Egypt. J. Vet. Sci. **(special issue)** pp. 81-88 (2019)
The 8th International Conference of Veterinary Research Division, NRC, 3-5 December 2019, Cairo, Egypt

Egyptian Journal of Veterinary Sciences
https://ejvs.journals.ekb.eg/

Evaluation of *Moringa Oleifera* Leaves Powder on Some Blood Parameters and Performances of Broilers

M. F. EL Dakroury
Department of Pharmacology, Faculty of Veterinary Medicine, Matrouh University, Marsa Matrouh, Egypt

This study aimed to investigate the effects of dietary *Moringa oleifera* leaves meal (MOLM) supplementation as a natural growth promoter in broiler chickens. Total of 160 one day old Hubbard chicks were randomly divided into 4 equal groups**.** Group (1) served as a control group. Groups (2), (3) and (4) received MOLM in their feed at levels of 2.5%, 5% and 7 %, respectively, till the end of the experiment (42 days)**.** The live body weights and the total amount of feed intake were recorded weekly. Hematological and biochemical tests were performed at 14th and 42th days of age. At the end of the experiment, birds were sacrificed and weights of breast meat, gizzard, heart and liver were recorded. It was observed that MOLM at 5 % and 7% levels significantly ($P < 0.05$) improved the weight gain, feed conversion ratio (FCR) and decreased the mortality rate. Moreover, the three levels of MOLM significantly ($P < 0.05$) enhanced the total red blood cell count (RBC) at 14th and 42nd days of age respectively comparing with a control group. Last group (MOLM 7%), achieved a significant improvement of the hemoglobin (Hb), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), total antioxidant capacity(TAC), phagocytic activity, total leukocytes count (TLC), lymphocytes, total protein (TP) and globulin levels. In conclusion, MOLM 7% could be used as a natural growth promoter in broilers chicken.

Keywords: *Moringa oleifera*, Performances, Hematology, Biochemistry.

Introduction

Poultry production plays an important role in bridging the protein gap. However, the high cost of feed ingredients especially protein and carbohydrate sources decreases significantly the productivity as well as the profitability of the intensive poultry production system. Using antibiotics as routine feed additives have been banned for possible antibiotic residual effects besides developing drug-resistant microorganisms[1]. Phytogenic additives in animal nutrition were the future for their potential role as alternatives to antibiotic growth promoters [2]. Moringa is a fast-growing plant widely available in tropics and subtropics countries. The plant is a good source of vitamins, minerals and amino acids. It plays an important role as a growth promoter [3-4].

Many reports investigated the MOLM roles as a growth promoter and immunostimulant nutrition. [5-6]. However the negative or the harmful consequence in broilers was present due to the anti-nutritional factors such as alkaloids, glucosinolates and haemagglutinins [7]. Hematological profile is a good mirror for health which was seemed to be good in the case of different MOLM doses [3,5].

This study was carried out to evaluate the graded levels of MOLM on the growth performance, immunological, some hematological and serum biochemical profile of broiler chickens**.**

Corresponding author M. F. El Dakroury, email Mohamed_542000@yahoo.com, Tel. 01018455451
(*Received* 01/09/2019 ; *accepted* 14/09/2019)
DOI. 10.21608/ejvs.2020.19548.1123

Materials and Methods

Chickens and management

A total of 160 chicks one day old Hubbard chicks (from commercial source) were used in the present study. Feed and water were ad-libitum offered. Diets were formulated to meet the requirements of broiler chickens as recommended in NRC [8] and presented in Table 1. The chicks were floor reared in experimental rooms bedded by chaffed wood and provided with clean feeders and drinkers.

Preparation of Moringa oleifera powder

Dried mature *Moringa oleifera* leaves were purchased from a local market, cleaned, chopped to small pieces then grounded into a powder.

Chemical composition of investigated Leaves

Moisture content, ash, crude fiber, crude lipid and crude protein were determined according to AOAC [9]. Carbohydrate content was determined according to Masuko et al [10] .

Experimental design

The chicks were randomly divided into four equal groups, 40 of each. Group (1) was used as a control group. Groups (2), (3) and (4) received MOLM at levels of 2.5%, 5% and 7% of the feed respectively till the end of the experiment (42 days).

