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Productive Performance of Rabbits Fed Diets Containing Lemongrass or Active Dried Yeast

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Abstract: This experiment was conducted to investigate the effect of lemongrass [*Cymbopogon citratus* (LG)] and active dried yeast (DY) on rabbit performance, digestibility coefficients, carcass characteristics and blood constituents. Twenty one of male New Zealand White rabbits aged 8 weeks with an average body weight of 1134 ± 62.9 g, were divided randomly into three equal groups (7 animals in each). The dietary treatments were classified as diet 1 control (C) not contained any additives, while lemongrass (LG) and active dried yeast (DY) were added at 0.50% in diet 2 and 3, respectively. Rabbits fed to allow *ad libitum* intake in feeding trial lasted 42 days. The results showed that, addition 0.5% of LG or DY to rabbit's diet improved DM, OM, CP, CF and NFE digetibilities compared to the control diet. On the other hand TDN% in significant (P>0.05) improvement by adding 0.05% of LG or DY to diets in comparison with the control diet, while 0.05% LG significantly (P<0.05) increase DCP% compared to the C and DY diets. Final weight, body weight gain and average daily gain in significantly (P>0.05) increased compared to the control diet (C). However, daily feed intake in significantly (P>0.05) decreased with adding 0.5% LG or DY to rabbit's diet compared to control group. Feed conversion ratio (g. intake/ g. gain) significantly (P<0.05) improved by adding 0.5% DY and in significantly (P>0.05) improved by adding 0.5% LG in comparison with the control diet. Caecal and stomach pH values were not affected among different groups, while total volatile fatty acids concentration significantly (P<0.05) decreased with adding 0.5% LG or DY to rabbit's diet compared to the control diet. Length of caecum, colon and rectum were not significant affected among different groups. Dressing percentages (DP) calculated as carcass weight/ slaughter weight (CW/SW) was not affected by addition 0.5% LG or DY to rabbit's diet compared to control diet (C). However, adding 0.5% LG significantly (P<0.05) increase DP as carcass weight/ empty body weight (CW/ EBW) compared to DY and control diets. Addition of 0.5% LG or DY to rabbits diets had no significant effect on total protein, globulin, creatinine, GOT and GPT compared to the control diet, however rabbits fed DY containing diet significantly (P<0.05) increased albumin and albumin: globulin ratio and significantly (P<0.05) decreased alkaline phosphatase compared to the control diet. On the other hand, adding 0.5% LG to rabbit's diet significantly (P<0.05) increased cholesterol in comparison with the control diet. Under this condition of this work it could be concluded that adding 0.5% of lemongrass or active died yeast in rabbit's diet improved digestion coefficients, growth performance and dressing percentages.

Key words: Lemongrass · Active dried yeast · Rabbit performance · Digestibility coefficients · Carcass characteristics · Blood constituents

INTRODUCTION

The medicinal plants and herbs have been used for many years in the treatment of various diseases in animals and human beings. Now-a-days, utilization of these medicinal plants is increasing. These are used in animal feed as the growth promoters. Due to prohibition of most of the antimicrobial growth promoters in animal feed because of their residual effects, plant extracts are becoming more popular. They act as antibacterial, antioxidant, anticarcinogenic, antifungal, analgesic, insecticidal, anticoccidial and growth promoters. These plant extracts compete with the synthetic drugs. Majority of medicinal plants do not have the residual effects [1]. Lemongrass oil is a volatile oil which can be extracted directly from fresh lemongrass using steam extraction and the grass contains 0.035 % essential oil [2]. Malee *et al.* [2] found improvements in productive performance of weanling pigs fed diets supplemented with lemon grass oil. Essential oils improve the absorption and utilization of nutrients in pigs [3], while some have been reported to enhance the activity of digestive enzymes and act as antimicrobial agents [4] to reduce the incidence of diarrhea.

