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EFFECT OF YEAST SUPPLEMENTATION ON PRODUCTIVE PERFORMANCE, SOME BLOOD CONSTITUENTS AND ECONOMIC EFFICIENCY OF GROWING BOUSCAT RABBITS.

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This study was carried out at Poultry Farm, Animal Production Department, Faculty of Agriculture, Assuit branch to study the effect of yeast supplementation on growth performance, some blood constituents and economic efficiency of growing Bouscat rabbits. A total number of 15 males aged 8 weeks of Bouscat rabbits were used in this study. The animals were divided randomly into three groups. The first group was kept without treatment as control and fed basal diet (16.18% CP). The 2nd and 3rd groups were fed the basal diet and supplemented drinking water with 3% and 5% yeast, respectively.

The experiment continued for 12 weeks from 8 up to 20 weeks of age. Initial body weight, final body weight were recorded each bioweekly, live body weight gain and feed consumption were recorded also. Feed conversion was calculated. Each 4 weeks blood samples were taken to determine plasma total protein, albumin and triglyceride. Plasma globulin and economic efficiency were calculated. Results obtained showed that:

1. *Addition of 3% or 5% yeast improved most of productive traits and all blood plasma traits as compared with those of control group.*
2. *Addition of 5% yeast was the best when compared with 3% yeast because it improved most of productive traits and blood plasma traits.*
3. *Addition of 3% yeast was the best for the economic efficiency as compared with those of other treatments.*

Key words: Yeast supplementation, productive performance, blood constituents, economic efficiency, Bouscat rabbits.

Feed is the major item of cost in the animal production. We need to use the natural products in ration to increase production performance. Supplementation of natural components in ration is now widely used in the world. Therefore, probiotics (yeast) as promoters and feed additive have been used as natural components.

A few years ago active live yeast, has been documented as a probiotic feed additive for poultry, due to its improvement effect on performance characteristics. The use of probiotics is one of the new alternatives for sustaining the growth of the poultry industry using recent developments in biotechnology (Kulkarni *et al*., 1997)

Nowadays, supplementation of animal feeds by types of growth promoters is commonly and widely used, in order to improve the utilization of nutrients (Radwan *et.al*., 1995). Each type of growth promoters has a specific mode of action according to its nature and purpose.

Probiotics are biological feed additives that provide not only yeast given orally to alter intestinal flora resulted improvement in body gain and feed efficiency (Hollister *et.al*., 1990). Dried yeast is rich in protein, energy and many amino acids particularly lysine, but it is low in methionine content (Ostrian, 1996)

Yeast culture as a feed additive probiotics are live microbial feed supplements, which beneficially affect the host animal by improving its intestinal microbial balance (Nunes, 1994). Yeast culture contains large amounts of yeast metabolites. These metabolites component inhibit bacteria altering microbial metabolism and decrease intestinal ph and use as probiotics (Makled, 1991 and Miles and Bootwella, 1991).

Lacto-Sacc is a biological feed additive that provide live yeast culture and natural lactic-acid bacteria to the rabbit digestive tract. Such lactic acid bacteria help to maintain an optimum low ph to inhibit growth of undesirable bacteria (Alltech Bio-technology center, 1989). Abdel Ghani *et.al*., (1995) postulated that yeast culture may act as a source of vitamin B complex (niacin is involved intimately with energy metabolism. Abdel Azeem *et al*. (2004) found that yeast supplementation to rabbits diet improved growth performance and economic efficiency and total plasma protein and decrease the level of cholesterol and total lipids. El-Hindawy *et al*. (1993) found that supplementation lacto-sacc to the diet of growing rabbits increased live body weight and weight gain, but insignificantly increased feed intake, feed conversion, performance index and economic efficiency were improved.

The effect of yeast as growth promoters on growing rabbits performance have not received due attention. For this reason, the aim of this study was to evaluate the effect of yeast supplementation on the performance, some blood components and economic efficiency of growing Bouscat rabbits, under Assuit environmental conditions.

MATERIALS AND METHODS

The present work was carried out at poultry farm, Animal Production Department, Faculty of Agriculture, Al-Azhar University, Assuit branch, Egypt.. The experimental period was extended for 12 weeks from March to June , 2008. A total number of 15 Bouscat male rabbits, Eight weeks age and about 1230 ±45.39 g body weight were used in the present work to study the effect of yeast supplementation in drinking water on the productive performance, some blood components and economic efficiency of growing Bousteat rabbits. Rabbits were randomly allotted to three groups 5 rabbits each. The first group was fed a basal diet *ad libitum* which was covering the nutritional requirements of the growing rabbits according to NRC (1994) recommendations and kept as a control diet, while the other groups (second and third) were fed the same diet, but supplemented drinking water with 3 or 5 % active humid yeast (28% dry matter), respectively. The active humid yeast (Forno) was obtained from starch and yeast Egyptian Company, it supplemented with water carefully every day. Ingredients and chemical composition of the control diet are shown in Table 1. Animals were individually housed in wired battery cages supplied with feeders and stainless steel nipples for eating and drinking. All the experimental animals were healthy and clinically free from internal and external parasites and were kept under the same managerial and hygienic conditions. Initial body weight, final body weight and feed intake were recorded. Body weight gain and feed intake were recorded weekly. Total body weight gain, daily weight gain and feed conversion were calculated.

