.5\pm2.3^{b}$	$^{C}77.0\pm2.2$
24 hrs	$^{B}44.1\pm4.7^{a}$	$^{C}72\pm3.1^{b}$	$^{BC}68.6\pm2.7^{b}$	$^{C}61.8\pm2.3$
48 hrs	$^{AB}29.8\pm4^{a}$	$^{B}48\pm3.1^{b}$	$^{B}47.9\pm2.9^{b}$	$^{B}42.6\pm2.04$
72 hrs	$^{A}15\pm2.3$	$^{A}16.5\pm1.9$	$^{A}20.5\pm1.7$	$^{A}17.8\pm1.1$
Overall X ± SE	37.5+1.7a	55.5+1.2b	55.4+1.6b	

a, b, c and A, B, C between treatments and duration of storage resp., with different superscripts are significant at (P < 0.05).

Results from this study show that additional YC had slightly effect on serum protein, albumin and globulin values in growing lambs (Table 4). These results are in agreement with those reported by Kovacs *et al.* (1998) who found that dietary YC addition increased total protein, albumin and globulin values in Suffolk ewes and similar to those reported by Metwally *et al.* (2000) in Fresian cows. These increase may be elated to an increase in dry matter intakeand stabilize rumen environment as a result of these feed additives (Hutjens, 1993).

It was also observed a highly (P < 0.05) significant differences in blood serum protein, albumin and globulin levels as age advanced but these variations were irregular patterns (Table 4).

The results in Table (4) showed that the concentrations of GOT and GPT activity were highest in control lambs followed by those fed 0.025% YC, while the lowest value in 0.05% YC but difference were not significant. These results are similar to those found by Abdel-Khalek *et al.* (2000) in calves.

Table (4): Some blood characteristics as affected by YC addition.

Treatments	Age (months)							Overall mean ±SE
	4	5	6	7	8	9	10	
RBCs (x 106/mm3)								
T1	10.52 +0.91b	B11.52 +0.98b	A9.89 +0.29b	9.88 +0.45b	B9.40 +0.42ab	9.23 +0.59ab	A7.45 +0.80a	9.69 +0.33
T2	11.73 +1.23c	B10.96 +0.39bc	a9.45 +0.42abc	9.88 +0.40abc	AB8.16 +1.04a	8.88 +0.77ab	A8.34 +0.69a	9.63 +0.35
T3	9.39 +0.64ab	A8.25 +0.15a	B11.78 +0.99c	9.51 +0.27ab	A7.74 +0.74a	8.31 +0.44a	B10.36 +0.46bc	9.33 +0.32
Overall mean+SE	10.49 +0.57c	9.87 +0.46bc	10.05 +0.61bc	9.43 +0.21abc	8.19 +0.44a	8.74 +0.29a	8.98 +0.46a	9.39 +0.18
WBCs (x 103/mm3)								
T1	10.25 +1.14	10.12 +0.82	AB8.08 +1.01	7.28 +0.69	7.17 +1.3	6.98 +2.13	6.96 +2.7	8.12 +0.39
T2	10.32 +1.29	8.64 +0.96	A8.52 +1.08	7.59 +0.55	8.52 +0.88	8.76 +1.71	8.28 +1.7	8.66 +0.49
T3	12.23 +2.10c	11.12 +1.34bc	B11.92 +1.83bc	7.88 +0.39ab	6.55 +0.38a	6.01 +0.47a	6.93 +1.17a	8.95 +0.65
Overall mean+SE	10.94 +1.04c	9.96 +0.59c	9.51 +0.84bc	7.58 +0.24ab	7.41 +0.43ab	7.25 +0.75a	7.39 +0.77ab	8.58 +0.29

Table (4): Cont.