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The function of probiotics fed to monogastric animals has been studied to a large extent relative to protection against enteric diseases, control of pre-and post-weaning diarrhea, mortality, shedding of *Escherichia coli* and growth promotion [5, 6]. Yeast probiotics (*Saccharomyces cerevisiae strains*) were more potent in producing beneficial effects in comparison to monensin [7]. Yeast probiotics produce one or more extracellular compounds, due to metabolic activity in the host system, which exert inhibitory action on some pathogenic bacterial strains [8]. The bacteriostatic or bactericidal activity of *S. cerevisiae* is due to production of proteases (e.g. serine proteases, etc.) [8,9]. Other metabolites of yeast, such as low-molecular weight fatty acids, may also inhibit bacterial growth, indicating that a complex mixture of yeast metabolites is involved in the inhibitory activity [8-11]. Concerning feeding yeast cultures, Williams and Newbold [12], Lesmeister *et al.* [13] and Stella *et al.* [14] reported improved feed consumption, BW gain and feed efficiency for gain, while Erasmus *et al.* [15], Agarwal *et al.* [16], Mahender *et a l.* [17], Kim *et al.* [18], Kawas *et al.* [19] and Tripathi *et al.* [20] found adverse effect on growth rate and efficiency of gain compared to the control. Mechanisms of action generally involved to explain the benefits of yeast supplementation in non ruminant species are stimulation of brush border disaccharidases, anti-adhesive effect against pathogens, stimulation of non specific immunity, toxin action inhibition and antagonistic effect against pathogenic micro-organisms [21].

The aim of this work was to study the effect of adding lemongrass or active dried yeast on rabbit performance, digestibility coefficients, carcass characteristics and blood constituents.

MATERIALS AND METHODS

This work was carried out at Animal House for Experiments at National Research Centre and the chemical analyses were made at laboratories of Animal Production Department, National Research Centre, Dokki, Giza, Egypt. A total number of 21 male New Zealand White rabbits aged 8 weeks with an average body weight of 1134±62.9 g, were divided randomly into three equal groups (7 animals in each). The basal experimental diet was formulated and pelleted to cover the nutrient requirements of rabbits according to NRC [22]. The feeding period was extended for 42 days and the experimental diets were classified as control diet (C) lemongrass (LG) and active dried yeast (DY) were added at 0.50% in diet 2 and 3, respectively. Rabbits individually housed in galvanized wire cages. Stainless steel nipples for drinking and feeders allowing recording individual feed intake for each rabbit were supplied for each cage (30 x 35 x 40 cm). Feed and water were offered *ad-libitum.* Rabbits of all groups were kept under the same managerial conditions and were individually weighed and feed consumption was individually recorded weekly during the experimental period.

At the end of the experimental period three rabbits from each group were used in digestibility trials over period of 7 days to determine the nutrient digestibility coefficients of the tested diets. Feces were daily collected quantitatively. Feed intake of experimental rations and weight of feces were daily recorded. At the end of the experimental period, seven representative rabbits from each treatment were randomly chosen and fasted for 12 hours before slaughtering according to Blasco *et al.* [23] to determine the carcass measurement.

Animals were slaughtered according to the Islamic rules. Animals were weighed just before slaughter, slaughter fasted weight was recorded. External offal's included fur, head, ears and feet were weighed. Edible offal's (Giblets) included liver; kidneys, spleen and heart were removed and individually weighed. Hot carcass weight was recorded.

Blood samples were taken from seven rabbits in each treatment during slaughtering process in heparinized test tubes and centrifuged at 3000 rpm for 15 minutes, the plasma were collected and preserved in a deep freezer at -18°C until the time of analysis. Various blood plasma chemical parameters were calorimetrically determined using commercial kits, following the same steps as described by manufactures. Plasma total protein was determined according to Armstrong and Carr [24]; albumin according to Doumas *et al.* [25]; cholesterol according to Ratilff and Hall [26] and Pisani *et al.* [27]. Globulin was calculated by subtracting the albumin value from total protein value. Plasma Glutamic Oxaloacetic Transaminase (GOT) and Glutamic Pyruvic Transaminase (GPT) activities were determined as described by Reitman and Frankel [28]. Glucose enzymatic colorimetric method determined according to Trinder [29], creatinine colorimetric kinetic method determined according to Bartles *et al.* [30] and Larsen [31] and alkaline phosphatase colorimetric method measured according to Belfield and Goldberg [32].

