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PERFORMANCE OF CALVES FED RATION CONTAINING *EUCALYPTUS GLOBULES* LEAVES.

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SUMMARY

This study aimed to evaluate the effect of using *Eucalyptus Globules* leaves as natural feed additives on calves health and performance, forty four calves with an average live body weight 149.6 ±6.4 kg were divided into two similar groups, 22 animals each. The experimental period was divided into two stages, growing stage extended for 140 days, and fattening stage extended for 80 days. During the growing stage, the animals were fed total mixed ration (TMR_1) containing 10.2 % CP without or with 0.1 g EG leaves/ kg live body weight for G1 and G2, respectively. Then the animals were fed total mixed ration (TMR_2) containing 8.63 % CP without or with 0.1 g EG leaves / kg live body weight for G1 and G2, respectively during the fattening stage. Insignificant differences in nutrient digestibility ($P \geq 0.05$) were recorded during growing stage, while during fattening stage digestibility of DM, OM, EE and NFE were higher ($P<0.05$) for G2 than G1. Insignificant differences were observed in serum total proteins, albumin globulin and urea concentration between G2 and G1 during growing stage. During fattening stage serum total proteins and albumin were higher ($P<0.05$) for G2 than G1. While G1 was higher serum urea concentration compared to G2. The supplemented group with EG leaves showed higher ($P<0.05$) daily gain and better feed conversion as DM, TDN and CP compared to control group during both stages, and the overall experimental period. The group received ration supplemented with EG leaves was higher ($P<0.01$) total gain, total return, net return and economic efficacy compared to the control group. It could be concluded that using *Eucalyptus Globules* leaves as natural feed additives in calves diet improve its health, digestibility, body weight gain, feed conversion ratio, dressing percentage and economic efficiency.

Keywords: *Eucalyptus globulus, beef, digestibility, feed conversion, animal health.*

INTRODUCTION

Feed additives are important materials that can improve the efficiency of feed utilization and animal performance. Attempts to use the natural materials as alternative growth promoters such as medicinal plants are widely accepted. *Eucalyptus globules* (EG) leaves contain essential oils consisted mainly of 1, 8 cineole (eucalyptol), alpha-piene, p-cymene, crptone and spathulenol (Li and Madden, 1995). Eucalyptus oil is used as an antiseptic, antispasmodic and stimulant agent in bronchitis, asthma and minor respiratory complaints (Mahran, 1967; Abou Zeid, 1992; El-Amary, 1993 and Juergens *et al.*, 2003). Moreover, Hmamouchi *et al.* (1992), Medina *et al.* (1992 and 2001) and Trivedi and Hotchandani (2004) found that EG oil has antibacterial activities against 9 microorgainsms including *Escherichia coli*, salmonella type, klebsiella spp, *Streptococcus aureus*, Proteus sp, and pseudomonas spp.

Eucalyptus globulus leaves have been listed as a natural feed additive in Europe since 2003, (Community Register of Feed Additives 1831-03, 2008). Aboul-Fotouh *et al.* (1999) studied the effect of using different levels of EG leaves as feed additives and observed that in vitro dry matter disappearance (IVDMD) of the tested diets were improved compared to the control diet, and the best level of EG leaves was 3 % of the total diet, while El-Ashry et al (2006) found that the optimum level was 2 % otherwise IVDMD and in vitro organic matter disappearance (IVOMD) could decreased dramatically up to 5% compared to the control diet. Moreover, inclusion of EG leaves in Rahmany lambs ration at the rate of 3% resulted in increase ($P<0.05$) CP digestibility, average daily gain as well as improve ($P<0.05$) TDN and digestible energy conversion (Aboul-

Fotouh *et al.*, 1999). Also Inclusion 3% of EG leaves in lactating buffaloes ration resulted in an increase ($P<0.05$) of milk yield, milk fat, protein, solid not fat, lactose content, and improved ($P<0.05$) feed conversion (Aboul-Fotouh *et al.*, 2000). El-Bordeny *et al.* (2005) observed that supplementing calves starter by 100 mg *Eucalypts globulus* leaves/ kg live body weight, improved ($P<0.05$) calves viability, feed intake, average daily gain and improve feed conversion, while it decreased ($P<0.05$) morbidity rate. So, this study was designed to determine the changes in digestibility, blood parameters, productive performance and dressing percentage of fattening calves received ration supplemented by EG leaves.

