

Effect of Using Different Levels of *Moringa Oleifera* Leaf Meal on Performance and Carcass Characteristics of Broilers

Elsiddig, A.E.A.¹; Elobeid, E.A.E. ^{1*} and Amin, A.E.²

¹ Faculty of Agriculture, Omdurman Islamic University ,Omdurman Sudan.

² Faculty of Veterinary Medicine University of Khartoum, Shambat,Sudan.

Abstract:

The Present study was carried out to determine the effect of feeding graded levels of *Moringa oleifera* leaf meal on performance and carcass characteristics of broiler chicks. Two hundred day-old unsexed Ross chicks were allotted randomly to four treatments in a 4x5x10 arrangement. Four experimental broiler rations,(NRC, 1994), semi-isocaloric semi-isonitrogenous were formulated with ascending levels of *Moringa oleifera* leaf meal, (MOLM), replacing performed total protein content of the diet percentagewise as 0, 2.5, 5 and 7.5% and designated as A, B, C and D respectively with ration A serving as control. Rations were allotted randomly to the four treatments. Experimental feeding was continued for 45 days on *ad libitum* basis, allowing for an initial adaptation feeding period on the control diet for one week. First three days of the adaptation week utilized the pre-starter ration. Experimental diets were then fed each to its respective group till the end of the experiment feeding period. Feed intake, body weight gain and feed conversion ratio (FCR) were recorded on weekly basis. At the end of the experiment, 10 birds from each group were selected randomly and slaughtered for carcass characteristics and dressing percentage.

Live weight, weight gain, FCR, weight after cleaning and dressing percentage all showed significant differences ($p < 0.05$) except ($p > 0.05$) for the daily and total voluntary feed intake and protein intake. In all carcass cuts, no significant differences ($p > 0.05$) were found except ($p < 0.05$) in the left side and neck. The present study indicated that supplementation of MOLM to broiler diets had positive effects on body weight gain, dressing percentage and carcass cuts when used up to 7.5% of the ration.

المستخلص:

اعدت هذه الدراسة لتقييم اثر استخدام معدلات متزايدة من وجبة اوراق المورنيقا اوليفيرا علي الاداء الانتاجي وخصائص الذبيحة للدجاج اللاحم. وزعت 200 ككتوك لاحم من سلالة (الروص) عمر يوم غير مجنس عشوائياً بترتيب أربعة مجموعات لكل منهما خمسة مكررات في الواحدة 10 ككتايت، أعدت أربعة علائق تجريبية متساوية في الطاقة والبروتين تقريباً حسب (NRC-1995)، استخدمت فيها أوراق وجبة اوراق المورنيقا اوليفيرا بمستويات (صفر، 2.5، 5، 7.5%) وسميت (أ)، (ب)، (ج) و (د) علي التوالي. واستخدمت العليقة (أ) كعليقة ضابطة ووزعت العلائق عشوائياً علي مجموعات التجربة واستمر الاعلاف حراً طول فترة التجربة لمدة 45 يوماً مسبقاً بفترة أقلمة علي عليقة ما قبل البادي لمدة ثلاثة أيام وباقي الاسبوع علي العليقة القياسية (العليقة الضابطة) قبل أن تتغذى الطيور علي العلائق التجريبية حتي نهاية فترة التجربة. ووجبة أوراق المورنيقا أوليفيرا أزاحت البروتين الكلي في العلائق الاختبارية (ب)، (ج) و (د) بنسبة 2.5، 5 و 7.5% علي التوالي. وتم تسجيل المأكول الطوعي والزيادة والوزنية ومعدل التحويل الغذائي علي مدار الاسبوع. وعند نهاية التجربة أخذت 10 طيور في كل معاملة عشوائياً وذبحت لإيجاد نسبة التصافي وفي معدل الأداء الإنتاجي النهائي للوزن الحي والوزن المكتسب معدل التحويل الغذائي والوزن بعد التنظيف ونسبة التصافي أظهرت جميعها تأثيراً معنوياً ($p < 0.05$). أما المأكول الطوعي اليومي والكلي وكمية البروتين المستهلك لم تظهر أي تأثير معنوي ($p > 0.05$) في أجزاء الذبيح ولم تسجل جميع القراءات أي فروقات معنوية ($p < 0.05$) عد الشق الأيسر والرقبة.

