Article in the Journal of Poultry Science · April 2012. http://www.jstage.jst.go.jp/ browse/ jpsa

Wegener, H.C (2003) Antibiotics in animal feed and their role in resistance development.Curr, Opin. Microbiol, 6: 439-445. doi:10.1016/j.mib.2003.09.009

Yasser, A., A. El-Nomeary, R. I. El- Kady and A. A. El-Shahat (2015) Effect of some medicinal plant seed meals supplementation and their effects on the productive performance of male rabbits. Int.J. ChemTech Res., 8 (6): 401-411.

Zeweil, H. S., M. H. Ahmed, S. M. Zahran ,Y.El-Gindy and A . Y. Al-Ghdaiwi (2016) Effects of dried onion and ascorbic acid on performance, immune response and serum blood lipid profiles of growing rabbits. J. Adv. Agric. Res. (Fac. Agric. Saba Basha), Vol. 21 (4): 570-583.

blood parameters, hematological and immunological variables of growing rabbits, M. Sc. Thesis, Fac. Agic. (Saba Basha), Alexandria Univ., Alexandria, Egypt.

Franz, C, Baser, K.H.C, Windisch, W (2010) Essential oils and aromatic plants in animal feeding – a European perspective. Areview, Flavour Frag. J., 25: 327-340. doi:10.1002/ffj.1967

Gerencser, Zs, Szendro , Matics , Radnai, I , Kovacs M , Nagy I , Dal Bosco A , Dalle Zotte, A (2012) Dietary supplementation of spirulina (Arthrospira platensis) and Thyme (Thymus vulgaris L.) PART 1: Effect on productive performance of growing rabbits. World Rabbit Science Association Proceedings 10 th World Rabbit Congress – September 3 - 6, 2012– Sharm El- Sheikh –Egypt, 657 – 661.

National Research Council (N.R.C) (1977) Nutrient Requirements of Domestic Animals USA National Academy of Science. Washington, D. C.

Saleh, H, Azizollah, J.K, Ahmadreza, H and Raham, A (2015) The Application of Thymus vulgaris in Traditional and Modern Medicine: A Review Global Journal of Pharmacology 9 (3): 260-266, 2015

Sallam, S. M. A., m. E. A. Nasser, M. S. H. Yousef, A. M. Elmorsy, S. A. S. Mahmoud and M. I. Yousef (2005) Influence of aluminum chloride and ascorbic acid on performance, digestibility, caecal microbial activity and biochemical parameters of rabbits. Res. J. Agric. and Biological Sci., 1 (1): 10-16.

Selim, A. D.; Soliman, A. Z. and Abd El-Khalek, A. M. (2004) Effect of drinking water temperatures and some dietary feed Additives on performance of heat stressed rabbits. 8th Wld. Rabbit Congress, Puebla, Mexico, 984: 990.

Selim, N. A., A. M. Abdel-Khalek, S. A. Nada and S. A. El-Medany (2008) Response of growing rabbits to dietary antioxidant vitamins E and C. 1. Effect on performance. Proc. of the 9th World Rabbit Congress, Verona, Italy, 803-808.

Skrivanova, V. and M. Marounek (1997) Effect of ascorbic acid on performance, mortality, digestibility of nutrients and quality of meat of rabbits housed at 25 degrees C. Archive fur Tierzucht, 40 (2): 153-157.

SPSS Statistical Packages for th e Social Sciences (2001) Statiatical software for windows version 11.0 Microsoft. SPSS ® , Chicago, IL, USA.

Toghyani, M.; M. Tohidi; A.A. Gheisari and S.A. Tabeidian (2010) Performance, immunity, serum biochemical and hematological parameters in broiler chicks fed dietary Thyme as alternative for an antibiotic growth promoter. African Journal of Biotechnology, 9(40):

Vahid, K, V. K. Marinus, H. Hamideh and M. Pileva (2012) Effects of Thyme Essential Oil on Performance, Some BloodParameters and Ileal Microflora of Japanese Quail.

Abou-Zeid, A. E.; A, Isshak,.; N. Badawy, and N, Abou-Ouf (2000) The potential effect of vitamin C supplementation in quail. Egypt. J. Poult. Sci., 20: 817-838.

Abu El-Hamd, M. A, M. A. M, Sheteifa,. and Ayat, A. Ragab (2013) Effect of ascorbic acid on productive and reproductive performance of does new zealand white rabbit J.Animal and Poultry Prod., Mansoura Univ., Vol.4 (9): 549 - 559 (2013).