MATERIALS AND METHODS

The present study was carried out at a private farm (Amber Feed Lot Station, Ambr company) located in El-Noubaria region, El-Behaira province, Egypt, while the chemical and statistical analysis were completed at laboratory of animal nutrition, Animal Production Department, Faculty of Agriculture, Ain Shams University.

Additives

Eucalyptus globules (EG) leaves were collected from *Eucalyptus globules* trees in Shoubra El-Khima, El-Kalubia province, Egypt. Leaves were air dried in shaded area (88 % DM), then grinded to be ready to use as feed additives.

Animals and their feeding

Forty four male crossbred (Friesian x Balady) local calves with mean initial body weight about 149.6 ± 6.4 kg were divided into two similar groups of 22 animals each, each group was assigned randomly to one of two dietary treatments, control (G1) or treatment (G2). The experimental period was divided into two stages, growing stage extended for 140 days, and fattening stage extended for 80 days, during this periods body weight of calves were recorded and the feed intake were adjusted biweekly. During the growing stage, the animals were fed total mixed ration (TMR_1) containing 10.2 % CP without or with 0.1 g EG leaves/ kg live body weight for G1 and G2, respectively. While in fattening stage, animals were fed total mixed ration (TMR_2) containing 8.63 % CP without or with 0.1 g EG leaves / kg live body weight for G1 and G2, respectively. The TMRs were balanced for minerals and vitamins and formulated to meet the nutrient requirements of calves according to NRC (2000) recommendations. The EG leaves was added to the TMRs fed to G2 according to animals body weight. The ingredient and chemical composition (% of DM), of the total mixed rations are illustrated in Table (1). The rations were offered daily in two portions; at 7 a.m. and 5 p.m. and the animals had free excess to clean fresh water.

Measurements of digestibility

Two digestibility trials were performed once at end of each experimental stage, six animals were randomly chosen from each group and feces sample were collected from each calves using a grab sample method. Fecal samples, were composed for each calf, dried at 55 °C, ground to pass a 1mm screen and retained for chemical analysis, applied the acid insoluble ash (AIA) as an internal marker according to Van Keulen and Young (1977) for determining the nutrients digestibility and feeding value of the experimental rations.

Blood samples

Blood samples were withdrawn from jugular vein of six animals from each group at 3 hr after morning feeding, at each stage. The blood serum was obtained by centrifuging the blood samples at 4000r /min for 15 minutes. Blood serum was transferred into a clean dried glass vials and then stored in deep freezer at -20 °C for subsequent specific chemical analysis.

Analytical methods

Samples of corn silage, bean straw and TMRs were taken and air dried, then kept to subsequent analysis. Dried samples were ground through a Wiley Mill fitted with a 1 mm screen (local grinder), and analyzed for DM, N, CF, EE and ash according to AOAC (1995) while CP contain was calculated by multiply N% by 6.25 and NFE content was calculated by difference. Total protein of blood serum was determined as described by Armstrong and Carr. (1964). Albumin (Al) was determined as described by Doumas et al.

(1971). Globulin (Gl) was calculated by subtracting albumin from total protein then A: G ratio was calculated. Urea was determined by the method of March (1965).

Table (1): ingredient and Chemical composition (% of DM), of the total mixed rations.