نتائج هذه الدراسة برهنت يمكن أنه يمكن اضافة وجبة أوراق المورنيقا في علائق الدجاج اللاحم بتأثير موجب علي الاداء الانتاجي في الزيادة الوزنية ونسبة التصافي والقطع المختارة ويمكن اضافتها حتي نسبة 7.5% بدون أي تأثيرات عكسية.

Keywords: *Moringa olifera*, leaf meal, chicks performance, carcass, broiler chicks

*Corresponding Author: Elobeid Abdelraheim Elobeid. Email: Elobeid1954@gmail.com

Introduction

Poultry industry in the Sudan is based mainly on conventional plant protein sources produced from residues of oilseed industries as by-products namely sesame, groundnut, sun flower seed cakes and some other by-products as sorghum gluten feed and wheat bran. Sorghum, wheat bran and oilseed cakes were considered the main sources of protein and energy in Sudan (Babiker *et al.*, 2009), but now supplies are facing the problem of high prices due to continued scarcity and consequent competition between livestock and humans for available grains (Tegbe *et al.*, 1984 and Madubvike, 1988). These problems prompted researchers for finding non-conventional sources of feed and introduce new sources of low prices, high in nutrients and above all not a resource combat.

The research programs to introduce plant protein sources from leaf meals, as with *Cajanus cajan* and *Medicago sativa*, would produce relatively abundant amounts of low price, high content amino acids, proteins, vitamins and minerals that can fairly support poultry nutrition (Bhatt and Sharma, 2001; Muriue *et al.*, 2002 and Onyimonyi and Onu, 2009). Leguminous, multipurpose trees and shrubs has been suggested to be an available alternative source of protein and the leaf meal stands for not only a source of protein but supplies poultry rations further with vitamins (as β carotenes) and more of macro and micro-minerals (D' mello *et al.*, 1987; Esonu *et al.*, 2001).

The MOLM was recently focused as a source of non-conventional protein in animal production in the world. The tree can be easily germinated well throughout sum-mer seasons with ability to produced feed. Nutrient components of the MOLM of Ca is estimated at four times that of milk, K as thrice that of bananas, Fe three times as in spinach, vitamin A four times as the radish and the protein and amino acids, two times as in milk (Sutherland *et al.*, 1990; Makkar and Becker, 1996; Sarwatt, 2002 and Kimoron, 2002). (Ghasi *et al.* (2000) and Matthew *et al.* (2001) reported that MOLM even improved immunity in poultry. This study was conducted to evaluate the effect of feeding diets containing graded levels of MOLM on performance, carcass and meat quality of boiler chicks.

Materials and methods:

This experiment was carried out in the Poultry Farm, Faculty of Agriculture, Omdurman Islamic University. Omdurman, Khartoum State, Sudan, during the period from January 28th up to February 27th 2012.

Preparation of MOLM: MOLM was produced by picking the leaves in the early flowering stage. Dryness took place under shade in an aerated condition for 3-4 days. Leaves were milled electrically. The leaves powder was kept in polythene bags to protect from light and humidity until used. MOLM was proximately analyzed (Table 1) according to (NRC, 1995).

Table1: Proximate chemical analysis (dry matter basis) of MOLM.

Component	%
Dry matter	94.8
Crude protein	22.8
Fat	5.33
Crude fiber	16.79
Ash	8.8
Nitrogen free extract	41.17
Energy Kcal/kg *	1355.64

*(Lodhi *et al.*,1976)

Experimental ration: Other experimental design consisting of four dietary treatments semi – components used in these study preaches from isonitrogen and semi- isocaloric A,B,C and D, Omd-urman marked. Ration formulation of treatment A serving as a control ration. Table (2) experiment diets according to the (NRC. 1995). showed the sum of the % com-ponents of the Feeding trails was a completely randomized ration used in the experiment.

Table 2. Percent inclusion rates of components (fresh basis) and proximate chemical composition (dry matter basis) of experimental broiler rations.