Control diet (C) composed of 32.00% yellow corn, 20.00% wheat bran, 18.00% soybean meal (44% CP), 12.00% wheat straw, 5.00% alfalfa hay, 5.00% rice bran, 2.80% linseed straw, 2.50% sunflower meal, 2.00% limestone, 0.30% sodium chloride, 0.30% vitamin & mineral mixture and 0.10% DL-methionin. While the second and third diets composed of control diet plus 0.50% of lemongrass (LG) or active dried yeast (DY) for 2nd and 3rd diets.

Chemical analysis of experimental rations and feces were analyzed according to A.O.A.C [33] methods.

Non fibrous carbohydrates (NFC), calculated according to Calsamiglia *et al.* [34] using the following equation:

$$NFC = 100 - \{CP + EE + Ash + NDF\}$$

Neutral detergent fiber (NDF) was calculated according to Cheeke [35] using the following equation:

$$NDF = 28.924 + 0.657\ (CF\ \%)$$

Digestible energy (DE) was calculated according to Cheeke [36] as following:

$$DE\ (Mcal/\ kg\ DM) = 4.36 - 0.04\ (NDF\%)$$

Collected data were subjected to statistical analysis as one way analysis of variance using the general linear model procedure of SPSS [37]. Duncan's Multiple Range Test [38] was used to separate means when the dietary treatment effect was significant.

RESULTS AND DISCUSSION

Data of Table 1 showed that, lemongrass (LG) had 12.25% CP 5.02% EE, 22.41% NFE and 53.16% CF, while active dried yeast (DY) contained 36.15% CP, 5.62% EE, 51.22% NFE and 1.65% CF.

Chemical Analysis of the Experimental Diets: Chemical analyses of the experimental diets are presented in Table 2 showed that the experimental rations were formulated to meet the rabbit's nutrient requirements for growth NRC [22].

Nutrient Digestibility and Nutritive Values of the Experimental Diets: Data of nutrient digestibility and nutritive values of the experimental diets presented in Table 3 showed that addition 0.5% of LG or DY to rabbit's diet improved DM, OM, CP, CF and NFE digetibilities compared to the control diet. On the other hand TDN% in significant ($P>0.05$) improvement with adding 0.05% of LG or DY to diets in comparison with the control diet, while 0.05% LG significantly ($P<0.05$) increase DCP% compared to the C and DY diets.

Cherdthong *et al.* [38] used four ruminally fistulated crossbred (Brahman native) beef cattle in 4x4 Latin square design to study the effect of lemongrass *(Cymbopogon citratus)* powder (LGP) on rumen ecology, rumen microorganisms and digestibility of nutrients. The LGP supplementation at 0, 100, 200 and 300 g/d with urea-treated rice straw (5%) fed to allow *ad libitum* intake and they noted that digestibilities of DM, EE and NDF were significantly different among treatments and were greatest at 100 g/d of supplementation. However, digestibility of CP was decreased with LGP supplementation ($P<0.05$). They also, concluded that supplementation of LGP at 100 g/d improved digestibilities of nutrients in beef cattle. Gomaa *et al.* [39] found that supplementations of sheep with yeast culture (YC) improved significantly ($P<0.05$) the nutritive values in terms of TDN% and DCP% compared to the control ration. Hanafy *et al.* [40] reported that adding 100 mg/ kg LBW/d lemongrass in lamb diet improvement DM, OM, CP, CF, EE and NFE digestibility coefficients, TDN% and DCP% compared to the control diet.

