Kuwait J. Sci. **44 (3)** pp. 96-103, 2017

Effect of varying levels of Moringa as replacement for Soya-bean meal in broiler ration

Mariam E. Al-Bahouh[1,*], Afaf Al-Nasser[1], Faten Khalil[1], Gehan Ragheb[1], Mohammed N. Boareki[1]

Environmental Life Science Research Center, Desert Agriculture and Ecosystem Program

Kuwait Institute for Scientific Research, Showaikh, P.O.Box#24885, 13109 SAFAT

**Corresponding author: mrbahouh@kisr.edu.kw*

Abstract

This research work was conducted to assess the effect of adding various levels of Moringa leaves on broiler production performance, and to perform an economic impact analysis for the feed alternative. A total of 80 broilers were randomly allocated into four dietary treatment levels as follows: C (Control), M10% (10% Moringa), M20% (20% Moringa), and M40% (40% Moringa). Moringa leaves contained crude protein 25.15%, fat 6.49%, crude fiber 8.86% and ash 9.81% on dry matter basis. During d 0 to 35, the overall effect on broilers fed the diet supplemented with 10% Moringa resulted in acceptable final body weight, body weight gain and high quality carcass. Inclusion of Moringa leaves in the broiler's diet did not cause any mortality in the experimental birds. It can be concluded that Moringa leaves could be added up to 10% level in the diet without any detrimental effect on the production performance parameters of broilers. Also, it is important to mention that the higher level of Moringa leaves in the diet have no adverse effect on the health of the birds. Furthermore, it was noticed that the inclusion of higher level of Moringa leaves in the diet (>10%) led to reduction in the average feed cost, but with no economic gain due to the reduction in the body weight.

Keywords: Economic impact; Moringa leaves; poultry; production performance; proximate analysis.

1. Introduction

Poultry industry is one of the most dynamic agribusiness trades in the world due to its participation in achieving food security (Portugaliza & Fernandez, 2011). Kuwait is not an exception, due to the growth of human and livestock population. Therefore, there is a need to evaluate alternative feed resources to ensure the stabilization of the poultry industry. This depends on the availability of high quality feed to both producers and consumers (Adenjimi *et al.,* 2011). However, Kuwait poultry industry faces many threats as it depends totally on the importation from external sources to supply the country with its needs of feed ingredients. Therefore, serious efforts should be placed on finding inexpensive local sources of protein to be used in the poultry diet (Gadzirayi *et al.,* 2012). Banjo (2012) has proposed the Moringa (*Moringapterigosperma:* Family *Moringaceae*) as an alternate source of protein. Moringa leaves are a native source of Ca, Fe, protein, vitamins and minerals for poultry (Olugbemi *et al*., 2010). Moringa leaves have high quality protein that is comparable to that of soya-bean as reported by Foidl & Paul (2008). Therefore, it is important to compare the efficiency of broilers by using different levels of Moringa leaves and recommend the best level by means of its positive effect on the broiler production efficiency.

2. Materials and methods

2.1. Animals and experimental design

The experiment was done by using eighty un-sexed Cobb500 broilersat one day old that were divided randomly into four treatments with different levels of Moringa leaves, and four replications per treatment, thus having five chickens per experimental unit. Broilers were kept in temperature controlled room. The temperature of the unit was 24°C during the experiment, with indoor relative humidity of 40 to 60%. The experiment was conducted in three phases consisting of a starter phase (d 0 to 7), grower phase (d 8 to 21) and finisher phase (d 22 to 35). The broiler chickens were provided with water *ad libitum*.

2.2. Diets

Moringa pods harvested from the well-established trees inside KISR campus were used for the seed extraction.

Moringa leaves were harvested once in 15 days from each plant after 30 days of field planting. Harvested leaves were sun dried and utilized for the feed. Thereafter, the dried leaves were ground with a mixer to make a leaf meal that was used in the diet. The four treatment diets consisted of C (basal diet), M10% (10% Moringa), M20% (20% Moringa), and M40% (40% Moringa). The experimental diets were fed from d 1 to 35. The chicks received a starter diet (24% protein, 3100Kcal/Kg), a grower diet (22% protein, 3100Kcal/Kg), and a finisher diet (21% protein, 3100 Kcal/Kg). All broiler diets were formulated to be iso-nitrogenous and iso-caloric according to NRC (1994) requirements (Table 1).

