

The Effect of Clove and Oregano on Economic Value of Broiler Chickens Diet under Hot Weather of Khuzestan

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Abstract: This study was conducted to evaluate economic value of clove and oregano cultivated in Iran on economic value of broiler chickens diets. About 271 day old Ross strain broiler chickens were allocated to 9 experimental diets with 3 replications in a 3×3 factorial experiment. Treatments were 0, 0.5 and 1% of clove and oregano (AH) that used as top-dress. A basal diet was formulated according to NRC recommendation for grower (14-21 days) and finisher (21-42) periods. The results showed that clove and oregano had significant effects on feed intake, feed conversion ratio and the cost of 1 kg feed and cost of 1 kg meat production ($p < 0.05$).

Key words: Economic value, clove, oregano, broiler chickens, conversion ratio, treatment

INTRODUCTION

The history of herbs is as long as the story of mankind for people has used these plants since earliest times. Wars have been fought and lands conquered for the sake of plants and even today we continue to depend on exotic species for many of the newest medicines and chemicals (Richmond and Mackley, 2000). Recently, many countries tended to minimize or prohibit the chemical components for their deleterious side effects on both animals and human.

Therefore, it is important to use natural promoters. Huang *et al.* (1992) concluded that the Chinese medicinal herbs have a stimulating effect on growth of broilers. In addition, some plants were found to have natural effects, e.g., tonics, anti-parasitic, anti-bacterial, stimulant, carminative, anti-fungal, anti-microbial and antiseptic (Boulos, 1983a; El-Emary, 1993; Soliman *et al.*, 1995) in addition, *Acacia nilotica* has been used in controlling diseases caused by *Clostridium perfringens* (Schragle and Muller, 1990).

In this respect, vegetable, herbs, spices and edible plants were suggested a non-traditional feed additive or growth promoters in broiler diets to improve the growth feed conversion efficiency and reduce the cost of feed (Boulos, 1983b; Ali *et al.*, 1992; Gill, 1999; Dickens *et al.*, 2000; Abaza, 2001; Al-Harhi, 2002; Hassan *et al.*, 2004). Also, Sabra and Mehta (1990) applied herbal plants as growth promoters in broiler diets and observed a

pronounced improvement in their body weight gain, mortality rate and Feed Conversion Ratio (FCR). Vogt (1990) fed broiler diets with extracted oils from thyme, mace and caraway or coriander, garlic and onion at 0, 20, 40 and 80 mg kg⁻¹ diet and found that daily gain, FCR, flavor and smell of meat were not affected by the extracted oils.

Abd El-Latif *et al.* (2002) indicated that adding thyme, black cumin, dianthus or fennel in Japanese quail diet improved body weight, body weight gain and feed conversion ratio. It was necessary to throw some more light on these plants concerning their effects on broiler performance.

Herbs and spices are not just appetite and digestion stimulants but can with impact on other physiological functions help to sustain good health and welfare of the animals and improve their performance Frankic *et al.* (2009). Feed supplements with growth promoting activity increase stability of feed and beneficially influence the gastrointestinal ecosystem mostly through growth inhibition of pathogenic microorganism's growth. Due to improved health status of digestive system, animals are less exposed to the toxins of microbiological origin. Consequently herbs and spices help to increase the resistance of the animals exposed to different stress situations and increase the absorption of essential nutrients, thus improving the growth of the animals (Windisch *et al.*, 2008). Numerous secondary metabolites formed by plants serve as defence agents against

physiological and environmental stressors, predators and pathogenic microorganisms. Several *in vitro* studies showed strong antimicrobial activity of certain plant extracts against Gram and Gram+ bacteria. Di-Pasqua *et al.* (2006). Therefore, the objective of the present study was to investigate the effect of clove and oregano on economic value of broiler chickens diet in weather of Khuzestan.

MATERIALS AND METHODS

This experiment was carried out with 270 day old male and female (Ross-308) broilers. Birds were weighed and distributed in pens of 10 birds each. The experimental treatments include: control (without AH); 5 g kg⁻¹ oregano; 10 g kg⁻¹ oregano; 5 g kg⁻¹ clove; 5 g kg⁻¹ clove+5 g kg⁻¹ oregano; 5 g kg⁻¹ clove+10 g kg⁻¹ oregano; 10 g kg⁻¹ clove; 10 g kg⁻¹ clove+5 g kg⁻¹ oregano; 10 g kg⁻¹ clove+10 g kg⁻¹ oregano.