In a study conducted by I .E.S.R. [41] to evaluate the effect of a partial incorporation of black cumin BCM (*Nigella sativa*) and/or lemon grass LGM (*Cymbopogon sp.*) at different levels using 72 New Zealand white growing rabbits aged 6 weeks divided to 6 groups and fed commercial basal diet as control and 90 % commercial basal diet in addition to either BCM and / or LGM (with or without urea). All digestibility coefficients were higher ($p<0.05$) for diet contained 10% LGM followed by other treatments. The values of TDN % and DCP % were significantly higher ($P<0.05$) for 5% BCM + 5% LGMU and 10% BCM diet than other treatments, while the lowest value was observed for diet containing 10% (LGMU).

Growth Performance of Rabbits Fed Diets Containing Lemongrass or Dried Yeast: Data of growth performance is presented in Table 4. The results showed that addition of 0.5% of LG or DY to rabbit's diet in significantly ($P>0.05$) increased final weight, body weight gain and Average daily gain compared to the control diet (C).

Table 1: Chemical analysis of lemongrass and active dried yeast

	Chemical analysis on DM basis					
Item	DM	Ash	OM	CP	CF	EE	NFE
Lemongrass (LG)	91.80	7.16	92.84	12.25	53.16	5.02	22.41
Active dried yeast (DY)	96.25	5.36	94.64	36.15	1.65	5.62	51.22

Table 2: Chemical analysis of the experimental diets

	Composition of the experimental diets		
Ingredients	Control (C)	Lemongrass (LG)	Active dried yeast (DY)
Dry matter	91.92	91.72	91.97
Chemical analysis, % on DM basis			
Organic matter (OM)	87.48	87.20	87.77
Crude protein (CP)	18.00	18.09	18.35
Crude fiber (CF)	11.48	11.88	11.70
Ether extract (EE)	2.83	2.58	2.76
Nitrogen free extract (NFE)	55.17	54.65	54.96
Ash	12.52	12.80	12.23
NFC*	30.18	29.80	30.05
Neutral detergent fiber (NDF)	36.47	36.73	36.61
Digestible energy (Mcal/ kg DM)	2.901	2.891	2.896

* NFC: Non fibrous carbohydrates

Table 3: Nutrient digestibilies and nutritive values of the experimental diets

	Experimental diets				
Item	Control (C)	Lemongrass (LG)	Active dried yeast (DY)	SEM	Sig.
Dry matter	76.86^{b}	79.55^{ab}	80.80^{a}	0.73	*
Organic matter	67.06^{b}	69.65^{a}	69.39^{ab}	0.53	*
Crude protein	72.12^{b}	76.48^{a}	73.80^{ab}	0.81	*
Crude fiber	27.11^{b}	39.38^{a}	39.45^{a}	1.90	*
Ether extract	75.58	75.88	69.99	1.79	NS
Nitrogen free extract	73.26	73.67	74.25	0.57	NS
Nutritive values, %					
Total digestible nutrient (TDN)	61.34	63.20	63.37	0.44	NS
Digestible crude protein (DCP)	12.99^{b}	14.04^{a}	13.35^{b}	0.17	*

a and b: Means in the same row having different superscripts differ significantly (P<0.05)

*: Significant at (P<0.05). NS: not significant Sig.,: Significant.. SE: Standard error mean

Table 4: Growth performance of rabbits fed diets containing lemongrass or dried yeast

	Experimental diets				
Item	Control (C)	Lemongrass (LG)	Active dried yeast (DY)	SEM	Sig.
Duration period, days	42.00	42.00	42.00	----	----
Initial weight, g	1136.00	1134.00	1131.00	62.90	NS
Final weight, g	2017.00	2024.00	2060.00	84.19	NS
Body weight gain, g	881.00	890.00	929.00	46.24	NS
Average daily gain (ADG's)	21.00	21.20	22.10	1.10	NS
Daily feed intake, g	129.00	116.00	107.00	4.56	NS
Feed conversion ratio (g. intake/ g. gain)	6.14^{b}	5.47^{ab}	4.84^{a}	0.22	*

a and b: Means in the same row having different superscripts differ significantly (P<0.05)