Treatments	Age (months)							Overall mean ±SE
	4	5	6	7	8	9	10	
				Haemoglobin (g %)				
T1	B12.86 ±0.94	B12.75 ±0.44	C12.36 ±0.15	B13.36 ±0.45	13.14 ±0.33	B13.85 ±0.21	A12.9 ±0.41	C13.03 ±0.18
T2	A11.01 ±0.36a	A11.16 ±0.42a	B11.72 ±0.38ab	AB12.47 ±0.44bc	13.22 ±0.43cd	Ab12.7 ±0.92bc	B14.14 ±0.17d	B12.35 ±0.25
T3	A11.25 ±0.27ab	A11.15 ±0.17a	A10.73 ±0.19a	A11.84 ±0.28abc	12.35 ±0.42bc	A11.93 ±0.35abc	A12.73 ±0.39c	A11.71 ±0.17
Overall mean±SE	11.71 ±0.40ab	11.67 ±0.33ab	11.60 ±0.24a	12.55 ±0.28bc	12.60 ±0.29c	12.84 ±0.29c	13.26 ±0.26c	12.36 ±0.13
				Albumin (g %)				
T1	3.75 ±0.06	3.68 ±0.06	3.71 ±0.03	3.78 ±0.01	3.69 ±0.1	3.75 ±0.05B	3.65 ±0.05	3.71 ±0.02
T2	bc3.68 ±0.056	d3.85 ±0.09	a3.41 ±0.06	ab3.62 ±0.09	ab3.62 ±0.06	cd3.86 ±0.07B	ab3.01 ±0.08	3.67 ±0.04
T3	ab3.64 ±0.05	b3.70 ±0.03	ab3.63 ±0.13	b3.82 ±0.04	ab3.64 ±0.12	a3.36 ±0.05A	ab3.57 ±0.11	3.63 ±0.04
Overall mean±SE	abc3.69 ±0.03	c3.78 ±0.04	a3.58 ±0.06	bc3.74 ±0.04	abc3.64 ±0.04	abc3.66 ±0.05	3.6 ±0.05ab	3.67 ±0.02
				Globulin (g%)				
T1	ab3.88 ±0.04	ab4.01 ±0.05	a3.77 ±0.11	ab4.03 ±0.08	a3.69 ±0.15	b4.19 ±0.17	b4.19 ±0.04	3.96 ±0.04
T2	3.89 ±0.06	4.06 ±0.06	3.94 ±0.12	4.02 ±0.06	3.91 ±0.04	3.91 ±0.06	4.06 ±0.07	3.97 ±0.04
T3	3.87 ±0.06	3.90 ±0.06	3.78 ±0.09	4.12 ±0.19	3.77 ±0.07	3.80 ±0.09	3.81 ±0.11	3.86 ±0.05
Overall mean±SE	3.88 ±0.03abc	3.99 ±0.03abc	3.82 ±0.05ab	4.06 ±0.09c	3.79 ±0.09a	3.97 ±0.08ab	4.02 ±0.06bc	3.93 ±0.03
				Total protein (g %)				
T1	7.63 ±0.07abc	7.69 ±0.04a-d	7.39 ±0.17ab	7.78 ±0.12bcd	7.32 ±0.19ad	8.08 ±0.11d	8.01 ±0.03c	7.7 ±0.06
T2	7.67 ±0.05b	7.75 ±0.05b	7.56 ±0.11ab	7.72 ±0.04b	7.32 ±0.18a	7.76 ±0.06b	7.82 ±0.04b	7.66 ±0.04
T3	7.56 ±0.11	7.75 ±0.010	7.42 ±0.14	7.52 ±0.14	7.41 ±0.17	7.21 ±0.05	7.16 ±0.08	7.40 ±0.04
Overall mean ±SE	7.62 ±0.04b	7.66 ±0.05b	7.46 ±0.07ab	7.68 ±0.07b	7.35 ±0.09a	7.68 ±0.07b	7.67 ±0.03b	7.59 ±0.03
				GOT (IU/L)				
T1	A39.69 ±0.3c	38.9 ±0.16bc	39.0 ±0.10bc	A38.0 ±0.37ab	38.3 ±0.42ab	A37.9 ±0.23a	38.1 ±0.18ab	38.56 ±0.16
T2	AB39.38 ±0.16b	39.3 ±0.21b	39.0 ±0.30b	B39.3 ±0.43b	38.8 ±0.26ba	A37.9 ±0.55a	38.4 ±0.31ab	38.87 ±0.15
T3	B38.56 ±0.28a	39.7 ±0.49b	38.5 ±0.10a	B40.1 ±0.43b	38.3 ±0.07a	B39.56 ±0.19b	38.0 ±0.18a	38.96 ±0.17
Overall mean ±SE	39.21 ±0.20c	39.3 ±0.19c	38.8 ±0.12abc	39.12 ±0.34bc	38.45 ±0.17ab	38.43 ±0.31ab	38.2 ±0.19a	38.79 ±0.09
				GPT (IU/L)				
T1	20.68 ±0.35	A20.25 ±0.41	20.37 ±0.48	A19.50 ±0.48	A20.19 ±0.48	20.13 ±0.22	20.63 ±0.21	20.25 ±0.15
T2	21.69 ±0.33	A20.13 ±0.33	20.84 ±0.35	a19.48 ±0.43	A20.75 ±0.44	20.31 ±0.35	20.37 ±0.54	20.51 ±0.18
T3	20.63 ±0.43	b22.44 ±0.28	20.56 ±0.29	B21.41 ±0.29	B22.43 ±0.89	20.87 ±1.41	20.13 ±0.24	21.21 ±0.22
Overall mean ±SE	21.0 ±0.25	20.93 ±0.37	20.59 ±0.21	20.13 ±0.44	21.13 ±0.44	20.44 ±0.20	20.38 ±0.20	20.66 ±0.12