Birds and feed consumption were weighed weekly to determine body weight, weight gain, feed intake and feed conversion ratio mortality was recorded daily. The starter diet was fed from 1-14 days old, the grower from 14-28 days old and the finisher from 28-42 days.

Clove and oregano were used as top-dress. Mashed diets were offered *ad libitum* during the entire experimental period and formulated with corn and soybean meal according to NRC recommendations. Table 1 and 2 data were analyzed as factorial experiment by SAS. Duncan's multiple range tests was used to compare treatment means at p<0.05.

Table 1: Composition of experimental diets

Ingredients	Grower	Finisher
Corn	60.00	60.0
Soybean meal (48% CP)	30.00	30.0
Fish meal (64% CP)	0.70	0.7
Soy oil	5.00	5.0
Oyster shell	1.50	1.5
Di Calcium phosphate	1.73	1.8
Salt	0.50	0.5
Premix vitamin and mineral	0.50	0.5
DL-Methionine	0.08	0.0
Total	100.00	100.0

Table 2: Analysis of experimental diets

Analysis	Unit	Grower	Finisher
Metabolism energy	Kcal kg ⁻¹	3200.00	3200.00
Crude protein	%	19.00	18.00
Calcium	%	0.90	0.80
Phosphate (available)	%	0.35	0.30
Methionine + Cysteine	%	0.76	0.60
Lysine	%	1.00	0.85
Energy protein ratio	%	168.42	177.70
Fiber	%	2.50	2.50

RESULTS AND DISCUSSION

The effects of oregano and clove on economic value of growing broiler chicken are shown in Table 3. In compared with control group, the cost of kg feed increased with increasing oregano and clove in diets. During in grower phase (0-21 day), feed intake had significant difference (p<0.05) between diets. Nevertheless, birds fed diet 8 (10 g kg⁻¹ clove+5 g kg⁻¹ oregano) had lower feed intake than another diets. Feed conversion ratio at the grower phases was significantly (p<0.05) lower in birds receiving the diets containing 5 g kg⁻¹ clove (T₄) than other diet.

There were significant difference (p<0.05) between bird fed control diet with bird fed diet containing clove and oregano for the cost of kg meat production. T₄ (5 g kg⁻¹ clove) had lower cost of kg meat production (p<0.05). During the finisher phase (21-42 day), the lowest feed intake and feed conversion ratio was belonged to bird fed diet 4 (5 g kg⁻¹ clove), respectively (p<0.05). The cost of kg meat production had significant difference (p<0.05) between experiment diet. At whole of period (0-42 days), there was significant differences (p<0.05) in feed intake between diet 1 (control group) with other diets.

The birds fed diet 2 (5 g kg⁻¹ oregano) had least feed intake than control and other trial group. Feed conversion ratio was significantly different between diets (p<0.05). However, trial 9 (10 g kg⁻¹ clove+10 g kg⁻¹ oregano) had highest feed conversion and bird fed diet 8 (10 g kg⁻¹ clove+5 g kg⁻¹ oregano) had best feed conversion than other group. The cost of kg meat production had significant difference (p<0.05) between diets. The best cost of kg meat production was T₅ (5 g kg⁻¹ clove+5 g kg⁻¹ oregano) in between diets (p<0.05) (Table 4). In compared with control group, the cost of kg feed increased with increasing clove and oregano in diets (the supplements were used as top-dress).

As shown in Table 5, there were significant differences (p<0.05) in feed intake between control group with other treatments. This result agreed with finding of Halle *et al.* (2004) and Cabuk *et al.* (2006) also disagreement with those obtains by Mehala and Moorthy (2008), Ertas *et al.* (2005), Al-Sultan (2003) and Sinurat *et al.* (2002). In fact, the Feed conversion ratio value that is the most sensitive factor in assessing performance, this factor depend on feed intake and grain of weight and an indication of quality of diets by the birds.