Al-Shanty, H (2003) Using vitamin C and sodium bicarbonate to alleviate the effect of heat stress on rabbit performance. Egypt. Poult. Sci. J., 23: 129-139.

Anadon, A (2006) Workshop III: 2006 EU ban on antibiotics as feed additives: consequences and perspectives. WS14. The EU Ban of Antibiotics as Feed Additives (2006): alternatives and consumer safety. J,vet, Pharmacol. Therap., 29: 41-44

Attia, K.H.M, F.A. Tawfeek, M.S. Mady and M.H. Assar (2015) Effect of dietary chromium, selenium and vitamin c on productive performance and some blood parameters of local strain dokki-4 under Egyptian summer conditions Egypt. Poult. Sci. Vol (35) (I): 311-329.

Benlemlih, M, Aarab, A. Bakkali, M , Arakrak, A and Laglaoui, A (2014) The effect of supplementing diets with dried fennel and Thyme on the zootechnical parameters and caecal microflora of growing rabbit, Journal of Animal and Feed Sciences, 23, 2014, 346–350

Bolukbasi, S.C, M.K. Erhan, A. Özkan (2006) Effect of dietary Thyme oil and vitamin E on growth, lipid oxidation, meat fatty acid composition and serum lipoproteins of broilers South Afric. J. Anim. Sci. 36(3): 189-196.

Brown, L., B. Rosner, W. W. Willett and F. M. Sacks (1999) Cholesterol-lowering effects of dietary fiber: a meta-analysis. Am. J. Clin. Nutr. 69 (1): 30–42

Cheeke, P.R (1987) rabbit feeding and Nutrition.Academic Press, INC, Orliando, Florida, 32887.

Ciftci, M, Guler, Dalkiliç, T. B and Ertas, O.N (2005) The Effect of Anise Oil (Pimpinella anisum L.) on Broiler Performance, Int. J. Poult, Sci., 4: 851-855.

Cross, D.E, R.M. McDevitt, K. Hillman and T. Acamovic (2007) The effect of herbs and their associated essential oils on performance, dietary digestibility and gut microflora in young chickens from 7-28 days of age. British Poultry Science, 48(4): 496-506.

Dauda, V.M, M. Orunmuyi, G.T. Iyeghe-Erakpotobor (2015) Performance of weaned hyla rabbits supplemented with vitamin.C J.Amin.Prod.Res.27:157-161.

Denli, A.M, B.B. Tops, R.H. Plasterk, R.F, Ketting and G.J. Hannon (2004) Processing of primary microRNAs by the Microprocessor complex.Nature 432, 231–235.

Duncan, D. B. (1955). Multiple range and F., test Biometric. 11:42.

Ettaib, M. O. R. (2015) Effect of diets containing propolis on the performance, carcass,

100 – Total edible parts, ****Giblets % = Kidney % + Heart % + Liver

Table 4: Means ± SE of effect of Vitamin .C, Thyme on digestibility coefficients of nutrients and nutritive values

Items	Dietary treatments				P. value
	Control	*Thyme leaves* 200mg/kg	*Thyme leaves* 400mg/kg	*Ascorbic Acid* 200mg/l	
DM (%)	65.66^{a}±0.33	64.00^{b}±0.57	63.00^{b}±0.57	64.33^{ab}±0.33	0.025
OM (%)	58.09^{a}±0.43	57.29^{ab}±0.32	56.06^{b}±0.34	57.90^{a}±0.60	0.045
CP (%)	74.20±0.10	75.21±0.35	75.57±0.10	74.89±0.39	0.130
EE (%)	62.57±0.30	63.02±0.50	63.39±1.45	61.35±0.35	0.271
CF (%)	31.53±0.28	32.51±0.58	32.94±0.23	32.25±0.13	0.760
NFE (%)	51.26±0.01	50.73±0.07	50.99±0.23	51.50±0.25	0.746
DCP (%)	12.82^{b}±0.01	13.13^{a} ±0.06	13.24^{a} ±0.01	12.94^{b}±0.06	0.001
TDN (%)	72.27±0.07	72.56±0.13	72.87±0.07	72.85±0.06	0.330

a, b, : Values in the same row with different superscripts differ significantly (P≤ 0.05)

DM= Dry matter, OM= Organic matter, CP= Crud protein, EE=Ether extract. CF=Crud fiber, NFE=Nitrogen free extract, DCP= Digestibility crud protein, TDN=Total digestibility nutrient.