Item	Bean straw	Corn silage	TMR_1	TMR_2
	Feed components % of fresh matter			
Corn silage			53.90	13.10
Bean straw			9.20	32.50
Yellow corn			19.37	35.36
Soybean			4.24	2.18
Wheat bran			5.54	8.70
Rice bran			4.43	4.90
Poultry litter			1.85	1.09
limestone			0.55	0.82
Salts			0.37	0.54
mineral and vitamin mixture*			0.55	0.82
Chemical composition, %				
DM	93.61	25	55.86	83.54
	Component, % on DM basis			
Organic matter	88.69	86.39	88.49	86.86
Crude protein	5.48	8.4	10.2	8.63
Crude fiber	34.96	29.14	23.06	20.37
Ether extract	0.65	1.14	1.60	1.89
Nitrogen free extract	47.60	47.71	53.63	55.97
Ash	11.31	13.61	1151	13.14

**Mineral and vitamin mixture: Mg 100 g/kg, Mn 125.8 g/kg, Zn 41.7 g/kg, Fe 166.7 g/kg, Cu 32 g/kg, I 810 mg/kg, Se 480 mg/kg, Co 2000 mg/kg and P 100 g/kg. vitamin A 20000000 IU, Vitamin D 2000000 and Vitamin E 10000 IU.*

Dressing percentage

All animals in each group were slaughtered and the data of fasting body weight, carcass weight and dressing percentage were recorded.

Statistical Analysis:

The obtained data were statistic analyzed according to statistical analysis system (SAS, 1999) using one-way classification (GLM model). Separation between means was carried out by using Duncan's Multiple Range test (Duncan, 1955). The following model was used to describe the data:

$Y = \mu + T_i + e_{ij}$, Where X_{ij} = represents observation, μ=: the overall mean, T_i = effect of treatment (experimental group), e_{ij}: experimental error.

RESULTS AND DISCUSSION

Apparent digestibility

During growing stage insignificant differences ($P>0.05$) was noticed for values of DM,OM, CF, CP, EE and NFE digestibility coefficient as well as the nutritive value as digestible protein and TDN between the control group (G1) and the group received EG leaves (G2) (Table 2). On the other hand, during the fattening stage, the values of DM, OM, CP, EE and NFE apparent digestibility coefficient as well as TDN and DCP content were significantly increased ($P<0.01$) for G2 compared to G1, while insignificant ($P>0.05$) increase was noticed in CF digestibility for G2 compared to G1 in both stages (Table 2). These might be indicate , that EG leaves have stimulating effect, due to effect of the essential oils content in EG leaves, which contain 1-8 cineol, camphine and α-pinene (Chalchat, 1995) through saving some micro factors to rumen micro-flora such

as micro elements, vitamins, hormones and enzymes which are required to the efficient digestion, absorption and metabolism (Aboul-Foutouh et al., 2000) and/or minimizing effectively hazards of mycotoxins by inhibition of harmful microorganisms growth (Hmamouchi et al., 1992; Tozyo et al., 1994 and Allam et al., 1999). Similar trend was observed by Aboul-Fotouh et al. (1999) when used EG leaves as feed additive to sheep diet. Also El-Bordeny et al. (2005) recorded that adding EG leaves to buffalo calves ration increase nutrients digestibility coefficient for buffalo calves. Aboul-Fotouh et al. (1999) and El-Ashry et al. (2006) reported that the eucalyptus essential oils had stimulating effect on *in vitro* dry matter disappearance and *in vitro* organic matter disappearance of the tested *in vitro* formulated diets.

Table (2): Effect of inclusion EG leaves in calves ration on nutrients digestibility.

	Growing stage			Fattening stage		
Groups	G 1	G2	SE	G 1	G2	SE
Animal No	6	6		6	6	
Dry matter, %	65.75	67.99	2.6	61.58^{b}	58.34^{a}	2.1
Organic matter, %	68.47	70.75	2.6	64.50^{b}	72.52^{a}	2.2
Crud fiber, %	59.47	65.48	4.6	53.32	57.31	6.4
Crud protein, %	68.11	70.16	2.4	58.55^{b}	61.75^{a}	2.3
Ether Extract %	70.30	72.53	2.9	65.78^{b}	68.51^{a}	4.3
Nitrogen free extract, %	70.66	72.25	2.2	71.10^{b}	77.40^{a}	2
Nutritive values,						
DCP, %	6.94	7.16	0.4	5.05^{b}	5.33^{a}	0.5
TDN, %	61.09	63.62	2.2	58.51^{b}	63.24^{a}	1.9

a and b: Means of treatments within the same row with different superscript letters are differ significantly ($p < 0.05$).

Table (3): Effect of inclusion EG leaves in calves ration on Blood serum parameters.