The results agreed with obtained by Mellor (2000), Durrani *et al.* (2006), Al-Kassie (2009) and Jamroz and Kamel (2002) also disagreement with those obtains by

Table 3: Economic evaluation: The Effects of clove and oregano as feed supplement ingredient of broiler chickens on cost of feed and meat

Parameters	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	SEM	PV
Grower											
C _f (Rial ¹)	3462.73	3482.73	3502.73	3522.73	3542.735	3562.73	3582.73	3602.73	3622.73	-	
C _{fi} (Rial ¹)	3639.81	3375.51	3471.45	3184.79	3564.170	3518.73	3357.71	3163.89	3434.81	3.50	0.0001
FI (g)	1051.13	968.21	991.07	904.06	1006.050	964.09	937.19	878.19	971.29	5.20	0.0001
FCR	1.87	1.77	1.90	1.70	1.830	1.87	1.73	1.76	1.93	0.04	0.0400
C _m (Rial)	6484.29	6170.89	6657.79	5988.65	6492.390	6999.93	6200.78	6340.81	6664.95	75.35	0.0001
Finisher											
C _f (Rial ¹)	3318.25	3338.25	3358.25	3378.25	3398.250	3418.25	3438.25	3458.25	3478.25	-	
C _{fi} (Rial)	3804.47	3194.11	3492.52	3214.85	4866.270	3342.04	3358.35	3379.51	3743.99	5.37	0.0001
FI (g)	2293.06	1834.25	1994.16	1825.20	2747.180	1876.11	2090.02	1876.08	1854.04	25.40	0.0001
FCR	1.85	2.12	1.86	1.94	1.880	1.77	1.77	1.66	2.01	0.03	0.0010
C _m (Rial)	7037.97	6776.23	6492.08	6234.40	9142.570	5911.65	6755.22	5609.94	6628.06	78.52	0.0001
Total											
C _f (Rial ¹)	3410.49	3430.49	3450.49	3470.49	3490.490	3510.49	3530.49	3550.49	3410.49	-	
C _{fi} (Rial)	3779.49	3255.35	3485.50	3204.83	4432.240	3412.61	3615.23	3307.64	3372.97	6.80	0.0001
FI (g)	3344.19	2604.13	2985.23	2729.26	3752.230	2840.2	3027.21	2754.27	2826.00	20.42	0.0001
FCR	1.86	1.95	1.88	1.82	1.860	1.82	1.75	1.71	1.98	0.01	0.0300
C _m (Rial)	7034.80	6346.56	6552.22	5831.79	5656.250	6138.34	6752.09	6328.79	8239.83	77.64	0.0001

FI = Feed Intake; FCR = Feed Conversion Ratio; C_f = The cost of 1 kg feed; C_{fi} = The cost of 1 kg feed intake; C_m = The cost of 1 kg meat production; SEM = Standard Error of Means

Table 4: Economic evaluation: the effects of clove as feed supplement ingredient of broiler chickens on cost of feed and meat

Parameters	Clove (%)			SEM	PV
	0	0.5	1		
Grower					
C _f (Rial ¹)	3462.735	3522.73	3582.73	-	
C _{fi} (Rial ¹)	3495.590 ^a	3394.59 ^b	3346.78 ^c	3.40	0.0001
FI (g)	1003.810 ^a	958.07 ^b	975.49 ^b	5.20	0.0030
FCR	1.840	1.80	1.80	0.01	0.5000
C _m (Rial)	6437.700	6382.00	6513.80	74.21	0.3100
Finisher					
C _f (Rial ¹)	3318.250	3378.25	3438.25	-	
C _{fi} (Rial)	3497.030 ^b	3807.72 ^a	3493.95 ^b	4.67	0.0001
FI (g)	2040.500	2149.50	1908.10	25.40	0.1900
FCR	1.940	1.86	1.81	0.02	0.2000
C _m (Rial)	6768.800 ^a	7096.20 ^a	6331.10 ^b	88.52	0.0020
Total					
C _f (Rial ¹)	3390.490	3450.49	3510.49	-	
C _{fi} (Rial)	3506.780	3670.01	3445.16	4.70	0.0001
FI (g)	3044.500	3107.60	2883.80	27.30	0.2800
FCR	1.890	1.83	1.81	0.01	0.2000
C _m (Rial)	6644.500 ^a	6736.70 ^a	6245.70 ^b	74.61	0.0200

FI = Feed Intake; FCR = Feed Conversion Ratio; C_f = The cost of 1 kg feed; C_{fi} = The cost of 1 kg feed intake; C_m = The cost of 1 kg meat production; SEM = Standard Error of Means

Table 5: Economic evaluation: The Effects of oregano as feed supplement ingredient of broiler chickens on cost of feed and meat