REFERENCES

Abd El-Hamid, A.E.Y and M.M, El-Adawy, (1999) Growth and physiological performance of New Zealand White Rabbits fed diet supplemented with ascorbic acid. Egypt. Poult. Sci., 19: 857-871.

Abou-Ashour, A. M. H., S. A. A. Abd El-Rahman, G. A. Zanaty, A. A. Essa and M. K. Abou El-Naga (2004) Effect of dietary ascorbic acid supplementation on the performance of laying hens. Egypt. Poult. Sci., 24: 401-416.

Table 3: Means ± SE of effect of Vitamin .C, Thyme on carcass characteristic of growing rabbits

Items	Dietary treatments				*P.* value
	Control	*Thyme leaves* 200mg/kg	*Thyme leaves* 400mg/kg	*Ascorbic Acid* 200mg/l	
Pre-slaughter weight(g)	2322.00^{b}±19.84	2462.00^{a}±11.13	2507.00^{a}±25.57	2367.00^{b}±21.88	0.001
Hot carcass %	56.59±0.18	56.78±0.46	56.28±0.17	56.78±0.29	0.616
Cold carcass %	54.21±0.35	55.81±0.49	55.31±0.35	55.43±0.41	0.073
T Edible parts %	61.01±0.20	61.09±0.55	60.14±0.23	61.16±0.35	0.198
Non Edible parts %	38.98±0.20	38.90±0.55	39.85±0.23	38.83±0.35	0.198
Giblets %	4.39±0.06	4.12±0.14	4.35±0.05	4.37±0.14	0.300
Kidney %	0.64±0.01	0.65±0.01	0.62±0.01	0.62±0.01	0.540
Kidney fat %	0.34±0.01	0.32±0.03	0.316±0.04	0.32±0.01	0.251
Heart %	0.33±0.02	0.39±0.01	0.36±0.01	0.31±0.02	0.095
Liver %	3.42±0.06	3.07±0.14	3.35±0.07	3.43±0.15	0.141
Lungs %	0.56^{b}±0.01	0.62^{a}±0.01	0.62^{a}±0.01	0.58^{b}±0.01	0.015
Head %	5.50±0.09	5.24±0.13	5.17±0.13	5.14±0.14	0.210
Small intestine length(cm)	258.00^{b}±3.74	286.00^{a}±60	292.00^{a}±5.83	262.00^{b}±6.63	0.001
Small intestine %	4.13^{a}±0.04	3.98^{b}±0.02	3.94^{b}±0.05	4.14^{a}±0.03	0.004
Colon length(cm)	38.00±1.22	40.00±0.00	40.00±0.00	39.00±1.00	0.261
Colon %	1.25±0.108	1.23±0.05	1.27±0.04	1.26±0.07	0.988
Caecum length (cm)	39.00±1.00	40.00±0.00	40.00±0.00	38.00±1.22	0.261
Caecum %	4.58±0.17	5.24±0.14	5.27±0.13	5.12±0.36	0.148
Spleen %	0.07±0.01	0.07±0.06	0.07±0.04	0.06±0.01	0.985
Thyroid gland (%)	0.01±0.03	0.01±0.02	0.01±0.01	0.01±0.01	0.455
Testes (%)	0.40±0.02	0.40±0.01	0.40±0.04	0.42±0.01	0.503

a, b, : Values in the same row with different superscripts differ significantly (P≤ 0.05)

*Hot and Cold carcass % without the head, **Total edible parts % = Hot carcass + Kidney % + Heart % + Liver %. *** Non edible parts % =

coefficients (%). While, **Sallam, *et al.* (2005)** indicated that the treatment with ascorbic acid (40 mg/kg body weight) resulted insignificant increase in digestibility coefficients (DM, OM, CP, CF, EE and NFE) and TDN. On the same trend, **Skrivanova and Marounek (1997)** reported that the digestibility of nutrients of Hyla 2000 rabbits supplied with ascorbic acid at 30 mg/kg body weight twice a week was not significantly affected. Supplementing heat-stressed laying hens with ascorbic acid improved productive performance compared to the control group. Digestibility of dry matter, organic matter, crude protein and ether extract were highest in the treated treatments and lowest in the control group **(Attia, *et al.* 2015)**.In conclusion the results showed that addition of Thyme or ascorbic acid in rabbit diets had improved the productive performance, carcass, digestibility of growing rabbits and 400 mg/kg Thyme was more effective tan 200 mg/kg Thyme or ascorbic acid.