*: Significant at (P<0.05). NS: not significant Sig., Significant, SE: Standard error mean

Table 5: Fermentation, length and weight of digestive tract of rabbits fed diets containing lemongrass or dried yeast

	Experimental diets				
Item	Control (C)	Lemongrass (LG)	Active dried yeast (DY)	SEM	Sig.
1- Fermentation of digestive tract					
Caecal pH	6.55	6.47	6.51	0.04	NS
Stomach pH	2.29	2.15	2.16	0.05	NS
Total volatile fatty acids (TVFA's), Meq./ 100 ml	7.50^{a}	3.78^{b}	3.80^{b}	0.47	*
2- Length of digestive tract, cm					
Stomach	30.6^{a}	32.00^{a}	26.3^{b}	0.87	*
Small intestine	309.6^{a}	262.00^{b}	310.3^{a}	8.89	*
Caecum	60.0	55.30	54.5	1.17	NS
Colon	35.6	33.30	36.5	0.97	NS
Rectum	83.6	80.10	87.3	2.64	NS
3- Weight of digestive tract, g					
1- Full:					
Large intestine	304.00	321.00	323.00	17.15	NS
% of slaughter weight	16.68	18.50	18.16	0.55	NS
Stomach	64.00	71.00	74.00	3.57	NS
% of slaughter weight	3.57	4.14	4.16	0.17	*
Small intestine	52.00^{a}	30.00^{b}	53.00^{a}	4.16	*
% of slaughter weight	2.85^{a}	1.78^{b}	2.95^{a}	0.17	NS
Total	419.00	422.00	450.00	22.94	NS
% of slaughter weight	23.10	24.42	25.27	0.75	NS
2- Empty:					
Large intestine	48.00^{ab}	41.00^{b}	52.00^{a}	2.12	*
% of slaughter weight	2.74^{ab}	2.36^{b}	2.98^{a}	0.11	NS
Stomach	20.00	24.00	23.00	1.16	NS
% of slaughter weight	1.10	1.39	1.34	0.08	*
Small intestine	36.00^{a}	18.00^{b}	37.00^{a}	3.10	*
% of slaughter weight	1.97^{a}	1.07^{b}	2.07^{a}	0.15	*
Total	105.00^{ab}	83.00^{b}	112.00^{a}	5.37	*
% of slaughter weight	5.82^{ab}	4.81^{b}	6.39^{a}	0.26	
3- Content:					
Large intestine	255.00	280.00	271.00	15.71	NS
% of slaughter weight	13.94	16.14	15.18	0.51	NS
Stomach	43.00	47.00	51.00	3.26	NS
% of slaughter weight	2.46	2.75	2.82	0.15	NS
Small intestine	16.00	12.00	16.00	1.80	NS
% of slaughter weight	0.88	0.71	0.88	0.08	NS
Total	314.00	339.00	338.00	19.11	NS
% of slaughter weight	17.29	19.60	18.88	0.62	NS

a and b: Means in the same row having different superscripts differ significantly (P<0.05)

* : Significant at (P<0.05). NS: not significant Sig.,: Significant.. SE: Standard error mean

Table 6: Carcass characteristics of rabbits fed diets containing lemongrass or dried yeast