Parameters	Oregano (%)			SEM	PV
	0	0.5	1		
Grower					
C _f (Rial ¹)	3462.73	3482.73	3502.73	-	-
C _{fi} (Rial ¹)	3394.11 ^b	3367.86 ^b	3475.00 ^a	2.70	0.0001
FI (g)	964.13	951.15	975.49	11.98	0.4800
FCR	1.76 ^b	1.78 ^b	1.90 ^a	0.01	0.0200
C _m (Rial)	6224.60 ^b	6334.70 ^b	6774.20 ^a	75.32	0.0090
Finisher					
C _f (Rial ¹)	3318.25	3338.25	3358.25	-	-
C _{fi} (Rial)	3587.77 ^b	3813.30 ^a	3397.63 ^c	5.20	0.0001
FI (g)	2069.40	2152.50	1908.10	24.94	0.1900
FCR	1.85	1.88	1.88	0.02	0.8000
C _m (Rial)	6633.50 ^b	7176.30 ^a	6386.30 ^b	78.12	0.0010
Total					
C _f (Rial ¹)	3390.49	3410.49	3430.49	-	
C _{fi} (Rial)	3533.18 ^b	3665.07 ^a	3423.69 ^c	4.98	0.0001
FI (g)	3033.60	3103.90	2883.80	27.30	0.2800
FCR	1.81	1.84	1.89	0.01	0.3000
C _m (Rial)	6398.50	6747.50	6480.90	73.21	0.1400

FI = Feed Intake; FCR = Feed Conversion Ratio; C_f = The cost of 1 kg feed; C_{fi} = The cost of 1 kg feed intake; C_m = The cost of 1 kg meat production; SEM = Standard Error of Means

Hernandez *et al.* (2004) and Mehala and Moorthy (2008). Economic value was improved in chicks fed diets supplemented with the herbal feed additives as compared with the unsupplemented one. The results obtained from cost of kg meat production agreed by report of Zeb-Ansari *et al.* (2008), Osman *et al.* (2006), Abd El-Latif *et al.* (2002) and Hassan *et al.* (2004).

CONCLUSION

Therefore, use of clove and oregano reduces the cost of feed intake and had significant effect on meat cost. Thus, these supplements may use in poultry diets in replacement by industrial antioxidant in heat stress condition and growth promoters for improvement of feed conversion ratio.

REFERENCES

- Abaza, I.M., 2001. The use of some medicinal plants as feed additives in broiler diets. Ph.D. Thesis, Faculty of Agriculture, Alexandria University.
- Abd El-Latif, S.A., F.A. Ahmed and A.M. El-Kaiaty, 2002. Effect of feeding dietary thyme, black cumin, dianthus and fennel on productive and some metabolic responses of growing Japanese quail. Egypt. Poult. Sci., 22: 109-125.
- Al-Harhi, M.A., 2002. Performance and carcass characteristics of broiler chicks as affected by different dietary types and levels of herbs and spices as non classical growth promoters. Egypt. Poult. Sci., 22: 325-343.
- Al-Kassie, G.A.M., 2009. Influence of two plant extracts derived from thyme and cinnamon on broiler performance. Pak. Vet. J., 29: 1-5.
- Al-Sultan, S.I., 2003. The effect of *Curcuma longa* (turmeric) on overall performance of broiler chickens. Int. J. Poult. Sci., 2: 351-353.
- Ali, H.A., F.F. Mohamed, H.A. Abdellatif and F.I. Massoud, 1992. Effect of Boi-tonic on broiler performance. Proceedings of the 2nd Congress Faculty of Veterinary Medicine, (CFVM'92), Cairo University, pp: 91-95.
- Boulos, I., 1983a. Medicinal plants of North Africa reference publication International. Proceedings of the 2nd Congress Faculty of Veterinary Medicine, Cairo University.
- Boulos, L., 1983b. Medicinal plants in Libya Al Hasad 16. Essa Standara Libya Inc.
- Cabuk, M., M. Bozkurt, A. Alcicek, Y. Akbas and K. Kucukylmaz, 2006. Effect of a herbal essential oil mixture on growth and internal organ weight of broilers from young and old breeder flocks. S. Afr. J. Anim. Sci., 36: 135-141.
- Di-Pasqua, R., N., Hoskins, G. Betts and G. Mauriello, 2006. Changes in membrane fatty acids composition of microbial cells induced by addition of thymol, carvacrol, limonene, cinnamaldehyde and eugenol in the growing media. J. Agric. Food Chem., 54: 2745-2749.
- Dickens, J.A. M.E. Berrang and N.A. Cox, 2000. Efficacy of an herbal extract on microbiological quality of broiler carcass during asimulated chill. Poult. Sci., 79: 1200-1203.
- Durrani, F.R., M. Ismail, A. Sultan, S.M. Suhail, N. Chand and Z. Durrani, 2006. Effect of different levels of feed added turmeric (*Curcuma longa*) on the performance of broiler chicks. J. Agric. Biol. Sci., 1: 9-11.
- El-Emary, N.A., 1993. Egyptian medicinal plants: An over view I. Assiut J. Env. Stud., 2: 18-19.
- Ertas, O.N., T. Guler, M. Ciftci, B. Dalkilic and U.G. Simsek, 2005. The effect of an essential oil mix derived from oregano, clove and anise on broiler performance. Int. J. Poult. Sci., 4: 879-884.
- Frankic, T., M. Voljc, J. Salbor and V. Rezar, 2009. Use of herbs and spices and their extracts in animal nutrition. Acta Agric. Slovenica, 94: 95-102.
- Gill, C., 1999. Herbs and plant extracts as growth enhancers. Feed. Int., 20: 20-23.
- Halle, I., R. Thomann, U. Bauermann, M. Henning and P. Kohler, 2004. Effects of a graded supplementation of herbs and essential oils in broiler feed on growth and carcass traits. Landbauforsch. Volk, 54: 219-229.
- Hassan, I.I., A.A. Askar and G.A. El-Shourbagy, 2004. Influence of some medicinal plants on performance: Physiological and meat quality traits of broiler chicks. Egypt Poult. Sci. J., 24: 247-266.
- Hernandez, F., J. Madrid, V. Garcia, J. Orengo and M.D. Megias, 2004. Influence of two plant extracts on broilers performance, digestibility and digestive organ size. Poult. Sci., 83: 169-174.
- Huang, Y.F., H.L. Ma, D.F. Wu, J.I. Zhou, K.S. Zhou and Z.Y. Qi, 1992. Effect of Chinese medicinal herbs additives on the growth of broilers. J. Fujian Agric. College, 21: 93-96.
- Jamroz, D. and C. Kamel, 2002. Plant extracts enhance broiler performance. In non ruminant nutrition: Antimicrobial agents and plant extracts on immunity, health and performance. J. Anim. Sci., 80: 41-41.
- Mehala, C. and M. Moorthy, 2008. Production performance of broilers fed with *Aloe vera* and *Curcuma longa* (Turmeric). Int. J. Poult. Sci., 7: 852-856.
- Mellor, S., 2000. Nutraceuticals-alternatives to antibiotics. World Poult., 16: 30-33.