Table 2: Means ± SE of productive performance of the rabbits fed the experimental diets.

Items	Dietary treatments				*P.* value
	Control	*Thyme leaves* 200mg/kg	*Thyme leaves* 400mg/kg	*Ascorbic Acid* 200mg/l	
Initial weight (g)	777.78±12.50	777.22±17.48	776.11±23.27	775.56±25.46	1.000
Final weight (g)	2119.40^{c} ±41.90	2280.00^{ab}±22.23	2360.60^{a}±15.05	2232.80^{b} ±30.58	0.001
Total weight gain (g)	1341.70^{c}±45.30	1502.80^{b}±24.86	1584.40^{a}±21.03	1457.20^{b}±10.00	0.001
Daily gain (g)	23.95^{c}±0.80	26.83^{b}±0.44	28.29^{a}±0.37	26.02^{b}±0.17	0.001
Weekly feed intake (g)	91.42^{b}±0.48	86.78^{a}±0.26	86.77^{a}±0.39	90.22^{b}±0.62	0.001
Feed conversion ratio	3.85^{a}±0.14	3.22^{b}±0.05	2.96^{c}±0.04	3.43^{b}±0.01	0.001
Performance index %	55.86^{d}±2.97	70.91^{b}±1.73	79.73^{a}±1.25	65.14^{c}±1.18	0.001

a, b, Values in the same row with different superscripts differ significantly (P≤ 0.05)

ascorbic acid (300 mg/kg diet) did not significantly affect total edible parts (%). Similar results obtained by **Selim, *et al.* (2008). Abou-Zeid, *et al.* (2000)** demonstrated the effect of ascorbic acid supplementation on relative organs weight of Japanese quail at 6 weeks of age, and reported that ascorbic acid supplementation (200 or 300 mg ascorbic acid / liter) had significant effect on the relative weight of liver, spleen and heart while kidney was not affected significantly. Aromatic plants are becoming more important due to their antimicrobial effects and the stimulating effect on animal digestive systems **(Ciftci, *et al.,* 2005). Al-Shanty (2003)** found insignificant effect due to ascorbic acid supplementation on carcass traits of rabbits exposed to heat stress. Also, other studies carried out by **Selim, *et al*. (2004 , 2008)** reported no effect of ascorbic acid on carcass traits of rabbits. As shown in Table (4), digestibility coefficients of DM was significantly ($P \leq 0.05$) decreased in the groups received *Thyme* in compared with control and ascorbic acid fed groups. Also, digestibility coefficients of OM were significantly ($P \leq 0.05$) decreased in the group had 400 mg Thyme in compared with control and *ascorbic acid* fed group. On the other hand, CP, EE, CF and NFE were insignificantly affected by ascorbic acid or Thyme supplementation in compared with the control, also results presented showed that feeding diets containing Thyme caused significant ($P \leq 0.05$) increment in DCP % value compared with control and ascorbic acid fed group. The present results are in agreement with those reported by **(Attia, *et al*. 2015)** said that supplementing heat-stressed laying hens with ascorbic acid improved productive performance compared to the control group. Digestibility of dry matter, organic matter, crude protein and ether extract were highest in the treated treatments and lowest in the control group. Also, **Skrivanova** and **Marounek (1997)** reported that the digestibility of nutrients of Hayla 2000 rabbits supplied with ascorbic acid at 30 mg /kg body weight twice a week werenot significantly affected. **Selim, *et al*. (2004)** reported that ascorbic acid (300 mg / kg diet) did not significantly affect crude protein digestibility coefficient, while it was significantly affected organic matter, ether extract and crude fiber digestibility coefficients. **Sallam, *et al*. (2005)** and **Ettaib (2015)** indicated that the treatment with ascorbic acid resulted in no significant increase in nutritive values of the experimental diets. **Selim, *et al.* (2004)** reported that the treat ascorbic acid (300 mg/kg diet) did not significantly affect crude protein (CP) digestibility coefficients (%), while, it was significantly affected organic matter (OM), ether extract (EE) and crude fiber (CF) digestibility