Ingredients	A	B	C	D
Sorghum	66.65	66.05	65.42	63.62
Groundnut cake	27	25.1	23.53	22.83
MOLM	0	2.5	5	7.5
Concentrate	5	5	5	5
Di ca	0.5	0.5	0.5	0.5
Shell	0.5	0.5	0.2	0.2
Nacl	0.25	0.25	0.25	0.25
Lysine	0.1	0.1	0.1	0.1
Total	100	100	100	100
Components				
Crude protein	22.85	22.25	22.05	22.07
Ether extract	4.02	3.98	3.98	4
Fiber	4.38	4.59	4.84	5.15
Ash	4.4	4.43	4.49	4.61
Nitrogen free extract	56.13	56.25	56.42	55.94
Ca	1	1	0.96	1
P	0.4	0.4	0.4	0.4
Lysine	1.19	1.2	1.2	1.23
methionine	0.37	0.37	0.38	0.7
Energy cal/kg*	3135	3096	3068	3021

*(Lodhi *et al.*,1976),

Chick of experiment:- A total of 200 Ross day old unsexed chicks were randomly distributed into 4 groups of 50 chicks. Each group was further subdivided into 5 replicates with 10 chicks per each. The chicks of each replicate were housed in a pen (1 square meter) in an open fine wire mesh sided poultry house on concrete floor, deep litter with the roof of metal sheets. Four (treatments A,B,C and D) with level of MOLM 0.0,2.5,5 and 7.5% were fed during the experiments period. Light continued throughout the experiment period, feed and water were offered *ad-libitum*. The temperature control by the observation of the chicks behavior during the day. In the three day the chick feeding on pre-starter and using the control diet the end of the week. All chicks vaccinated against Gy-m-boree and Newcastle diseases on week and 15 day respectively. Added vitamins to the water throughout the first 5 day and before and after vaccination temperature between 20- 23'.

Experiment data collection:

Performance values of experiment birds weekly calculated, as chicks life weight gain (g) feed intake (g) and calculated FCR, accepted weight,

total protein consumed and mortality rate for experiment groups.

At the end of experiment birds overnight fast(except for water) two birds randomly selected from each replicate after weighing and slaughter according to the Islamic procedure to assess the impact (MOLM) inclusion in the diet on performance and carcass characteristics. Slaughter birds washed and then placed on cold snow water to be cold enough. Parts weight separately and recorded were expressed as % of the live weight.

Data analysis:

Data on the performance and carcass characteristics analysis (ANOVA) and compare mean according Duncan (1955) multiple range test and Snedecor and Cochran(1989).

Results:

Observation of yellow colour covering leg, shank, beak, and skin, before and after slaughter and the colour increasing in ascending order by the level of MOLM in the diets increase and no mortality recorded in all treatment groups.

2.1. Effect of adding different level of MOLM on the chicks performance:

Table (3) average (mean±sd) values of performance (Kg) of broiler chicks fed graded level of MOLM for 45days.

Item	Treatment				F-value
	A	B	C	D	
Live weight	2.310±.07a	2.336±.09a	2.296±.09a	2.098±.10b	7.212∞
Weight gain	2.194±.07a	2.219±.09a	2.218±.09a	1.982±.10b	7.212∞
Feed intake	4.270±.10	4.340±.12	4.23±.11	4.220±.09	1.322ns
FCR	1.950±.03b	1.960±.03b	1.940±.06b	2.13±.10a	11.434∞
Protein intake	.97±.02	.96±.02	.94±.04	.93±.02	3.201ns
Feed/day	0.102±.00	0.103±.00	0.101±.00	0.100±.00	1.322ns

Mean in row followed by the same letter or no letter do not differ significantly (p > 0.05).

The chicks showed highly significant different ($p < 0.01$) on the final live body weight, weight gain and feed conversion ratio. Treatment D recorded low live body weight, gain in body weight and feed conversion ratio in comparison

with the other treatment groups (A, B and D) respectively. While total feed intake, protein intake and daily feed intake showed ($p > 0.05$).

2.2. Effect of adding different level of MOLM on the carcass weight parts:-

Table(4): Average (mean \pm sd) values of weight of carcass parts (Kg) of broiler chicks fed graded level of MOLM for 45days.

Items	Treatments				F-value
	A	B	C	D	
Carcass weight after clean	1.464 \pm .05b	1.616 \pm .11a	1.553 \pm .06ab	1.394 \pm .12c	5.945°
Dressing%	68.6 \pm 1.42b	70.8 \pm 1.21a	69.8 \pm 1.03ab	70.7 \pm 1.47a	3.065°
Neck	0.085 \pm .01	0.0920 \pm .00a	0.086 \pm .01ab	0.076 \pm .01b	4.885°
Carcass weight after cold	1.481 \pm .06b	1.658 \pm .07a	1.614 \pm .06b	1.414 \pm .12b	9.208 ∞
Left side hot	0.715 \pm .02b	0.808 \pm .07a	0.779 \pm .05ab	0.683 \pm .08c	4.412 ∞
Left side after cold	0.72 \pm .02c	0.883 \pm .05a	0.0813 \pm .05b	0.702 \pm .07c	8.865°

Mean in row followed by the same letter or no letter do not differ significantly ($p > 0.05$).