Blood samples were taken from the marginal ear vein of three rabbits males within each group monthly. Blood samples collected into dry clean centrifuge tubes.

Blood plasma was separated by centrifugation at 3000 r.p.m. for 20 minutes and kept in a deep freezer at (-20°c) until biochemical analysis. Total protein level was estimated according to Armstong and Corri (1960). Albumin level was estimated according to Doumas *et.al.* (1971). Globulin level values were obtained by subtracting the values of albumin from corresponding values of total protein. Plasma triglycerides were estimated according to Fassati and Principe (1982).

Table 1. Composition and chemical analysis of the experimental basal diet.

Ingredients	%
Alfalfa hay	28.0
Wheat bran	28.0
Barley	20.0
Soy bean meals 44%	12.0
Yellow corn	7.0
Molasses	3.0
Limestone	1.1
Sodium chloride salt	0.3
Vitamin and mineral premix*	0.6
Total	**100**
Chemical analysis (%)**	
Crude protein	16.18
Crude fiber	13.30
Ether extract	2.40
Ash	5.55
NEF	50.67
DM	88.10
OM	82.55
Calculated DE (Kcal/kg)***	2620

Each 3 kg of Vit. and min in premix contain: 6000000 IU Vit. A, 900000 IU Vit.. D3, 40000 mg Vit.. E, 2000 mg Vit.. K, 2000 mg Vit. B1, 4000 mg Vit. B2, 2000 mg Vit. B6, 10 mg Vit.. B12, 50000 mg Niacin, 10000 mg Pantothenic acid, 50 mg Biotin, 3000 mg Folic acid, 250000 mg Choline, 50000 mg Zn, 8500 mg Mn, 50000 mg Fe, 50000 mg Cu, 200 mg I, 100 mg Se and 100 mg Co.
**Analyzed according to A.O.A.C. (1995).
*** Calculated according to N.R.C. (1994).

Economic efficiency of meat production was calculated from input-output which was calculated according to the prices of the experimental diets and body weight gain during the year of 2008. The values of economical efficiency were calculated as follows:

Economic efficiency (EE) = Net revenue (LE) / Total feed cost (LE)

Data of experiments were statistically analyzed according to Sendcor and Cochran (1982) as the following model:

$$Yij = \mu + Ti + Eij$$

Where Yij = The individual observation , μ= The overall mean

Ti = The effect of treatments , Eij = The experimental error

Significant differences between treatments means were tested according to Duncan's Multiple test (Duncan, 1955).

RESULTS AND DISCUSSION

Productive performance

Results in Table 2 shows that the addition of 3% and 5% yeast in drinking water of growing Bouscat rabbits had a significant effect ($P \leq 0.05$) on all productive traits except feed consumption as compared with those of control group. Rabbits received 3% yeast in drinking water had higher values of final live body weight and total feed consumption when compared with those supplemented with 5% yeast while, total body weight gain and feed conversion insignificantly improved in rabbits received 5% yeast in drinking water when compared with those supplemented with 3% yeast.

These findings agree with those reported by DeBlas *et.al.* (1991), El-Hindawy *et.al.*(1993) and AbdelAzeem *et.al.*, (2004) who found that most of performance traits of growing rabbits were improved when fed diet supplemented with yeast in the drinking water . Also, Osman (1996) and Tawfeek and Marai (1997) found the same results in broiler chicks and laying hens.

Stokkland (1993) indicated that many of the beneficial effects attributed to yeast culture are associated with alterations in the digestion processes, which resulted in the improvement in the feed utilization.

The mode of beneficial action of yeast can be attributed to its antagonistic bacteria and altering gut micro flora make-up (Line *et.al.*,1998). Abdel Ghani *et.al.*(1995) postulated that yeast culture may act as a source of vitamin B complex (especially niacin) is involved intimately with energy metabolism. The supplementation of cows with yeast increased the quantities of VFA's formed to provide metabolizable energy and to stimulate protein synthesis in the rumen to supply amino acids to the host animal (Wallace and Newbold, 1993).