gain, body weight, feed consumption, but found Significant differences were only for feed conversion ratio. Feed conversion ratio was not influenced by dietary Thyme supplementation **(Benlemlih, *et al*., 2014). Denli, *et al,* (2004)** Concluded when addition of 60 mg/kg of Thyme oil to quail diets significantly improved the body weight gain and feed conversion of quails. **Yasser *et al.* (2015)** demonstrated that daily body weight gain and feed conversion ratio of rabbits fed Thy were significantly improved in compared to the control diet. Also **Al Shanty (2003)** showed that ascorbic acid (1ml/Liter water) significantly improved final body weight and numerically decreased feed intake when compared with the control. **Selim *et al*. (2004**) cleared that rabbits had access to extra levels of ascorbic acid beyond recommendation level achieved better performance in weight gain and feed conversion ratio compared to the control group. In addition, **Selim, *et al.* (2008)** cleared that the treated growing rabbits with 200 ppm of ascorbic acid recorded significantly the best feed conversion ratio (2.68 vs. 3.68 in control group). On the other hand, **Skrivanova** and **Marounek (1997**) reported that growth of Hayla 2000 rabbits supplied with ascorbic acid at 30 mg /kg body weight and feed intake twice a week were not significantly affected. Also, **Zeweil, *et al*. (2016)** indicated that the treatment with ascorbic acid (200 mg/kg) resulted in no significant increase in body weight, body weight gain and feed intake of rabbits. Based on the obtained results, doe rabbits which received ascorbic acid in drinking water 50 mg/ rabbits/day were improvement feed intake(**Abu El-Hamd, *et al*,. 2013).** Feed conversion efficiency was better for 150 and 200 ascorbic acid than for 100 and 250 ascorbic acid. Performance of weaned Hyla rabbits could be improved during the hot period by supplementing 150- 200 mg ascorbic acid in water **(Dauda, *et al*. 2015).**(Tapel 3) Results for pre-slaughter weight was significantly affected ($P \leq 0.05$) by different treatments in comparison with control. Results for percentage of hot and cold carcass, total edible parts, non-edible parts, giblets, liver, heart, kidneys, spleen, colon, caecum, small intestine, testes, thyroid gland and head and length of small intestine, caecum and colon were insignificantly affected by different treatments, however, kidney fat and lungs percentage were significantly ($P \leq 0.05$) decreased and increased, respectively, in the group received 400 mg Thyme in comparison with control. **Abd El-Hamid and El-Adway (1999)** reported that carcass percentage, dressing hot carcass weight, kidney and spleen were not significantly affected by the treatment by ascorbic acid of heat-stressed rabbits. **Selim, *et al*. (2004)** reported that

RESULTS AND DISCUSSIONS

In the present study the experimental rabbits looked apparently healthy and no mortality was recorded. The effect of Thyme and ascorbic acid on the performance of growing rabbits is presented in (Table 2). The results showed that the supplementation of 200 mg ascorbic acid, 200 and 400 mg Thyme leaves /kg diet brought a significant ($P \leq 0.05$) improvements in final body weight by the value of 5.1, 7.7 and 9.3 %, weight gain by 8.6, 12.3 and 14.7 %, feed conversion ratio by 10.9, 15.1 and 17.9 %, performance index by 16.6, 25.0 and 31.3 % and significantly ($P \leq 0.05$) decreased feed intake by 1.3, 2.7 and 4.3 %, respectively, in comparison with control. A part of the improvement in growth of rabbits obtained attributed to the positive impact of Thyme on body weight gain BWG and feed conversion ratio FCR due to its antioxidant properties and phenolic compounds. Just like feed intake, BWG also depends on several factors like genotype, housing, hygienic conditions, management, feeding system and diet attributes. Additives feeding have been shown to increase BWG by their ability to destroy pathogen microorganisms in the digestive system and consequently increasing the production of digestive enzymes which improve utilization of digestive products.**Cross, *et al.* (2007)** reported a significant improvement in BWG when supplementing 1 g/kg of Thyme, and when 10 g/kg of the corresponding herb was fed, it was noticed that Thyme herb did not achieve the same positive results as its essential oil. Nevertheless, another study showed that an addition of 5 g/kg Thyme herb improved BWG by approximately 6% when compared to the corresponding control group. Another study showed that an addition of 5 g/kg Thyme herb improved BWG by approximately 6% when compared to the corresponding control group **Toghyani, *et al.* (2010)**.While found **Cross, *et al.* (2007)** Addition of 100 mg/kg thymol, the major component of *Thyme*, did not show any effects on BWG when compared to the control treatment**. Vahid, *et al.* (2012)** concluded the addition of 1 g/kg Thyme essential oil might offer some beneficial effects on Japanese quail to increase live body weight. The feed conversion ratio FCR describes the relation of feed intake and BWG. More precisely, it is the animal's overall efficiency in converting feed mass into body mass over a specific period of time **Toghyani, *et al.* (2010)** discovered that Thyme herb at an inclusion level of 10 g/kg downgraded FCR by approximately 4%, **Bolukbasi, *et al.* (2006)** found changed FCR beneficially when used 100 and 200 mg/kg of Thyme. **Gerencser, *et al.* (2012)** stated Thyme had no effect on the rabbits' weight