	Growing stage			Fattening stage		
Groups	G 1	G2	SE	G 1	G2	SE
Animal No	6	6		6	6	
Total proteins (g/dl)	6.17	6.28	0.32	5.98^{b}	6.50^{a}	0.20
Albumin (g/dl)	3.29	3.24	0.24	2.99^{b}	3.29^{a}	0.15
Globulin (g/dl)	2.88	3.04	0.7	2.99	3.20	0.43
A:G ratio	1.14	1.07	0.37	1.00	1.03	0.2
Urea (mg/dl)	24.39	24.75	1.3	25.67^{a}	22.36^{b}	1.02

Blood serum metabolites

Data presented in Table (3) indicated that insignificant differences (P>0.05) were noticed between the different experimental groups in the blood serum total proteins, albumin, globulin and urea concentration during the growing stage. On the other hand, the animals fed ration supplemented with EG leaves had significant higher (P<0.05) serum total proteins and albumin concentration compared to the animals fed control ration in the fattening stage. This may be attributed to the improvements occurred in metabolic process as a response to increase apparent nutrients digestibility specially, protein and organic matter digestibility (Table 2), also can be due to effect of EG leaves additives. Serum total proteins reflect the nutritional status of the animal and it has a positive correlation with dietary protein (Kumar et al., 1980). Also, Bush (1991) reported a positive correlation between dietary protein and plasma protein concentration, and stated that the low level of plasma proteins may be attributed to a decrease in the protein absorbed and synthesized and an increase in protein losses. The same trend was observed by El-Bordeny (2005) and El-Ashry *et al.* (2006) on growing buffalo calve and Saleh and E-Ashry (2007) on Egyptian lambs, they found that blood serum total proteins and albumin concentration were higher (P<0.05) for group supplemented with EG leaves compared to the control group. While animals of G2 had significant lower (P<0.05) blood urea

concentration compared to G1 during the fattening stage. Decreased blood serum urea concentration by adding EG leaves may due to decrease protein degradation in animal body as a response to EG leaves additives. Bush (1991) stated that plasma urea concentration increases as a result to the increase in rate of protein breakdown and carbohydrate deficiency. El-Bordeny (2005) and El-Ashry *et al.* (2006) found that adding EG leaves to buffalo calves ration decreased (P<0.05) blood serum urea concentration, while Saleh and El-Ashry (2007) found that adding EG leaves to local Egyptian lamb increased(P<0.05) blood serum urea concentration. Insignificant differences were noticed among the different experimental group in blood serum globulin concentration and albumin globulin ratio.

Growth performance and feed conversion

Data of table (4) showed that, although insignificant differences (P>0.05) were observed in initial and final body weight between the two experimental groups in growing stage, the group received ration supplemented by EG leaves (G2) had higher (P<0.05) average daily gain compared to the control group (G1). On the other hand, G2 had higher (P<0.05) final body weight and average daily gain than G1 during the fattening stage. Also, the group received ration supplemented by EG leaves (G2) was higher (P<0.05) in average daily gain compared to the control group (G1) through overall of the experimental period. It is clear that the data of average daily gain are parallel with the data of apparent digestibility (Table 2) and blood serum metabolites (Table 3). Adding EG leaves to animals rations lead to 1) increase nutrients digestibility (Table 2). 2) improved animal general health and viability. 3) Improvements occurred in metabolic process - increase protein anabolism and decrease protein degradation- as indicated in data of blood metabolites (Table 3). El-Bordeny *et al.* (2005) in study on buffalo calves and Aboul-Fotouh *et al.* (2000) and Saleh and El-Ashry (2007) in studies on Egyptian local lambs found that adding EG leaves to ruminant diets increased average daily gain, and attributed this increase to improve nutrient digestibility and metabolic process. And El-Bordeny *et al.* (2005) attributed the increase in average daily gain also to improve animal general health and viability.

Table (4): Effect of inclusion EG leaves in calves ration on growth performance and feed conversion.