Clinical signs, mortality rate and growth performance

Clinical signs and mortality rate were recorded daily. Live body weights and the total amount of feed intake were recorded weekly till the end of the experiment (42 days) for all birds. The FCR was calculated (feed intake/weight gain). Gross lesions of the internal organs for either slaughtered or dead chicks were recorded.

Vaccination program

All chicks were vaccinated with Izovac®-B1 Hitchner and Nobilis® ND-LaSota vaccines at 7th and 18th day of age (by intraocular route), respectively.

Sampling

At 14th and 42th day of age, five blood samples from each group were collected via the wing vein in two test tubes of each bird; one of them had EDTA (Sigma) for immediately hematological examination and the other for serum collection and preservation (at -20 °C) for subsequent biochemical examination. At the end of the experiment, birds were sacrificed and the weights of breast meat, gizzard, heart and liver were recorded.

Biochemical examination

Frozen serum samples were conducted for determination of aspartate aminotransferase (AST), alanine aminotransferase (ALT) (Randox Co., UK), alkaline phosphatase (ALP) (El tech, France), total protein (TP), albumin (Stanbio, USA), uric acid (Biomed, Germany), urea (Diamond, Egypt), creatinine (Human, Germany) and total antioxidant capacity (Bio- Diagnostic, Egypt) as recommended by manufactured sources. Globulin and albumin globulin (A/G) ratio were calculated [11].

TABLE 1. Composition of basal diets of broilers.

	(3 - 4) weeks	(4 - 6) weeks
ME K cal/kg	3197.5	3200.8
Crude protein %	23.0	20.1
Calcium%	1.0	0.9
Available phosphorus%	0.45	0.35

TABLE 2. Chemical composition of investigated Leaves.

Item	values
Moisture	9.43
Ash	5.1
Crud fiber	18.2
Crude proteins	26.9
Crude lipid	3.3
Carbohydrate	36.68

Hematological examination:

Manual RBC count and TLC counts were performed using Natt and Herrick solution and improved Neubauer haemocytometer [12]. Phagocytic activity was also estimated according to Barry et al.[13]. The Hb concentration was determined spectrophotometrically after centrifugation. PCV, mean corpuscular volume (MCV), MCH and MCHC were calculated and differential leukocytes count was done manually [14].

Statistical analysis:

All obtained data were recorded and analyzed statistically[15].

Results

Administration of MOLM to the broilers at levels of 2.5%, 5% and 7 % for 6 weeks revealed that:

Hematological examination

Tables 3-6 demonstrated the hematological profile of the experimental chickens. The RBC count of the three MOLM groups was improved significantly at 14th and 42nd days of age compared with a control group. Moreover, at the 42th day of age, the last group given MOLM (7%), had significantly higher levels of Hb, MCH, MCHC and TAC than control one, in addition to the immunological response of the total leukocytes count (TLC), lymphocytes levels and phagocytic activity.

Biochemical examination

There was no statistically significant difference in AST, ALT, ALP, urea, uric acid and creatinine levels between all treated groups and control one at the two experimental periods. Meanwhile, on the 42th day of the experiment, total protein (TP) and globulin levels were significantly elevated in MOLM 5 % and 7% groups compared with a control group (Table 5).

Clinical signs, mortality and growth performance

The obtained data presented in Tables (6) and (7) showed that, the inclusion of MOLM at levels of 5% and 7% improved the weight gain (2% and 4%) respectively , FCR (1.84 and 1.87) in the treated groups than in control one (2.06) and decreased the mortality % (7.5%) in comparison with control (15%) and 2.5% MOLM groups (12.5%). On the 42th day of the experiment, breast meat weights in the group (4) were improved (9 %) than control.

TABLE 3. Erythrogram of broilers chicken administered different levels of MO leaves powder (N=5, Mean ± SE).