Berseem hay	33.00
Soybean meal 44%	15.00
Molasses	3.00
Di-Calcium phosphate	1.00
Lysine	0.10
Methionine	0.10
Vitamins and mineral premix[1]	0.30
Salt	0.30
Total	100
Chemical analysis (%)	
Dry matter	92.96
Organic matter	84.83
Crude protein	17.29
Crude fiber	13.50
Ether Extract	2.80
Ash	8.12
NFE*	51.24
NDF	37.79
DE**kcal/kg	2504.50

Table1: Composition and chemical analysis of the basal experimental diet

[1]Vit+Min mixture provides per kilogram contains: Vit A 6000 IU; Vit D_3 450 IU; Vit E 40 mg; Vit K_3 1 mg; Vit B_1 1 mg; Vit B_2 3 mg; Vit B_3 180 mg; Vit B_6 39 mg; Vit B_{12} 2.5 mg; Pantothenic acid 10 mg; biotin 10 mg; folic acid 2.5 mg; choline chloride 1200 mg; Manganese 15 mg; Zinc 35 mg; Iron 38 mg; Copper 5 mg; Selenium 0.1 mg; Iodine 0.2 mg; Selenium 0.05 mg. [2]Analyzed values according to **AOAC (2000).**

**NFE = (Organic matter) - (Crude protein + Crude fiber+ Ether Extract).

***Digestible energy (DE) of the experimental diets was calculated according to the equation described by Cheeke, *et al.*, (1987) as follows: ***DE (K/cal) = 4.36-0.0491×NDF%, NDF = 28.924+0.657× CF%.

ment was further sub-divided into 3 replicate of 3 rabbits. Rabbits were housed in wire floor batteries of 45 x 36 x 36 cm and were offered diets for duration of the feeding trial until reaching 13 weeks of age. All animals were kept under similar hygienic conditions. Rabbits were housed in well ventilated block building. Fresh air circulated in the house using exhaust fans. The rabbits were kept within a cycle of 16 h light and 8 h dark. Four pelleted diets were prepared. Group one fed control diet free of feed additives and served as a control group. Group 2 and 3 supplemented with 200 and 400 mg Thyme leaves / kg diet, respectively (Purchased from local market). Group 4 received control diet, but drinking water supplemented with 200 mg ascorbic acid /L (Fisher chemical analytical reagent Grande). Fresh water was automatically available at all times through stainless steel nipples for each cage.The experimental diets were offered to rabbits *ad libitum*. The formula of basal experimental diet is presented in Table (1) that formulated to cover the requirements of rabbits according to National Research Council **(NRC, 1977)** specific for rabbits**.** Individual body weight and feed consumption were recorded weekly. Body weight gain and feed conversion ratio were also calculated. At the end of the feeding trial, 5 rabbits were selected from each treatment group randomly, starved of food but not water for 12 hours and slaughtered for carcass analysis. The results were expressed as the mean ± SEM. All data were analyzed using one way analysis of variance (ANOVA) using SPSS 16.0 statistical software **(SPSS, 2008)**. Significant differences between means were detected using new Duncan multiple range test **(Duncan, 1955)**.

Data were analyzed by using the following model:

$Y_{ij} = \mu + \alpha_i + e_{ij}$

Where:

Y_{ij} = an observation,

μ = overall mean ,

α_i = treatment effect (i=1,….,6)

e_{ij} = random error.