	Growing stage			Fattening stage			Overall period		
Groups	G 1	G2	SE	G 1	G2	SE	G 1	G2	SE
Animal No	22	22		22	22		22	22	
initial weight	150.25	149.75	1.5	290. 4.6	303.35	4.6	150.25	149.75	1.5
final weight	290.25	303.35	4.6	360.15^{B}	381.5^{A}	6.1	360.15^{b}	381.5^{a}	6.1
Days	140	140		80	80		220	220	
ADG	1.00^{b}	1.097^{a}	0.03	0.874^{b}	0.977^{a}	0.05	0.954^{b}	1.053^{a}	0.03
Feed consumption									
Fresh	14.61	14.61		16.26	16.26		15.21	15.21	
DMI kg/ d	8.16	8.16		13.59	13.59		10.13	10.13	
TDNI kg/ d	4.985	5.191		7.951	8.594		6.063	6.103	
CP g/ d	832	832		1172	1172		955.9	955.9	
Feed conversion									
DMI kg/ kg gain	8.16^{a}	7.44^{b}	0.24	15.55^{a}	13.91^{b}	1.0	10.62^{a}	9.62^{b}	0.4
TDNI kg/ d	4.985^{a}	4.731^{b}	0.17	9.097^{a}	8.796^{b}	0.7	6.354^{a}	6.428^{b}	0.3
CP g/ kg gain	832^{a}	759^{b}	24	1341^{a}	1199^{b}	84	1002^{a}	908^{b}	34

a and b: Means of treatments within the same row with different superscript letters are differ significantly (p < 0.05).
A and B: Means of treatments within the same row with different superscript letters are differ significantly (p < 0.01).

It is well established that, feed conversion as DM, TDN and CP were significantly improved (P<0.05) for the group received ration supplemented by EG leaves compared to the control group during the growing and fattening stages (Table 4). Also DM, TDN and CP conversion for G2 improved (P<0.01) compared to G1 during the overall experimental period (Table 4). The improvement occurred in feed conversion as DM, TDN and CP may be due to that group G2 had higher average daily gain than group G1 (Table 4) parallel with the same feed intake for both groups during the growing and fattening stages as well as overall of the

experimental period. Similar trend was observed by Aboul-Fotouh *et al.* (1999 and 2000) when studied the effect of inclusion *Achillea millefoluim, Cymbopogon citratus* and EG leaves as feed additives to sheep ration and lactating buffalo diets. Significantly improvement (P <0.05) of feed conversion was found for treated groups compared to the control group for sheep and buffaloes. Also El-Ashry *et al.* (2006) observed that adding EG leaves to ration of buffalo calves improved (P <0.05) the feed conversion.

Slaughter traits

Data of Table (5) showed that, the groups received ration supplemented by EG leaves had higher (P<0.01) final body weight, fasting body weight and carcass weight, consequently they were recorded higher dressing percentage compared to the control group at rate 5.9, 7.4, 7.3 and 1.3 % respectively. This may be attributed to effect of EG leaves supplementation in increase metabolic process and body weight gain (Tables 3 and 4) consequently increase meat production.

Table (5): Effect of inclusion EG leaves in calves ration on fasting body weight, carcass weight and dressing percentage.

Item	G 1	G2	SE	Sig
Animal No	22	22		
Final weight (Kg)	360.15^{B}	381.5^{A}	6.1	**
Fasting body weight (kg)	333.67^{B}	358.26^{A}	6.68	**
Carcass weight (kg)	214.58^{B}	230.24^{A}	4.26	**
Dressing percentage, %	59.58^{B}	60.35^{A}	0.21	**

A and B: Means of treatments within the same row with different superscript letters are differ significantly ($p < 0.01$).

Table (6): Effect of inclusion EG leaves in calves ration on Economic efficiency.

Item	G 1	G2	SE	Sig
Animal No	22	22		
Daily feed cost (LE)	10.69	10.91		
Total feed cost (LE)	2352	2400		
Kg live body weight price (LE)	18	18		
Total gain (Kg)	208.4^{B}	234.5^{A}	5.75	**
Total return (LE)	3751.2^{B}	4221^{A}	104.45	**
Net return (LE)	1399.1^{B}	1821^{A}	104.45	**
Economic efficacy %	59.49^{B}	75.88^{A}	4.4	**
Relative economic efficacy %	100	127.54		

A and B: Means of treatments within the same row with different superscript letters are differ significantly ($p < 0.01$).