Table 1. Ingredients composition of broiler diet with different levels of Moringa leaves

Ingredients	Starter diet				Grower diet				Finisher diet			
	Moringa Leaves%											
	0%	10%	20%	40%	0%	10%	20%	40%	0%	10%	20%	40%
Corn	54.00	48.00	42.50	32.50	57.60	51.2	45.33	36.00	60.50	53.77	47.61	36.47
SBM	39.80	36.00	32.00	22.00	35.60	32.28	28.570	18.340	32.70	29.62	26.14	17.5
Soya oil	2.900	2.50	2.00	2.00	3.200	2.71	2.18	2.00	3.60	2.80	2.44	2.00
Moringa Leaves	0	10	20	40	0	10	20	40	0	10	20	40
Limestone	1.33	1.50	1.50	1.50	1.45	1.55	1.55	1.40	1.30	1.55	1.55	1.55
Dical-phos	1.30	1.20	1.20	1.20	1.40	1.24	1.24	1.24	1.20	1.24	1.24	1.24
Salt	0.10	0.20	0.20	0.20	0.21	0.42	0.42	0.42	0.15	0.42	0.42	0.42
L-Lysine	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.10	0.12	0.12	0.12
DLMethionine	0.25	0.28	0.28	0.28	0.27	0.28	0.28	0.28	0.25	0.28	0.28	0.28
Broiler Premix	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
%Crude Protein	24.04	24.25	24.37	23.76	22.36	22.73	22.98	22.297	21.19	21.67	21.99	21.95
Energy (Kcal/kg)	3012.1	3071.00	3134	3325	3054.44	3104	3163	3353	3112.83	3133	3198	3356

3. Sampling and measurements

3.1. Proximate composition

Moringa leaves samples were analyzed for determination of ash, protein, fiber, and fat content according to the methods of the Association of Official Analytical Chemists (AOAC, 2005). The proximate values were reported in percentage. Moringa leaves were used in triplicates for determination of ash by ashing at 550^{o}C for 3 hours. The Kjeldahl method was used to estimate the protein by multiplication of the nitrogen content with (6.25). The crude fiber content was estimated by digestion method and the fat was determined by Soxhlet extraction method.

3.2. Production performance

The broiler chickens were weighed and the consumed feed was recorded on weekly basis. This information was then used to estimate body weight gain, feed consumption, and feed efficiency. Mortality was noted daily and percent mortality was computed weekly. The data of the production performance were analyzed statistically and comparison was made between the different factors (age and treatment).

3.3. Economic impact analysis

The economic impact assessment starts by making use of performance parameters obtained by examining the biological indictors, such as the impacts of the new feed on bird weight gain/unit of time (Okanovic *et al.,* 2014). The benefit from the feed ration was measured by the differences in the net revenue per bird in the feed ration. The economic impact assessment starts by making use of performance parameters; the next step involves comparing costs of feed required per bird per unit of time. Finally, the feeding regimes were evaluated in terms of its cost per unit of food production.

4. Statistical analysis

Data were analyzed by using two-way analysis of variance to estimate the level of significance (P<0.05). The level of treatment and the age were used as the two main factors and the data was analyzed using the SPSS software (SPSS 16.0 for Windows, SPSS Inc, Chicago, IL, USA). Means were separated using Duncan's multiple range tests.

5. Result and discussion

5.1. Chemical composition of Moringa

The proximate chemical analysis (Table 2) of Moringa leaves revealed that it contains 25.15% protein, 6.49% fat, 8.86% crude fiber and 9.81% ash. The results of present study agreed with that reported by Makkar & Becker (1997), which indicated that Moringa leaf is a rich source of protein. The crude protein content of Moringa leaf in the current study was slightly lower than 28.2% as estimated by Tesfaye *et al*. (2013), and higher than that (22.23%) reported by Aye & Adegun (2013). Similarly, Gakuya *et al*. (2014) proximate result showed that Moringa had 23.33% protein. The fat content of Moringa leaf in the present study is in partial agreement with that reported by Aye & Adegun (2013), who found that the fat content of Moringa is 6.41%. However, Tesfaye *et al.* (2013) reported higher (6.60%) and Sodamade *et al.* (2013) reported lower (2.43%) fat content of Moringa. The crude fiber content of Moringa leaf used in this study was 8.86%, which is higher than 6.5% as reported by Tesfaye *et al.* (2013). The ash content of Moringa leaf in our study is lower than that reported by Tesfaye *et al.* (2013), who estimated that the ash content of Moringa to be 11.9%. On the other hand, the ash content in the current study is higher than 7.93%, which was reported by Aye & Adegun (2013). The variation in the proximate composition of Moringa leaves could be due to the differences in soil, stage of harvesting, and the processing techniques such as drying that had an impact on the Moringa contents (Tesfaye *et al*., 2013).