Groups	RBC (10^6/µl)	Hb (g/dl)	PCV (%)	MCV (fl)	MCH (pg)	MCHC (%)
			14th day of age			
Control	2.69 ± 0.18^{b}	6.61 ± 0.27	38.61 ± 1.72	142.57 ± 6.12	25.86 ± 2.71	18.07 ± 1.29
MO (2.5%)	3.15 ± 0.19^{a}	7.73 ± 0.28	41.57 ± 3.79	131.33 ± 4.63	24.79 ± 2.26	19.03 ± 2.38
MO (5%)	3.12 ± 0.07^{a}	7.95 ± 0.42	39.01 ± 0.40	125.23 ± 1.70	25.49 ± 1.14	20.36 ± 0.97
MO (7%)	3.12 ± 0.14^{a}	7.25 ± 0.59	38.26 ± 2.13	123.87 ± 11.90	23.45 ± 2.63	18.92 ± 0.87
			42th day of age			
Control	2.56 ± 0.06^{b}	6.18 ± 0.17^{b}	35.80 ± 2.82	134.50 ± 10.86	23.20 ± 0.37^{b}	17.45 ±1.23^{b}
MO (2.5%)	2.88 ± 0.24^{a}	7.21 ± 0.32^{ab}	37.33 ± 1.86	128.37 ± 9.27	24.74 ±1.23^{ab}	19.33 ± 0.52^{ab}
MO (5%)	2.95 ± 0.15^{a}	7.47 ± 0.50^{b}	38.48 ± 0.95	135.07 ± 3.66	26.11 ± 0.73^{a}	19.37 ± 0.82^{ab}
MO (7%)	3.18 ± 0.21^{a}	8.23 ± 0.44^{a}	39.50 ± 0.63	125.10 ± 6.65	25.92 ± 0.44^{a}	20.81 ± 0.84^{a}

MO, *Moringa oleifera* leaves powder; different superscript letters (a, b) in the same vertical column are significantly different at $P < 0.05$

TABLE 4. Leukogram of broilers chicken administered different levels of MO leaves powder (N=5, Mean ± SE).

Groups	TLC 10^3/µl	Lymphocytes 10^3/µl	Heterophils 10^3/µl	Monocytes 10^3/µl	Eosinophils 10^3/µl	Basophils 10^3/µl
14th day of age						
Control	14.67 ± 1.76	6.44 ± 0.95	7.64 ± 1.18	0.34 ± 0.05	0.18 ± 0.03	0.07 ± 0.12
MO(2.5%)	11.33 ± 0.67	6.31 ± 0.18	4.53 ± 0.77	0.22 ± 0.05	0.15 ± 0.04	0.11 ± 0.12
MO (5%)	16.67 ± 1.76	7.64 ± 1.58	7.52 ± 1.97	0.84 ± 0.39	0.36 ± 0.14	0.31 ± 0.32
MO (7%)	12.00 ± 2.31	5.61 ± 1.21	5.48 ± 1.10	0.61 ± 0.26	0.24 ± 0.06	0.05 ± 0.09
42th day of age						
Control	13.33 ± 0.67^{b}	8.09 ± 0.51^{b}	4.74 ± 0.15	0.31 ± 0.05	0.14 ± 0.08	0.05 ± 0.04
MO 2.5%)	13.33 ± 1.76^{b}	6.73 ± 0.49^{b}	6.06 ± 1.62	0.38 ± 0.14	0.11 ± 0.06	0.05 ± 0.03
MO (5%)	13.67 ± 0.88^{ab}	8.23 ± 0.50^{b}	4.95 ± 0.67	0.29 ± 0.07	0.13 ± 0.08	0.07 ± 0.07
MO (7%)	17.33 ± 0.88^{a}	10.37 ± 0.45^{a}	6.04 ± 0.24	0.49 ± 0.14	0.32 ± 0.03	0.11 ± 0.07

MO, *Moringa oleifera* leaves powder; different superscript letters (a, b) in the same vertical column are significantly different at $P < 0.05$.

TABLE 5. Some serum biochemical parameters and phagocytic activity of broilers chicken administered different levels of MO leaves powder (N=5, Mean ± SE).