Highly effected ($P < 0.01$) carcass weight after cold and left side half cut before cold while left side half cut after cold and carcass weight after clean, dressing %, neck, also showed significant different ($p < 0.05$). Treatment B showed high average weight on carcass weight parts and came late treatment C, A and D respectively.

Discussion

No mortality recorded, it may be due to the good environmental factors under control and water clean and feed abundance and balance in nutrients composition components this result agreement with (Yany *et al.*, 2006 and Kakenji *et al.*, 2007) whose indicating that no mortality were observed in the chicken feeding on MOLM which had antimicrobial activities and reducing the bacteria in the animal intestines and no poison substantial in the meal. (Ghasi *et al.*, 2000; Matthew *et al.*,

2001 Yany *et al.*., 2006; Du *et al.*, 2007) they reported that MOLM was to enhance immune responses and improved intestinal health of broiler and their efficiency, encourages balanced metabolism healthy digestion of broiler production. (Life in heath, 2, 2011) observation of yellow colour on skin ,beak and legs in the experiment birds and these mainly attributed to the presence of xanthophylls and carotenoid pigmentation in MOLM, as in the others tree and shrub leaf meal as out lined by (D Mello *et al.*, 1987 Austic and Neishen ,1990; Opara ,1996; Esonu *et al.*, 2001 Zanu *et al.*, 2012).

Chemical composition of MOLM used in table(1) was similar with reported by (Both and Wickens 1988; Kakenji *et al.*, 2003; Folid and Paull, 2008; Onu and Aneibo, 2011) the Crude protein 20-35%; fat 2.3-6.4%; crude fiber 13-22.5%; ash

7.13- 14.17% nitrogen free extract 38.2-47.25% and dry matter 76.53-92.5%. While contract in dry mater % (94.8%) and energy 1355.64kcal/ kg, the % of energy as recorded by Odura *et al.*, 2008 and Onu and Aneibo,(2011),1440; 1296kcal/kg respectively. The differences may be attributed to the of environment factors, different stage of harvesting, storage environment and during the preparing sample in the lablotary for analyses and these agreement with (Yadav and Sehgal, 1997 and Yang *et al* ., 2006) in the procedure of leaf meal dryness as recorded.

These increasing effect ($P < 0.05$) of broiler performance in the treatments A,B and C while treatment D with 7.5% MOLM recorded the lower performance due to a high fiber content which effect the digestion, absorption and metabolism of nutrients in the intestinal of the birds and reduce the FCR and these similar with (Aderemi,2003; Onu and Otuma, 2008; Onu,2010). While low live weight of treatment D with high level of protein in the diet return to the effect of anti-nutritional factors as recorded by Kakengi *et al*, (2003). Esonu ,(2001) mention in the study of MOLM contain 1.23(g/kg) tannin and tannin interaction with protein poi logical and less degree with carbohydrate and fat. Low feed intake in group D return to up normality of abetted and testing of MOLM which stop the birds of taking the abundance amount of feed to reached optimizing stat of satisfactory, these agreement with (Kakengi et al,2003) in their studies on the other plants used as leaf meal which mention in the study by (Tangendjaja et al., 1990 ;North.,1990).

High level of protein and energy in the diet with level of MOLM 2.5% ,5% which containing high amount of nutrients content as Fe; Cu; P; Mg; and vitamins as A; C; Thaimin ; Riboflaffen and some amino acids these diets well metabolizable nutrients and increasing the efficiency of body performance of the birds and these inline with (Booth and Wickens .,1988; Makker and Becker.,1996; Fuglie 2000; Kakenji et al., 2003; Oduro et al., 2008; Folid and Paull.,2008; Onu and Aniebo., 2011; Suad, 2012; Zanu et al., 2012).