Table 2. Proximate chemical analysis of Moringa leaves

	% On Dry Matter Basis			
	Ash	**Crude Protein**	**Fat**	**Crude Fiber**
Moringa Leaves	9.81	25.15	6.49	8.86

5.2. Effect of adding varying levels of Moringa leaves on broiler body weight and body weight gain

The result of the present study indicated that the body weight and the body weight gain (gm/bird) of broilers decreased significantly (P<0.05) as Moringa level was increased in the diet of broilers (Table 3 & Figure 1). This result agreed with that reported by Gadzirayi *et al*. (2012); who noticed the negative effect of high level of Moringa on the body weight of broiler. In concurrence with that, Zanu *et al.* (2011) found a reduction in the body weight and body weight gain (P<0.05) with the dietary inclusion of Moringa. In the same contest, Ashong & Brown (2011) found higher body weight gain in the control diet, compared to diets with Moringa on leghorn chickens. Furthermore, Gakuya *et al*. (2014) evaluated the effect of *MoringaOlifera* in the broiler diet and concluded its negative effect on body weight, if it exceeds 7.5% level in the ration. Similarly, present results were similar to that stated by Olugbemi *et al*. (2010), who reported the negative effect of *MoringaOlifera* above 5-10% on the broilers weight gain and final body weight. The reduction in the body weight might be due to the high level of anti-nutritional factor (phytate), in the extracted kernel of the Moringa (Reddy *et al*., 1982). As the phytate reduce the digestibility of protein and starch (Thompson, 1993). On the other hand, present resultsare contrary to thatestimated by Rajput *et al*. (2009) who noticed a negligible impact of Moringa on the live weight of broilers. Furthermore, Du *et al.* (2007) reported an improvement in the performance of broilers with the increased supplementation of Moringa. This variation could be due to the various rearing environments, genetic variability and the different proportion of Moringa used in the diet, which should not exceed certain limit.

5.3. Effect of adding varying levels of Moringa leaves on broiler feed consumption (gm feed/bird/week)

Results of the present study showed that there were no significant (P>0.05) variances starting from the second week on the feed consumption of broilers fed with different levels of Moringa leaves. However, significant differences (P<0.05) were noted in the overall feed consumption (Table 3 & Figure 1). Present results agreed with that estimated by Gakuya *et al*. (2014), who reported a reduction in the broiler feed consumption (P<0.05) with the dietary inclusion of Moringa in the diet. Furthermore, Tesfaye *et al.* (2013) reported that the addition of 10-20% of Moringa resulted in a significant (P<0.05) reduction in feed intake, while values for 5% Moringa was similar

(P>0.05) with the control. On the other hand, present result disagreed with that reported by Lannaon (2007), who found an improvement in the feed consumption with the increase of Moringa levels in the broiler's diet. However, Atuahene *et al*. (2010) found no significant influence of Moringa leaf diet up to 7.5% on the broilers feed intake.

5.4. Effect of adding varying levels of Moringa leaves on broiler feed efficiency

The results of the present study showed that the feed efficiency is affected negatively (P<0.05) with the addition of Moringa up to 40% level as compared to control diet (Table 3 & Figure 1). This result agreed with that reported by Olugbemi *et al.* (2010), who indicated the negative effect of *MoringaOlifera* above 5% on the broilers feed efficiency. On the other hand, present results disagreed with that reported by Raphael *et al.* (2015), who found a significant (P<0.05) development in the feed conversion of broilers.

5.5. Effect of adding different levels of Moringa leaves on broiler mortality percentage

The result of current study indicated that there was no mortality throughout the duration of the experiment. This result agreed with that reported by Abbas & Ahmed (2012), who found no case of death among the broilers. The high level of Moringa leaves in the diet results in a reduction in the contents of uric acid and triglycerides, which reflects positively on the broilers immune response (Du *et al*., 2007). In the same contest, Moringa could have the ability to increase the antioxidant capacity of the plasma and reduce diseases as reported by Chanda & Nagani (2010).