Groups	AST (µ/l)	ALT (µ/l)	ALP (µ/l)	TP (g/dl)	Albumin (g/dl)	Globulin (g/dl)	A/G (ratio)	Urea (mg/dl)	Uric acid (mg/dl)	Creat (mg/dl)	TAC (µmol/L	Phagocytic activity
14th day of age												
Control	14.40 ± 1.96	10.75 ± 1.04	250.07 ± 36.03	3.80 ± 0.31	2.15 ± 0.14	1.65 ± 0.29	1.39 ± 0.25	10.43 ± 1.57	10.45 ± 0.85	0.57 ± 0.07	37.45± 33.65^{a}	21.56± 2.54^{a}
MO(2.5%)	17.11 ± 1.40	10.62 ± 1.67	280.77 ± 24.67	3.69 ± 0.27	2.02 ± 0.15	1.67 ± 0.16	1.23 ± 0.12	12.34 ± 1.52	11.23 ± 0.61	0.61 ± 0.11	38.16± 32.90^{a}	23.09± 2.53^{a}
MO (5%)	17.33 ± 1.67	13.37 ± 2.05	251.69 ± 18.08	3.74 ± 0.18	1.97 ± 0.05	1.78 ± 0.14	1.12 ± 0.08	12.60 ± 0.15	10.73 ± 1.20	0.67 ± 0.11	39.83± 41.63^{a}	24.94± 3.84^{ab}
MO (7%)	13.95 ± 2.05	11.80 ± 1.04	261.85 ± 23.22	3.20 ± 0.17	1.79 ± 0.18	1.41 ± 0.13	1.29 ± 0.21	11.77 ± 0.69	11.72 ± 1.10	0.53 ± 0.10	44.93± 41.79^{b}	27.46± 3.62^{b}
42th day of age												
Control	14.00 ± 1.79	12.38 ± 1.06	311.24 ± 41.47	3.39 ± 0.03^{b}	1.79 ± 0.13	1.60 ± 0.11^{b}	1.14 ± 0.16	10.54 ± 0.75	10.91 ± 0.40	0.56 ± 0.12	39.31± 35.85	22.35± 3.15^{a}
MO(2.5%)	15.22 ± 0.43	14.19 ± 1.30	246.1 4 ± 46.72	3.46 ± 0.15^{b}	1.68 ± 0.10	1.78 ± 0.21^{ab}	0.97 ± 0.15	10.74 ± 1.05	11.26 ± 0.88	0.75 ± 0.07	39.83± 36.57^{a}	23.73± 2.03^{a}
MO (5%)	15.84 ± 2.65	10.80 ± 0.72	238.43 ± 32.96	4.17 ± 0.16^{a}	2.01 ± 0.12	2.16 ± 0.09a	0.94 ± 0.06	10.37 ± 0.01	11.65 ± 1.05	0.56 ± 0.11	43.52± 46.41^{b}	25.32± 3.49^{b}
MO (7%)	13.33 ± 0.87	10.46 ± 0.1.23	225.10 ± 9.09	4.07 ± 0.13^{a}	1.95 ± 0.06	2.12 ± 0.09^{a}	0.93 ± 0.04	9.05 ± 0.40	11.27 ± 0.49	0.58 ± 0.04	46.25± 42.69^{b}	28.35± 3.90^{b}

MO, *Moringa oleifera* leaves powder; Creat, Creatinine& TAC, Total antioxidant capacity.
Different superscript letters (a, b) in the same vertical column are significantly different at $P < 0.05$

TABLE 6. Growth performance and mortality rate of growing broilers chicken administered different levels of MO leaves powder at 42th day of age (N = 40, Mean ± SE).

Groups	Weight gain (g)	FCR	Dead birds	Mortality rate (%)
Control	1992 ±148[c]	2.06 ± 0.039[a]	6	15
MO (2.5%)	2003 ± 194[c]	1.96 ± 0.032[a]	5	12.5
MO (5%)	2034 ± 164[b]	1.87 ± 0.041[b]	3	7.5
MO (7%)	2074 ±159[a]	1.84 ± 0.044[b]	3	7.5

MO, *Moringa oleifera* leaves powder; FCR, Feed conversion rate; different superscript letters (a, b, c) in the same vertical column are significantly different at $P < 0.05$

TABLE 7. Weights of some organs of broilers chicken administered different levels of MO leaves powder at 42th day of age (N=40, Mean ± SE).

Groups	Breast meat	Gizzard	Heart	Liver
Control	512.3 ± 43 [b]	27.6 ± 1.1	10. 7 ± 0.85	54.2 ± 6.1
MO (2.5%)	524.6 ± 52 [b]	28.4 ± 1.3	10. 3 ± 0.71	53.1 ± 5.7
MO (5%)	538.3 ± 91 [b]	29.3 ± 2.2	10. 6 ± 0.80	55.2 ± 5.9
MO (7%)	563.4 ± 85 [a]	30.4 ± 2.1	10.5 ± 0.63	61.2 ± 6.3

MO, *Moringa oleifera* leaves powder; weights in g/bird; different superscript letters (a, b) in the same vertical column are significantly different at $P < 0.05$.