	Experimental diet				
Item	Control (C)	Lemongrass (LG)	Active dried yeast (DY)	SEM	Sig.
Slaughter weight (SW), g	1824	1743	1802	92.2	NS
Blood					
Weight, g	56	43	39	5.25	NS
% of SW	3.07	2.47	2.15	0.26	NS
*External offals**					
Weight, g	391	318	351	25.04	NS
% of SW	21.44^{a}	18.24^{b}	19.48^{ab}	0.54	*
Digestive tract weight, g					
Full	419	422	450	22.94	NS
Empty	105^{ab}	83^{b}	112^{a}	5.37	*
Content	314	339	338	19.14	NS
Empty body weight (EBW), g	1510	1404	1464	77.32	NS
Carcass weight (CW), g	881	889	897	47.68	NS
Edible offals (Giblets)					
Liver					
Weight, g	52	50	43	2.42	NS
% of CW	5.90^{a}	2.91^{c}	4.79^{b}	0.3	*
Kidneys and spleen					
Weight, g	19.00^{a}	15.00^{b}	15.00^{b}	0.9	*
% of CW	2.16^{a}	0.89^{c}	1.67^{b}	0.13	*
Heart					
Weight, g	6	6	7	0.31	NS
% of CW	0.68^{a}	0.35^{b}	0.78^{a}	0.05	*
Total giblets					
Weight, g	77	71	65	3.02	NS
% of CW	8.74^{a}	4.15^{c}	7.24^{b}	0.45	*
Carcass weight + giblets (CWG)	958	960	962	50.1	NS
Dressing percentages (DP) calculated as:					
CW / SW	48.3	51	49.78	0.69	NS
CW / EBW	58.34^{c}	63.32^{a}	61.27^{b}	0.71	*
CWG / EBW	63.44^{b}	68.38^{a}	65.71^{ab}	0.71	*

a, b and c: Means in the same row having different superscripts differ significantly (P<0.05)

* : Significant at (P<0.05). NS: not significant Sig.,: Significant. SE: Standard error mean

External offals* : included fur, head, ears and feet

Table 7: Blood constituents of rabbits fed diets containing lemon grass or dried yeast

	Experimental diets				
Item	Control (C)	Lemongrass (LG)	Active dried yeast (DY)	SEM	Sig.
Total protein (g/dl)	5.95	5.93	6.02	0.02	NS
Albumin (g/dl)	3.21^{b}	3.39^{ab}	3.44^{a}	0.04	*
Globulin (g/dl)	2.74	2.54	2.58	0.04	NS
Albumin: Globulin ratio	1.18^{b}	1.34^{ab}	1.35^{a}	0.04	*
Cholesterol (mg/dl)	191^{b}	207^{a}	197^{b}	1.91	*
Glucose(mg/dL)	101.2^{b}	112^{a}	100.3^{b}	1.48	*
Creatinine (mg/dL)	0.93	1.04	0.97	0.07	NS
Alkaline phosphatase (IU/L)	76.54^{a}	76.64^{a}	72.78^{b}	0.80	*
GOT (U/ml)	30.31	32.36	31.47	0.48	NS
GPT (U /ml)	20.38	21.24	21.61	0.26	NS

a and b: Means in the same row having different superscripts differ significantly (P<0.05)

*: Significant at (P<0.05). NS: not significant Sig.,: Significant.. SE: Standard error mean

However, daily feed intake in significantly (P>0.05) decreased with adding 0.5% LG or DY to rabbit's diet compared to control diet. Feed conversion ratio (g. intake/ g. gain) significantly (P<0.05) improved by adding 0.5% DY and in significantly (P>0.05) improved by adding 0.5% LG in comparison with the control diet.

I.E.S.R [41] noted that, rabbits received 10 % BCM (T2) and mixture of 5% BCM+5% LGM (T4) diets recorded the highest (P<0.05) average live body weight, body weight gain, feed intake and feed conversion at 6 week of age.

Tartrakoon *et al.* [42] fed weanling pigs on a basal diet containing corn-soybean meal (diet 1). While, diet 2 was a basal diet supplemented with 0.75 g tetracycline/kg basal diet. Diet 3, 4 and 5 were basal diets supplemented with lemon grass oil at 1, 2.5 and 5 ml/kg diet respectively. They noticed no significant difference of ADG among treatments. Also, the inclusion of lemon grass oil 5 ml/kg diet tended to improve FCR of piglets. The pigs fed control diet had higher average daily feed intake (ADFI) (p<0.05) than pigs fed diets containing 1 and 2.5 ml lemon grass oil /kg diet (diet 3 and 4).

Gomaa *et al.* [39] noted that supplementations sheep with yeast culture (YC) improved feed conversion ratio as (kg intake/ kg gain).