Economic efficiency

Results of Table (6) showed that, the group received ration supplemented with EG leaves had higher (P<0.01) total gain, total return, net return and economic efficacy compared to the control group. This may be attributed to that EG leaves supplementation increased average daily gain parallel with improve feed conversion (table 4), consequently increase total return, net return and economic efficiency.

Important observations

1) Although the animals received ration supplemented with EG leaves (G2) were consumed the total restricted quantity of feed, they consumed this quantity in prolonged time compared to animals of the control group (G1). This may be affect on nutrient digestibility, and may be due to flavor of the *Eucalyptus Globules* volatile oil

2)The skin of the animals of G2 was more shine compared to the skin of animals of G1. This may be attributed to *Eucalyptus Globules* essential oils act as anti oxidant. Sadlon and Lamson. (2010) reported that *Eucalyptus Globules* essential oils had anti oxidant properties.

3)The ticks were not found around the pen of the animal received ration supplemented with EG leaves, and were found around pen of the control group. This may be attributed to effect of *Eucalyptus Globules* essential oils.

4)Eight animals of the control group were suffered from ring worms, while the animals of G2 were free of ring worms. Also, fifteen animals of the control group were suffered from internal parasite (scaris), while the animals of G2 were free of internal parasite. This may be due to the EG leaves containing essential oils had insecticide activity. Papachristos *et al.* (2004) and Sharma *et al.* (2001) found that the EG essential oil had insecticidal activity against *Acanthosceides obtectus*. Also, Magi and Sahk (2003) guaranteed the use of herbal medicine such as *Eucalyptus Globules* used in practice as alternatives to neurotoxic insecticides. The use of natural products is becoming more popular since drugs of synthetic origin may have a negative impact on the environment and parasite resistance to poisonous chemicals can develop after repeated applications Magi and Sahk (2003).

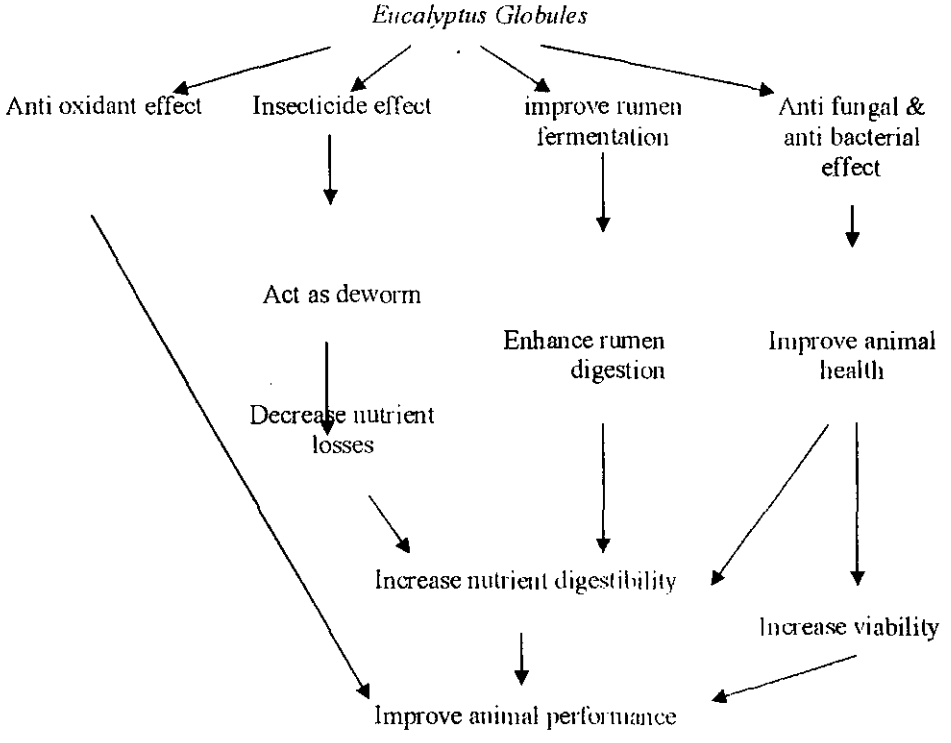

Fig. (1): The benefit of using *Eucalyptus globules* in animal feeding

CONCLUSION

The main target of using *Eucalyptus Globules* leaves as feed additives in calves' ration is to enhance calves health and performance through one or more of the following mode of actions.