Blood constituents:

Data presented in Table 3 show that the addition of yeast in drinking water of growing rabbits had a significant effect ($P \leq 0.05$) on all studied traits except plasma triglyceride which was significantly lower compared with those of the control group. Rabbits received 5% yeast in drinking water had higher values of plasma total protein, albumin and globulin when compared with those fed the basal diet and that supplemented with 3% yeast .while, plasma triglyceride had lower value in the rabbits received 5% yeast in the drinking water when compared with those received 3% yeast. These results agree with those reported by Tawfeek and Marai (1997) and Abdel Azeem *et al.* (2004) who found that the rabbit fed diets supplemented with yeast had higher plasma

Table 2. Growth performance of Bouscat rabbits as affected by yeast supplementation.

Items \ Treatments	T1 (Control)	T2 (3% Yeast)	T3 (5% Yeast)	Significant test
Initial body weight (g)	1210 ± 32.0	1228 ± 15.0	1153 ± 25.0	NS
Final body weight (g)	2663.3 ± 20.0^{b}	3300 ± 51.0^{a}	3235 ± 38.0^{a}	**
Total body weight gain (g)	1453 ± 29.0^{b}	2072 ± 32.0^{a}	2082 ± 52.0^{a}	**
Live body weight gain/day (g)	17.30 ± 0.62^{b}	24.67 ± 0.34^{a}	24.78 ± 0.20^{a}	**
Total Feed consumption (g)	11704 ± 61.0^{a}	11186.3 ± 46.0^{b}	11046 ± 26.0^{b}	**
Feed consumption rabbit/ day/(g)	139.3 ± 3.32^{a}	133.1 ± 1.90^{b}	131.5 ± 3.80^{b}	*
Feed conversion	8.05 ± 0.14^{a}	5.40 ± 0.26^{b}	5.31 ± 0.21^{b}	**

a, b, c Means in the same raw having the same superscript are not significant at (P<0.05).

total protein and globulin level than that of the control group. Also, Soliman *et al.* (2005) showed increased total plasma protein and albumin when growing quail fed diets contained yeast while, blood total lipid wasn't affected. Victor *et al.* (1993) found that cholesterol content was lower with the inclusion of yeast into broiler chicks diet. On the other hand, few results are available on the effect of feeding yeast of growing rabbits on plasma triglyceride.

Probiotics addition was accompanied with the higher value of plasma globulin which reflects the good immunity status of the animal.

El-Tantawy *et al.*(2001) suggested that the increasing total plasma proteins' level might reflect an increase in the hepatic function, thus probiotics may act through affecting the metabolic rate besides its effect on the gastro-intestinal microbial activity. Klasing and Austic (1984) observed an increase in protein synthesis in liver of chickens infected with E-coli bacteria. Similar explanation can be introduced for the higher blood protein value of layers fed diets supplemented with yeast, that the high inclusion of active live yeast may induce an inflammation in the small intestine wall causing increase in blood protein level.

Table 3. Effect of supplementing yeast on blood components of growing Bouscat rabbits.

Items	Weeks	Treatments			Significant test
		T1 (Control)	T2 (3% Yeast)	T3 (5% Yeast)	
Total protein	8-12	6.46 ± 0.10^{c}	6.70 ± 0.16^{b}	7.21 ± 0.12^{a}	
	13-16	5.93 ± 0.12^{c}	6.64 ± 0.06^{b}	7.16 ± 0.07^{a}	
	17-20	5.77 ± 0.12^{c}	7.12 ± 0.13^{b}	7.76 ± 0 .16^{a}	
	Overall means	**6.05 ± 0.13^{C}**	**6.82 ± 0.10^{B}**	**7.38 ± 0.11^{A}**	**
Albumin	8-12	3.33 ± 0.13^{b}	3.96 ± 0.12^{a}	4.10 ± 0.10^{a}	
	13-16	3.49 ± 0.16^{b}	3.92 ± 0.10^{a}	4.32 ± 0.12^{a}	
	17-20	3.41 ± 0.14^{b}	3.61 ± 0.13^{b}	3.89 ± 0.06^{a}	
	Overall means	**3.41 ± 0.08^{C}**	**3.83 ± 0.08^{B}**	**4.10 ± 0.07^{A}**	**
Glubulin	8-12	3.13 ± 0.04	2.74 ± 0.28	3.11 ± 0.07	
	13-16	240 ± 0.02	2.72 ± 0.13	2.84 ± 0.14	
	17-20	3.36 ± .04^{b}	3.51 ± 0.25^{a}	3.87 ± 0.22^{a}	
	Overall means	**2.64 ± 0.12^{B}**	**2.99 ± 0.17^{A}**	**3.27 ± 0.17^{A}**	**
Triglyceride	8-12	154.73 ± 2.66^{a}	133.4 ± 2.69^{b}	125.10 ± 2.35^{c}	
	13-16	133.80 ± 2.14^{a}	126.0 ± 2.55^{b}	123.37 ± 1.65^{b}	
	17-20	155.17 ± 2.57^{a}	144.83 ± 2.47^{b}	134.33 ± 0.86^{c}	
	Overall means	**147.9 ± 3.73^{A}**	**135.41 ± 3.01^{B}**	**127.60 ± 1.19^{C}**	**

a, b, c means in the same raw having the same superscript are not significant at ($P<0.05$).