References

- Aderemi, F. A. (2003). Effect of enzyme supplemented cassava sivierte in cassava based diet on some visceral organs of pullet chicks. Proc. of the 8th Annual Conference of the Animal Science Society of Nigeria. Pp 57-59
- Austic, R .E. and Neishem M. C. (1990).Poultry Production. Lea and Febiger Publisher. pp 260-275.
- Bhatt, R.S. and Sharma S.R. (2001).Nutrient utilization and growth performance of broiler rabbit fed oat plant meal and tall fescue hay. Asian-Australasian Journal of Animal Science, 14: 1228-1232.
- Booth, F.E.M. and Wickens, G.E. (1988). Non-timber uses of selected arid zone trees and shrubs in Africa. FAO conse-rvation guide, Rome, pp 92-101.
- Babiker, M. S; Kijora, C., Abbas,S.A. and Danier, J , (2009). Nutrient composition of main poultry feed ingredient used in the Sudan and their variations from local standard tables values. Int. Poult. Sci., 8:355-358.

- Du, P.L. Lin, P.H.; Yang, R.Y.; Fan, Y.K.; Hsu, J.C. (2007). Effects of dietary supplementation of *Moringa oleifera* on growth performance, blood characteristics and immune response in broilers. *Journal of the Chinese Society of Animal Science*. 36 (3):135-146.
- Duncan , D.B .(1955). Multiple range and multiple F test. *Biometric* 11, 1.
- D,Mello, J.P.E.; T. Acamovic and A.G. Walker, (1987). Eval-uation of leucaena leaf meal for broiler growth and pigmentation. *Tropical Agriculture(Trinidad)*. 64: 33-35.
- Esonu, B.O.; Emenalom, O. O.; Udedibie, A.B.I.; Herbert, U.; Ekpok, C.F.; Okolie, I.C. and Iheukwumere,F.C.(2001).Performance and blood chemistry of weaner pigs fed raw mucuna (Velvet bean)*Tropical Animal production Investigations* ,4:49-54.
- Life in health.2011 *Moringa.oleifera*.www.lifeinhealth.org.(Accessed 19 february 2013)
- Fuglie, L. J. (2000). New Uses of *Moringa* Studied in Nicaragua. *ECHO Development Notes* No. 68, June, 2000.
- Folid, N. and Paull, R. (2008). *Moringa oleifera*. In: *The Encyclopedic of Fruit and Nuts*. CABI, Oxfordshire, UK. Pp 509–512
- Ghasi, S.;Nwobodo, E. and Ofili, J. O. (2000) .Hypocholesterole-mic effects of crude extract of leaf of *Moringa oleifera* Lam in high fat diet fed wistar rats. *Journal of Ethno-pharmacology* 69 (1): 21-25
- Kakengi, A M V Kaijage, J T Sarwatt, S V Mutayoba, S K, Shem M N and Fujihara T. (2007). Effect of *Moringa oleifera* leaf meal as a substitute for sunflower seed meal on performance of laying hens in Tanzania *Livestock Research for Rural Development* 19 (8).
- Kakengi, A.M.V.; Shem, M.N.; Sarwatt S.V.; Fujihara, T. (2003). Can *Moringa olifera* be used as a protein supplement to ruminants? *Asian Australian Journal of Animal Sciences*. 18 (1): 42-47.
- Kimoro, B. N. (2002). Potential of selected Multi-purpose trees as feed for growing goats on maize stover basal diet. MSc. Thesis. Sokoine University of Agriculture, Morogoro - Tanzania..
- Lodhi, GN.;Single ,D.and Ichhp-onani, J.S (1976). variation in nutrient content of feeding stuffs rich in protein and reassessment of chemical method for metabo-lizable energy estimation for poultry.*J.Agri.Sci.*,86:293.
- Makkar, H.P.S. and Becker, K. (1996). Nutritional value and anti-nutritional components of whole and ethanol extracted *Moringa oleifera* leaves. *Animal feed science and technology*, 63: 211-228.
- Madubuiké , F.N; (1988).Bridging the animal protein gap for rural development in Nigeria: considerations for the goat.*J.Agri. Rural Dev.*, 3:12-30.
- Matthew, T.; Matthew, Z.; Taji, S. A. and Zachariah, S. (2001). A review of Viricidal Ayurvedic Herbs of India for Poultry Diseases. *Journal of American Holistic Veterinary Medicine Association* 20(1): 17 – 20
- Muriue, J.I.; Njoka-Njiri, E.N.; Tuitoek, J.N. and Nanua, J.N. (2002). Evaluation of sorghum (*Sorghum bicolor*) as replacement of maize in the diet of growing rabbit (*Oryctolagus cuniculus*).