1) improve rumen fermentation, which resulted in enhance nutrients digestibility (Aboul-Fotouh *et al.*, 1999)

2) Act as deworms through its insecticidal activity against worms and parasites (El-Bordeny, 2006 and Papachristos *et al.*, 2004).

3) Act as anti fungal & anti bacterial materials, especially against the pathogenic microbes (Trivedi and Hotchandani, 2004; Juergens *et al.*, 2003 and Sadlon and Lamson, 2010).

4) Act as anti oxidant materials Sadlon and Lamson. (2010)

So, it could be suggest that the benefit of using *Eucalyptus globules* from the previous results and literature in Fig. (1).

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أداء العجول المغذاة على علائق تحتوي على ورق الكافور

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أجريت هذه الدراسة لتقييم استخدام ورق الكافور كإضافات علفية طبيعية على صحة العجول و الاداء الانتاجي لها. استخدم في هذه الدلراسة 44 عجل بمتوسط وزن 149.6 +6.4 كجم قسمت على مجموعتين كلا منها 22 عجل ، و قسمت الفترة التجريبية الى مرحلة نمو امتدت 140 يوم و مرحلة تسمين امتدت 80 يوم. غذيت الحيوانات خلال محلة النمو على علائق مخلوطة TMR1 تحتوي على 10.2 % بروتين خام بدون أو مع 0.1 جم ورق كافور / كجم وزن حي للمجموعة الأولى و الثانية على التوالي، بينما خلال مرحلة التسمين غذيت الحيوانات على علائق مخلوطة TMR2 تحتوي على 8.63 % برتين خام بدون أومع 0.1 جم ورق كافور / كجم وزن حي للمجموعة الأولى و الثانية على التوالي. و كانت النتائج المتحصل عليها على النحو التالي:-

لم يلاحظ أي فرق معنوي بين المجموعات التجريبية في معاملات هضم العناصر الغذائية خلال مرحلة النمو بينما خلال مرحلة التسمين ارتفعت معدلات هضم المادة الجافة و المادة العضوية و مستخلث الايثير و المستخلص الخالي متن الزوت للمجموعة الثانية بالمقارنة بالمجموعة الأولى . أيضا لم يلاحظ فروق معنوية بين المجموعتين في محتوى سيرم الدم من البروتينات الكلية و الألبيومين و الجلوبيولين و البوريا، بينما سجلت المجموعة الثانية مستوى أعلى معنويا بالمقرنة بالمجموعة الأولى في محتوى سيرم الدم من البروتينات الكلية و الألبيومين و الجلوبيولين و كانت أقل معنويا في محتوى السيرم من اليوريا . أدت اضافة ورق الكافور الى العلائق في المجموعة الثانية الى ارتفاع معنوي في معدلات النمو وتحسن كفاءة تحويل الغذاء كمادة جافة و مواد كلية مهضومة و بروتين خام بالمقانة بالمجموعة الأولى خلال مرحلتي النمو و التسمين و متوسط الفترة التجريبية. كذلك أدى اضافة ورق الكافور الى العلائق في المجموعة الثانية الى تحقيق أعلى كمية نمو و معدلات عائد اقتصادي و كفاءة اقتصادية بالمقارنة بالمجموعة الضابطة و كانت الفروق معنوية عند مستوى 0.05 .

و يمكن الخلاصة الى أن استخدام ورق الكافور كإضافات علفية طبيعية في علائق العجول أدى الى تحسن صحة العجول و زيادة معدلات الهضم و النمو و تحسن كفاءة تحويل الغذاء و ارتفاع نسبة التصافي عند ذبح الحيوانات و تحسن الكفاءة الاقتصادية.