Discussion

Regarding the hematological results, red blood cells are responsible for the transportation of oxygen and carbon dioxide to the tissues along with carring hemoglobin. Normal cell blood count (CBC) means normal hematological tissue and its requirements [16]. White blood cells play an essential role in both humoral and cellular immunity [14]. Present results were between significantly unchanged pictures and improvement of most hematological profile especially of the 4th group (7% MOLM). These results were in harmony with others but with different doses in diets, 0.75 and 1% [4]. On the other hand, at levels of 0.2%, 0.4%, 0.6% for 28 days [5] and 400 or 600 g MO/75 kg of feed for 21 days it did not make any change [3]. This may be due to low MOLM levels and short duration of treatments. On the the contrary, Zanu et al. [17] recorded lowered MCH in chickens but with relatively high doses (10% and15%).

Interestingly, the fourth group (MOLM 7%) established the immunomodulatory action of the MOLM for several reasons: it had lymphocytic leukocytosis, higher phagocytic activity and TAC, normal liver and kidney function tests and elevation of TP and globulin levels. Improvement of phagocytic activity could be due to the contents of MOLM from vitamins and minerals which play important roles for the secretion of different cytokines essential for phagocytic activities [18]. The MOLM was enriched with phenolics, flavonoids [19] and vitamin C[20], inhibited the formation and retention of free radicals in the organs of the chicken. The MOLM had raised the level of TLC with doses of 5, 10, 15 and 20% in broiler diet [21]. However 10% -15 % of MOLM increased white blood cell and lymphocytes [22]. It induces also, a positive influence on PCV and RBC of broilers[23]. This is a pointer that, MOLM had a high nutritive value and could be used as a raw feed additive in broiler rations without causing any harmful effect on blood indices.

MOLM had hepatoprotective effects [24]. The current biochemical results showed normality in all studied parameters except elevation the TP and globulin. Normal liver and kidney function tests reflect the liver and kidney state. Uric acid is the main end product of the metabolism of nitrogen and purine proteins in birds. Serum proteins had many functions like maintenance of the colloidal osmotic pressure and pH of the blood, transportation of hormones, enzymes, chemicals and aids in body protection [14,25]. Serum TP had improved at 2.5% and 5.0% MOLM in broilers [26]. Contraries, MOLM supplementation (0.5, 1.0, 1.5 and 2.0%) to broiler chickens feed had mildly reduced the TP, albumin, ALP and uric acid[3]. Also, protein, uric acid and liver enzymes (AST and ALT) were decreased at 20% MOLM level[27]. However, 5% and 10% MOLM had reduced the albumin and TP and increased the uric acid levels in another study [3]. In general, MOLM was able to be a natural feed additive in broilers chicken without any important negatively influences due to the high nutritional value, antimicrobial and immunomodulatory properties.

The present data indicated the positive effect of dietary supplementation of MOLM at levels of 5% and 7% on growth performance represented by improved weight gain and FCR was in agreement with Igugo [4]. Also, it improved the carcass yield of broiler chicken[28] and its adds up to 24% feed did not cause any adverse impact on growth performance and organs characteristics[29]. This may be due to MOLM is a good source of many minerals, vitamins as well as amino acid which acting as growth promoters, absorption enhancers, antimicrobial agents and metabolic modifiers beside immunomodulatory properties[3]. The dose of 5% secondly 10% MOLM were achieved the most preferable results and quality.

Conclusion

It could be concluded that MOLM (7%) could be used as a natural, effective and safe alternative to growth promoting antibiotics in broilers chicken to decrease incidence of antibiotics resistant. This effect was not noticeable at a level of 2.5%.

Acknowledgment: Non

Funding statement: No founding sponsors

Conflict of interest: The author declares no conflict of interest.