Fermentation, Length and Weight of Digestive Tract of Rabbits Fed Diets Containing Lemongrass or Dried Yeast: Data of Table 5 showed that caecal and stomach pH values were not affected among different groups, while total volatile fatty acids (TVFA's) concentration significantly decreased with adding 0.5% LG or DY to rabbit's diet compared to the control diet. Length of caecum, colon and rectum (large intestine) were not significant affected among different groups. These results of TVFA's were in agreement with those obtained by El-Manyalawi *et al.* [43] and Abou Sekken *et al.* [44]. Cherdthong *et al.* [38] noted that ruminal VFA concentrations were similar among supplementation concentrations (P>0.05) when they adding of lemongrass *(Cymbopogon citratus)* powder (LGP) in crossbred Brahman native beef cattle diets at 0, 100, 200 and 300 g/d with urea-treated rice straw. Abou Sekken and AbdEl-Hakim [45] showed that ceacum weight% of rabbit fed 8% *cotula cinerea* meal (CCM) had significantly (P<0.05) the best value comparing with other groups and control one. Caecum length (cm) values were significantly (P<0.05) increased by increasing of dietary CCM level and group fed 16% CCM recorded best one (24.0 cm). The observed differences in length and weight of caecum may be attributed to dietary fiber source [46].

Carcass Characteristics of Rabbits Fed Diets Containing Lemongrass or Dried Yeast: Data of Table 6 showed that dressing percentages (DP) calculated as carcass weight/ slaughter weight (CW/SW) was not affected by addition 0.5% LG or DY to rabbit's diet compared to control diet (C). However, adding 0.5% LG significantly (P<0.05) increase DP as carcass weight/ empty body weight (CW/ EBW) compared to DY and control diets. These results were in agreement with those obtained by I.E.S.R [41] who recorded that, fasted weight, dressing weight, dressing percentage and carcass tended to be higher in rabbits fed lemongrass LGM (*Cymbopogon sp.*) containing diets . Abd El-Latif *et al.* [47] found that the highest (P<0.05) values of dressing and proportions of abdominal fat were noticed when quails feed diets plemented with either dietary Thyme or Fennel at level of 1 kg/ ton for each additive compared with other treatments.

Blood Constituents of Rabbits Fed Diets Containing Lemongrass or Dried Yeast: Data of blood constituents are presented in Table 7 showed that, addition of 0.5% LG or DY to rabbits diets had no significant effect on total protein, globulin, creatinine, GOT and GPT compared to the control diet, however rabbits fed on DY containing diet significantly (P<0.05) increased albumin and albumin: globulin ratio and significantly (P<0.05) decreased alkaline phosphatase compared to the control diet. On the other hand, adding 0.5% LG to rabbit's diet significantly (P<0.05) increased cholesterol in comparison with the control diet. The present results of blood parameters indicated that values were within the normal range, consequent the rabbits fed on rations contained LG or DY with not adverse effect on kidney and liver function and the rabbits were healthy under such feeding program.

Raghab *et al.* [48] recorded that dietary supplementation of *lacto-Sacc* (L-S) resulted in significant (P<0.05) decreases in concentration of albumin (5.4%) and cholesterol (7.8%) and in activity of ALT (25%), also significant (P<0.05) increase in glucose (9.9%) as well as in activity of AST (12%) were observed in blood serum of supplemented calves compared with their control. The increase in serum protein and albumin may be an indication of protein reserves in body as reported by Allison [49]. Results obtained in this work were in partial agreement with those findings of Hillyer and Quesenberry [50] and El-Medany *et al.* [51] they found that the normal values of some blood components in rabbits were 5.4-8.3 g/dl, 2.4-4.6 g/dl, 13-29mgdl, 243-390 mg/dl and 14-31 U/l for total protein, albumin, urea-N, total lipids and GPT and, respectively.

CONCLUSION

From these results it could be concluded that addition 0.5% of lemongrass or active dried yeast in rabbit's diet improved digestion coefficients, growth performance and dressing percentages.

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