Ingredients	Basal diet
Corn yellow	19.00
Wheat bran	11.00
Barley	17.20

INTRODUCTION

Since the European Union EU first limited and then definitively banned the use of antibiotics as growth promoters in animal feeding **(Anadon, 2006),** public opinion on antibiotic use by humans in the **USA** has changed progressively and scientific studies have increasingly focused on natural alternatives **(Franz, et al. 2010),** The EU decision stemmed from the concern that low-continuative dosage of antibiotics to either enhance animal performance or for simple prophylaxis purposes could lead to the formation of resistant strains of human pathogens that pose a real sanitary risk to the population **(Wegener, 2003).** As a result, new commercial additives of plant origin, considered to be natural products that consumers would accept, have been proposed to livestock producers. Herbs, spices, and various plant extracts have received increased attention as possible antibiotic growth promoter replacements. Some of the important aspects associated with herbal additives are their ability to prevent digestive disturbances; *Thyme* is a flowering plant in the mint (family *Lamiaceae*). *Thymus* is a widely used medicinal plant in food and pharmaceutical industries. Among different species of *Thyme*, *Thymus vulgaris* is used more than other species in therapeutic dosage forms. In traditional medicine *Thymus vulgaris* is cultivated in many countries by most people especially in rural areas depend on herbal medicines to treat many diseases including inflammation-related ailments such as rheumatism, muscle swelling, insect bites, pains, etc. Also the modern medicine in essential oil of *Thyme* has demonstrated the compounds have shown anti-inflammatory, immunomodulatory, antioxidant, antibacterial and antifungal properties**, (Saleh, et al, 2015).** Ascorbic acid is not considered a required dietary nutrient, but under certain adverse environmental conditions, the metabolic need for this vitamin may exceed the inherent biosynthetic ability of ascorbic acid **(Abou-Ashour, et al., 2004).** However, many additives are recently added to rabbit feed or water to help alleviate adverse adverse to enhance productive performance and immune response of rabbits.The present study was conducted to determine the effects of different levels of Thyme leaves and compare their effects with ascorbic acid on growth rabbits performance, carcass traits, digestibility coefficients of nutrients, and meat quality.

MATERIALS AND METHODS

Thirty-six growing V-line rabbits male, 5 weeks old, with initial weights of 776.67±9.71 gm were used for the study. The rabbits were randomly allocated to four treatments groups of 9 rabbits each. Each treat-

Effect of Thyme Leaves and Ascorbic Acid as Natural Growth Activities on the Performance, Carcass, Digestibility of Growing Rabbits

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Abstract

Thirty-six growing V-line rabbits male, 5 weeks old, with initial weights of 776.67±9.71 gm were used for the study. The rabbits were randomly allocated to four treatments groups of 9 rabbits each. Group one fed basal diet free of feed additives and served as a control group. Groups 2 and 3 supplemented with 200 and 400 mg Thyme leaves / kg diet, respectively. Group 4 received control diet, but drinking water supplemented with 200 mg ascorbic acid /L.Results showed that at 13 weeks of age the supplementation of 200 mg ascorbic acid, 200 and 400 mg Thyme leaves /kg diet brought a significant ($P \leq 0.05$) improvements in final body weight by the value of 5.1, 7.7 and 9.3 %, weight gain by 8.6, 12.3 and 14.7 %, feed conversion ratio by 10.9, 15.1 and 17.9 %, performance index by 16.6, 25.0 and 31.3 % and significantly ($P \leq 0.01$) decreased feed intake by 1.3, 2.7 and 4.3 %, respectively. Most of the carcass traits were insignificantly affected by different treatments, however, kidney fat and lungs percentage were significantly ($P \leq 0.05$) decreased and increased, respectively, in the group received 400 mg Thyme leaves in comparison with control. Digestibility coefficients of DM was significantly ($P \leq 0.05$) decreased in the groups received Thyme leaves, however, digestibility coefficients of OM was significantly ($P \leq 0.05$) decreased in the group had 400 mg Thyme leaves in compared with control and ascorbic acid fed groups. Diets containing Thyme leaves caused significant ($P \leq 0.05$) increment in DCP % value compared with control and ascorbic acid fed groups. In conclusion the results showed that addition of Thyme leaves or ascorbic acid in rabbit diets had improved the productive performance, carcass, digestibility of growing rabbits and 400 mg/kg Thyme leaves was more effective tan 200 mg/kg Thyme leaves or ascorbic acid.

Key words: Rabbits, Thyme leaves, ascorbic acid, performance.