References

1. Jin, L.Z., Ho, Y.W., Abdullah, N. and Jalaludin, S. Probiotics in poultry: modes of action. *World's Poult. Sci. J.*, **53**, 351-368 (1997).
2. Akubugwo, I.,Obasi, N.,Chinyere, G.,Ugbogu, A. Nutritional and chemical value of amaranthus hybridus l. Leaves from afikpo, nigeria. *African Journal of Biotechnology* **6**, 833–2839(2007).
3. Modisaojang-Mojanaga, M. M., Ogbuewu, I. P.,Oguttu, J. W., Mbajiorgu, C. A. Moringa leaf meal improves haemato-biochemical and production indices in broiler chickens: A review. *Comparative Clinical Pathology*, **26**,621-624(2019). doi: https://doi.org/10.1007/s00580-017-2434-213
4. Igugo , R. U. An assessment of the use of varying levels of moringa oleifera leaf meal as a substitute for vitamin+mineral premix in finisher broiler diet. *Journal of Experimental Research,* **2**, 88-92(2014).
5. Makanjuola B, A.,Obi O, O.,Olorungbohunmi T, O.,Morakinyo O, A.,Oladele-Bukola M, O.,A, B. B. Effect of moringa oleifera leaf meal as a substitute for antibiotics on the performance and blood parameters of broiler chickens. *Livestock Research for Rural Development*, **26**(8),1-5(2014).
6. Adamu, Y. A.,Shamsudeen, S. Effect of moringa oleifera leaf meal as a subtitute for antibiotics on the performance and blood parameters of broiler chicken in sokoto, nigeria. *International Education & Research Journal*, **1**, 21-23(2015).
7. Harr, K. E. Clinical chemistry of companion avian species: A review. *Veterinary Clinical Pathology*, **31,** 140-151(2002)
8. N. R. C.: Nutrient requirements of poultry, ninth revised edition, National Academy Press, Washington DC(1994).
9. AOAC. Association of Official Analytical Chemists. *Official Methods of Analysis*. 17th ed., The Association, Washington DC., USA (2000).
10. Masuko, T., Minami, A., Iwasaki, N., Majima, T., Nishimaru, S., and Lee, Y. C. Carbohydrate analysis by a phenol–sulfuric acid method in microplate format. *Analytical Biochemistry,* **339**, 69–72 (2005) doi.org/10.1016/j.ab.2004.12.001 (2005).

11. Kaneko, J.J., Harvey, J.W. and Bruss, M.L. *Clinical biochemistry of domestic animals*; 4th ed USA (1997).

12. Natt, M. P. and Herrick, C. A. A new blood diluent for counting the red and white blood cells of the chicken. *Poultry Science,* **31**, 173-177(1952).

13. Barry L., Ghamon, U., John R., and Glisson A. In vitro microbial activity of avian peritoneal macrophages. *Avian Diseases*. **23**(1),177-181(1989).

14. Coles, E. H. *Veterinary clinical pathology*; WB Saunders, Philadelphia, Pa, USA. 4th edition,(1986).

15. Duncan, D.B. Multiple range and multiple (F) test. *Biometrics,* **11**, 1- 42(1995).

16. Rosenfeld ,A. J. and Dial ,S., M. Clinical Pathology for the Veterinary Team. Edition first published 2010 Blackwell Publishing Ltd,USA (2010).

17. Zanu, H. K.,Asiedu, P.,Tampuori, M.,Abada, M. and Asante, I. Possibilities of using moringa (moringa oleifera) leaf meal as a partial substitute for fishmeal in broiler chickens diets. *Online Journal of Animal and Feed Research* ,**2**, 70-75 (2012).

18. Fakurazi S., Hairuszah, I. and Nanthini U. *Moringa oleifera* Lam prevents acetaminophen induced liver injury through restoration of glutathione level. *Food Chem. Toxicol.,* **46**, 2611-2615(2008).

19. Doria,E., Daoudou, B., Buonocore, D., Verri M., Dossena, M., Mashigo, L, Manzi,S. and Egal1, A .Total Antioxidant Capacity, Antimicrobial Activity and

20. Preliminary Analysis of Some Nutritional Compounds in *Moringa oleifera* preparations. *Int. J. Food Nutr. Sci.,* **4**(1), 23- 29(2017).

21. Vanisha S. Nambiar, Hema M. Matela, and Alma B. Total antioxidant capacity using ferric reducing antioxidant power and 2, 2-diphenyl-1 picrylhydrazyl methods and phenolic composition of fresh and dried drumstick (*Moringa oleifera*) leave**s.** *International Journal of Green Pharmacy* ,January-March 66-72(2013). DOI: 10.4103/0973-8258.111626 (2013)**.**

22. Alnidawi, N.A.A, Ali H.F.M. Abdelgayed, S.S., Ahmed, F.A.and Farid ,M. Moringa oleifera leaves in broiler diets: effect on chicken performance and health. *Food Sci. and Quality Mgt.,* **56**,40–48(2016).