- Asian-Australasian Journal of animal science, 15: 565-569.
- NRC(994) Nutrient Requirement of Poultry. Ninth revised edition. National Academic Press Washington D.C.USA.155 pp.
- North, M. O. (1990). Commercial Poultry Production manual. Westport connection Publishing Company. Inc, USA. pp 299-301.
- Oduro, I.; Ellis, W.O. and Owusu, D. (2008). Nutritional potential of two leafy vegetables: *Moringa Oleifera* and *Impomeabatatas* leaves. Scientific research and essay, 3 (2): 57-60.
- Onu, P. N. and Otuma, M. O. (2008). Utilization of heat – treated sheep chopping in the diets of broiler finisher chicks. *International Journal of Poultry Science*, 7 (2): 169 – 173
- Onu, P. N. (2010). Impact of heat treated sheep manure-based diets with or without exogenous enzyme on nutrient digestibility and economics of production of finisher broilers. *International Journal of Science and Nature*
- Onu, P.N.1 and Aniebo. A. O. 2(2011). Influence of *Moringa oleifera* leaf meal on the performance and Blood Chemistry of Starter Broilers. *International Journal of Food, Agriculture and Veterinary Sciences* ISSN: 2277-209X.
- Onyimonyi, A.E. and Onu, E. (2009). An Assessment of Pawpaw Leaf Meal as Protein Ingredient for Finishing Broiler. *International Journal of Poultry Science*, 8 (10): 995-998.
- Opara, C.C. (1996). Studies on the use of *Alchornia ordifolia* leaf meal as feed ingredient in poultry diets. M.Sc Thesis, Federal University of Technology, Owerri, Nigeria, pp: 150-159
- Sarwatt, S.V.; Kapange, S.S. and Kakengi, A.M. (2002). Substituting sunflower seed cake with *Moringaoleifera* leaves as supplemental goat feed in Tanzania. *Agro-forestry systems*, 56: 241-247.
- Snedecor ,G.W., Cochran, W.G., 1989. Statistical Methods, 8th edition, Iowa State University Press, Ames, Iowa, USA.
- Suad, G. S.(2012). Nutritional value of *Moringa oleifera* Leaf Supplement for Broiler Production, in Sudan Meal as Feed. A thesis Submitted to the Sudan Academy of Sciences in Fulfillment of the Requirements for Master of Science Degree in Animal Production (Poultry)
- Sutherland, J. P, F.; olkard G K and Grant, W. D. (1990). Natural coagulants for appropriate water treatment: a novel approach, *Waterlines*, April (4), pp30-32.
- Tangendjaja, B.; Rahardjo, V. C. and Lowry, J. B. (1990). *Leucaena* leaf meal in the diet of growing rabbits: Evaluation and effect of a low mimosine treatment. *Animal Feed Science and Technology* 29: 63-72.
- Tegbe,T.S.; Attah, B;and Jegede J.O.(1984).Utilization of agro. Industrial by – products (rice and wheat offal)in the diets of pigs 9th Annual conference , Nigeria Soc. Anim. production UNN.
- Yadav, S.K and Sehgal, A. (1997). Effect of home processing on ascorbic acid and beta carotene content of bathua (*Chenopodium album*) and fenugreek (*Trigonella foenung-raecum*) leaves. *Plant Food Hum. Nutr.* 50: 239-247.
- Yang, R.Y.; Tsou, S.C.S.; Lee, T.C.; Chang, L.C.; Kuo, G. and Lai, P.Y. (2006). *Moringa* a novel

plant rich in antioxidants bio-available iron and nutrients. American chemical society symposium series, 925: 224-239.

Zanu, H.K.; Asiedu P.; Tampuori, M.; Abada, M. and Asante I. (2012). Possibilities of using moringa (*moringa oleifera*) leaf meal as a partial

substitute for fishmeal in broiler chickens diets. *Online J. Anim. Feed Res.*,2(1):70-75.Scienceline/Journal homepages:

<http://www.science-line.com/index/> [http:// www.ojafr.ir/](http://www.ojafr.ir/)

This article has been transpired from the proceedings of the International Seminar on Live Stock and Wildlife in Arid and Desert Environments, Siefad 2014, Livestock and Wildlife Facing the Climatic and Socioeconomic Change 16 -18, December 2014, Djerba, Tunisia