Economic efficiency

Results of economic efficiency (E.E) and relative economic efficiency (R.E.E) estimated for different treatments used during the experiment period are shown in Table 4. According to the input- output, the best Relative economic efficiency (R.E.E) was recorded by rabbits supplemented with 3% in drinking water. These results indicated that rabbits supplemented with 3% yeast were more economic than the rabbits in other experimental groups. These results are in agreement with those reported by El-Hindawy *et al.* (1993) and Abdel Azeem *et al.* (2004), who found that rabbits fed diets supplemented with yeast improved the economic efficiency.

Table 4. Effect of supplementing yeast on the economic efficiency of growing Bouscat rabbit.

Treatments / Items	T1 (Control)	T2 (3% Yeast)	T3 (5% Yeast)
Total feed in take (gm)	11704	11186	11046
Cost of feed intake (LE)	19.9	25.82	29.90
Body weight gain (gm)	1453	2072	2082
Total revenue (LE)	29.06	41.44	41.64
Net revenue (LE)	9.16	15.62	11.74
Economic efficiency (EE)*	0.46	0.60	0.39
Relative economic efficiency (R.E.E)**	100	132	86

L.E = Egyptian Pound Price of kg yeast = 10 L.E according to price at 2008
Price of Kg body weight gain = 20 L.E Price of Kg ration = 1.7 L.E
* Economical efficiency (E.E) = Net revenue/ Feed cost
*R.E.E =Economical of treat / Economical of control X 100

This improvement could be due to increasing final live body weight (Table 2), and decreasing cost of feed intake (Table 4).

Conclusively, it may be concluded from the present study that yeast as a probiotics can be used as growth promoters for growing Bouscat rabbits to improve efficiency of feed utilization and rabbit performance, some blood components and economic efficiency. The best results in this study were obtained by the group supplemented with 3% yeast in drinking water.

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تأثير إضافة الخميرة على الأداء الإنتاجى وبعض مكونات الدم والكفاءة الاقتصادية لأرانب البوسكات النامية.

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أجريت هذه الدراسة بمزرعة قسم الإنتاج الحيوانى بكلية الزراعة جامعة الأزهر فرع أسيوط وذلك لدراسة تأثير إضافة الخميرة على الأداء الانتاجى وبعض مكونات الدم والكفاءة الاقتصادية . استخدم فى هذه الدراسة عدد ١٥ أرنب بوسكات ذكر عمر ٨ أسبوع. قسمت الحيوانات إلى ٣ مجموعات تركت المجموعة الأولى بدون معاملة (مقارنة) وغذيت على العليقة الأساسية (١٦,١٨%) بروتين خام والمجموعتين الثانية والثالثة غذيتا على العليقة الأساسية مع إضافة ٣ ، ٥ % خميرة إلى ماء الشرب على التوالى. استمرت التجربة لمدة ١٢ أسبوع وحتى عمر ٢٠ أسبوع وتم وزن الأرانب فى بداية التجربة ونهايتها وتم وزن الأرانب والغذاء المستهلك كل أسبوعين وتم حساب الكفاءة التحويلية للعلف وتم أخذ عينات دم فى نهاية كل ٤ أسابيع لتقدير البروتين الكلى والألبيومين والجلسريدات الثلاثية فى البلازما وتم حساب الجلوبيولين وكانت النتائج كالتالى:

١. إضافة ٣% أو ٥% خميرة إلى ماء الشرب أدى إلى تحسن فى معظم الصفات الإنتاجية ومكونات الدم بالمقارنة بالمعاملة الكنترول.
٢. إضافة ٥% خميرة كانت أفضل من إضافة ٣% لتحسن معظم الصفات الإنتاجية ومكونات الدم.
٣. كانت المعاملة ٣% أفضل اقتصاديا من المعاملات الكنترول و المعاملة ٥% .

التوصيـــة: يمكن التوصية بإضافة الخميرة إلى ماء الشرب لأرانب البوسكات النامية حتى ٣% حيث أنها كانت الأحسن اقتصاديا.