23. Ahemen, T., Abu, A.H. and Iorgilim, L.K. Physiological responses of rabbits fed graded levels of Moringa oleifera leaf meal (MOLM):some aspects of haematology and serum biochemistry. Scholars Research Library. *Archives of Applied Sci. Res*., **5**,172–176(2013).

24. Onu, P.N. and Aniebo, A.O. Influence of Moringa oleifera leaf meal on the performance and blood biochemistry of starter broilers. *Nig. Int. J. Food Agric. and Vet. Sci.,* **1**,38–44(2011).

25. Fakuraz, S., Hairuszah, I. and Nanthini U. *Moringa oleifera* Lam prevents acetaminophen induced liver injury through restoration of glutathione level. *Food Chem Toxicol.,* **46**, 2611-2615(2008).

26. Tizard, I.R. Veterinary immunology an introduction .Sixth edition. W.B.Saunders Company. A Har Court Health Sciences Company Philadelphia-London –Toronta – montereal (2000).

27. 26.Onu, P.N, and Aniebo, A.O. Influence of Moringa oleifera leaf meal on the performance and blood biochemistry of starter broilers. *Nig. Int. J. Food Agric. and Vet. Sci.,* **1**,38–44 (2011).

28. 27.Tijani, L.A., Akanji A.M., Agbalaya ,K. and Onigemo, M. Haematological and serum biochemical profiles of broiler chickens fed diets containing moringa leaf meals. *J. Trop. Agric. Food Enviro. and Ext*., **14**,7–11(2015).

29. 28.Hassan H.M.A, El-Moniary M.M., Hamouda Y., El-Daly E.F., Youssef, A.W. and

30. Abd El-Azeem N.A . Effect of different levels of Moringa oleifera leaves meal on productive performance, carcass characteristics and some blood parameters of broiler chicks reared under heat. *Asian Journal of Animal and Veterinary Advances,* **11**(1), 60-66 (2016).

31. 29.Ayssiwede, S. B., A. Dieng, H. and Bello, C.A.A.M. Chrysostome and M.B. Hane et al.,,. Effects of moringa oleifera (lam.) leaves meal incorporation in diets on growth performances, carcass characteristics and economics results of growing . *Pakistan Journal of Nutration*, **10** (12),1132-1145(2011).

تأثير أوراق المورنجا المطحونة على بعض قياسات الدم ومعدل الاداء فى دجاج التسمين

محمد فهمى الدكرورى
قسم الفارماكولوجى - كليه الطب البيطرى - جامعه مطروح - مطروح - مصر.

تهدف هذه الدراسه الى تقيم استخدام اوراق المورنجا المطحونة كمنشط نمو طبيعى لدجاج التسمين. اجريت الدراسه على ١٦٠ كتكوت عمر واحد يوم حيث قسمت الكتاكيت الى اربع مجموعات متساويه. المجموعه الأولى كانت مجموعه ضابطه أعطيت عليقه أساسيه فقط،بينما المجموعه الثانيه والثالثه والرابعه تم اضافه مسحوق اوراق المورنجا الى العليقه الاساسيه بنسبه ٢,٥٪ و٥ ٪ و٧ ٪ على التوالى وذلك من عمر يوم واحد وحتى نهايه التجربه (٤٢ يوم). أوزان الطيور ومعدل استهلاكها للعلف تم تسجيله اسبوعيا بينما عينات الدم تم تجميعها عند أعمار ١٤ و٤٢ يوم. وقد أظهرت الدراسة أن استخدام أوراق المورنجا المطحونة (٥٪ و٧٪) أدى الى زيادة الوزن المكتسب ومعدل التحويل الغذائى وتقليل نسبه النفوق ، بينما أدى استخدام المورنجا بنسبه ٧٪ الى زيادة مستوى الهموجلوبين، معدل النشاط البلعمى ، العدد الكلى لكرات الدم البيضاء، السعه الكليه لمضادات الأكسدة وكذلك مستوى البروتين الكلى والجلوبيولين فى الدم .

الخلاصه: يمكن استخدام أوراق المورنجا المطحونة (٧٪) كمنشط نمو بديلا عن المضادات الحيوية وذلك لتجنب الآثار السلبية الناتجة عن استخدامها كمنشطات نمو.