a, b, c and A, B, C values within months and treatments respectively, for each character with the different superscripts are significant (P < 0.05).

In conclusion, the addition of dietary YC improved growth rate, limited the time taken to reach puberty, improved semen quality and increased rate of storability and enhancement of blood parameters compared with unsupplemented animals.

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تأثير إضافة الخميرة الجافة على بدأ البلوغ ، إنتاج السائل المنوى ومكونات الـــدم فى ذكور الحملان الخليطة

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استخدم فى هذه الدراسة ٢١ حمل ذكر خليط (نصف رومانوف × نصف رحمانى) عمر ٤ شهور و متوسط وزن جسم ٢١,٢كجم وقسمت إلى ثلاثة مجاميع متساوية لدراسة تأثير إضافة الخميرة على معدلات النمو ، بدأ البلوغ (أول قذفة محتوية على حيوانات منوية متحركة) وخواص السائل المنوى بعد البلوغ والقدرة على تخزينه على درجة ٥°م ومكونات الدم. وغذيت حملان التجربة كالتالى المجموعتين الأولـــى والثانيـــة غذيت على العليقة الأساسية مضافا إليها الخميرة بمعدلات ٠,٠٥% ، ٠,٠٢٥% من الوزن الحـــى للحيـــوان بينما المجموعة الثالثة غذيت على العليقة الأساسية فقط بدون إضافات. جمعت عينات الـــدم وكذلـــك وزنـــت الحيوانات مرة كل ١٥ يوم على مدار فترة التجربة (٦ شهور).

وقد أوضحت نتائج التجربة أن إضافة الخميرة للمجموعة الأولى والثانية زاد معنويـــا مـــن أوزان الحيوانات وكذلك معدلات نموها بالمقارنة بالمجموعة المقارنة. وأيضا وصول حيوانات المجموعـــة الأولـــى والثانية إلى عمر البلوغ مبكرا بمقدار ٢٧ ، ٢٢,٥ يوم وكذلك أثقل وزنا بالمقارنـــة بالمجموعـــة المقارنـــة. النسب المئوية للحيوانات المنوية المتحركة والحية وكذلك تركيز الحيوانـــات المنويـــة كـــانت مرتفعـــة فـــى المجموعة الأولى والثانية ولكن أقل فى نسبة الحيوانات المنوية الشاذة بالمقارنة بالمجموعة المقارنة. معـــدلات حيوية الحيوانات المنوية على درجة ٥°م كانت ٥٥,٤ ، ٥٥,٥ ، ٣٧,٥% للثلاث مجاميع على الترتيب. عدد كرات الدم الحمراء و قيم الهيموجلوبين كانت عالية فى المجموعة الأولى والثانية ومنخفضة فى كرات الـــدم البيضاء بالمقارنة بمجموعة المقارنة. وكان لإضافة الخميرة تأثير طفيف علـــى قيـــم كـــل مـــن الـــبروتين والألبيومين والجلوبيولين. وعلى العكس فإن نشاط إنزيمات GPT, GOT كان عاليا فى المجموعـــة الغـــير معاملة مقارنة بالمجموعتين المعاملتين بالخميرة وكانت الفروق غير معنوية.