- Osman, A.M.R., H.M.A.E. Wahed and M.S. Ragab, 2006. Performance and carcass characteristics of broiler chicks fed diets supplemented with some medicinal and aromatic plants. *Poult. Sci.* 5: 193-227.
- Richmond, A.C.K. and S.M.L. Mackley, 2000. *Herbs and Spices*. 2nd Edn., Lorenz Books Anness Publishing Inc., London, UK.
- Sabra, K.L. and R.K. Mehta, 1990. A comparative study on additive of livol (Herbal growth) promoters and chemical growth promoters in the diets of broiler chickens. *Ind. J. Anim. Prod. Manage.*, 6: 115-118.
- Schragle, R. and W. Muller, 1990. The influence of selected Tannin-containing plants species on the tenacity of pathogenic bacteria *in vitro* rumen system. 1-Communication: The influence of selected plant species on the tenacity of *Cl. Derferingens*. *Zentralbl Veterinarmed B*, 37: 181-186.
- Sinurat, A.P., T. Purwadaria, M.H. Togatorop, T. Pasaribu, I.A.K. Bintang, S. Sitompul and J. Rosida, 2002. Responses of broilers to Aloe vera bioactives as feed additive: The effect of different forms and levels of bioactives on performances of broilers. *J. Ilmu. Ternak. Dan. Veteriner.*, 7: 69-75.
- Soliman, A.Z., N.Y. Abd El-Malak and A.M. Abbas, 1995. Effect of using some commercial feed additives as promoters on the performance of growing and adult rabbits. *Egypt. J. Applied Sci.*, 10: 501-515.
- Vogt, H., 1990. The effect of a mixture of essential oils in broiler diets. *Landbauforschung Volkenrode*, 40: 157-159.
- Windisch, W., K. Schedle, C. Pletzner and A. Kroismayr, 2008. Use of phytogetic products as feed additives for swine and poultry. *J. Anim. Sci.*, 86: 140-148.
- Zeb-Ansari, J., A.H. Yousaf, T.M. Ahmad and S. Khan, 2008. Evaluation of different medicinal plants as growth promoters for broiler chicks. *Sarhad. J. Agric.*, 24: 323-329.