Table 3. Effects of adding different levels of Moringa leaves on broiler production performance

	Treatments				
	Week	**Control**	**M10%**	**M20%**	**M40%**
Body Weights (gm/bird)	**1st**	168.29 ± 4.26^{*a}	140.68 ± 10.02^{b}	113.69 ± 1.90^{c}	90.19 ± 4.22^{d}
	2nd	352.17 ± 13.86^{a}	264.37 ± 16.08^{b}	219.95 ± 24.03^{c}	165.76 ± 11.02^{d}
	3rd	672.01 ± 23.77^{a}	518.53 ± 37.07^{b}	415.04 ± 43.39^{c}	302.46 ±33.36^{d}
	4th	1062.00± 51.48^{a}	874.00 ± 33.39^{b}	689.00 ± 66.48^{c}	469.00 ± 59.90^{d}
	5th	1569.00 ± 82.45^{a}	1270.00 ± 96.58^{b}	1079.00 ± 92.17^{c}	715.00 ± 69.85^{d}
	Final Bwt.	**1569.0 ± 82.5^{a}**	**1270.0 ± 96.6^{b}**	**1079.0 ± 92.2^{b}**	**715.0 ±69.9^{c}**
Body Weight Gain (gm/bird)	**1st**	123.56 ± 4.33^{*a}	96.78 ± 9.82^{b}	69.10 ± 3.29^{c}	44.82 ± 3.82^{d}
	2nd	183.88 ± 11.58^{a}	123.69 ± 11.18^{b}	106.26 ± 23.65^{c}	75.57 ± 6.95^{d}
	3rd	319.84 ± 21.14^{a}	254.16 ± 28.98^{b}	195.10 ± 19.37^{c}	136.70 ± 23.37^{d}
	4th	389.99 ± 37.63^{a}	355.47 ± 25.65^{b}	273.96 ± 23.89^{c}	166.54 ± 27.03^{d}
	5th	507.00 ± 36.72^{a}	396.00 ± 65.56^{b}	390.00 ± 25.82^{c}	246.00 ± 18.04^{d}
	Overall	**1524.26 ± 71.38^{a}**	**1226.10 ± 84.36^{b}**	**1034.42 ± 81.25^{c}**	**669.63 ± 59.55^{d}**
Feed Consumption (gm feed/bird/ week)	**1st**	120.71 ± 3.84^{*a}	109.62 ± 6.35^{bc}	117.40 ± 13.38^{b}	102.00 ± 2.99^{c}
	2nd	259.09 ± 1.06^{a}	243.97 ± 8.27^{a}	256.57 ± 33.07^{a}	235.40 ± 2.76^{a}
	3rd	499.24± 1.51^{a}	484.67 ± 4.97^{a}	515.67 ± 65.88^{a}	478.72 ± 2.33^{a}
	4th	689.59 ± 6.76^{a}	681.71 ± 1.36^{a}	722.23 ± 83.54^{a}	667.82 ± 2.20^{a}
	5th	1048.41 ± 5.97^{a}	1039.48 ± 3.30^{a}	1105.81±125.93^{a}	1034.29 ± 6.72^{a}
	Overall	**2617.1 ± 11.1^{a}**	**2559.4 ± 7.40^{c}**	**2645.9 ± 33.8^{b}**	**2518.2 ± 3.4^{d}**
Feed Efficiency	**1st**	0.98 ± 0.01^{*c}	1.14 ± 0.13^{c}	1.72 ± 0.22^{b}	2.28 ± 0.21^{a}
	2nd	1.41 ± 0.09^{c}	1.99 ± 023^{bc}	2.59 ± 1.11^{ab}	3.13 ± 0.29^{a}
	3rd	1.57 ± 0.11^{c}	1.92 ± 0.19^{c}	2.69 ± 0.66^{b}	3.58 ± 0.62^{a}
	4th	1.78 ± 0.16^{c}	1.92 ± 0.14^{c}	2.67 ± 0.58^{b}	4.08 ± 0.61^{a}
	5th	2.08 ± 0.15^{c}	2.69 ± 0.13^{bc}	2.86± 0.55^{b}	4.22 ± 0.29^{a}
	Overall	**1.72 ± 0.10^{d}**	**2.10 ± 0.16^{c}**	**2.60 ± 0.57^{b}**	**3.79 ± 0.39^{a}**

*Values are means±SD (n=4)

$^{a/b/c/d}$means in the same raw with different superscripts are significantly different (P<0.05)

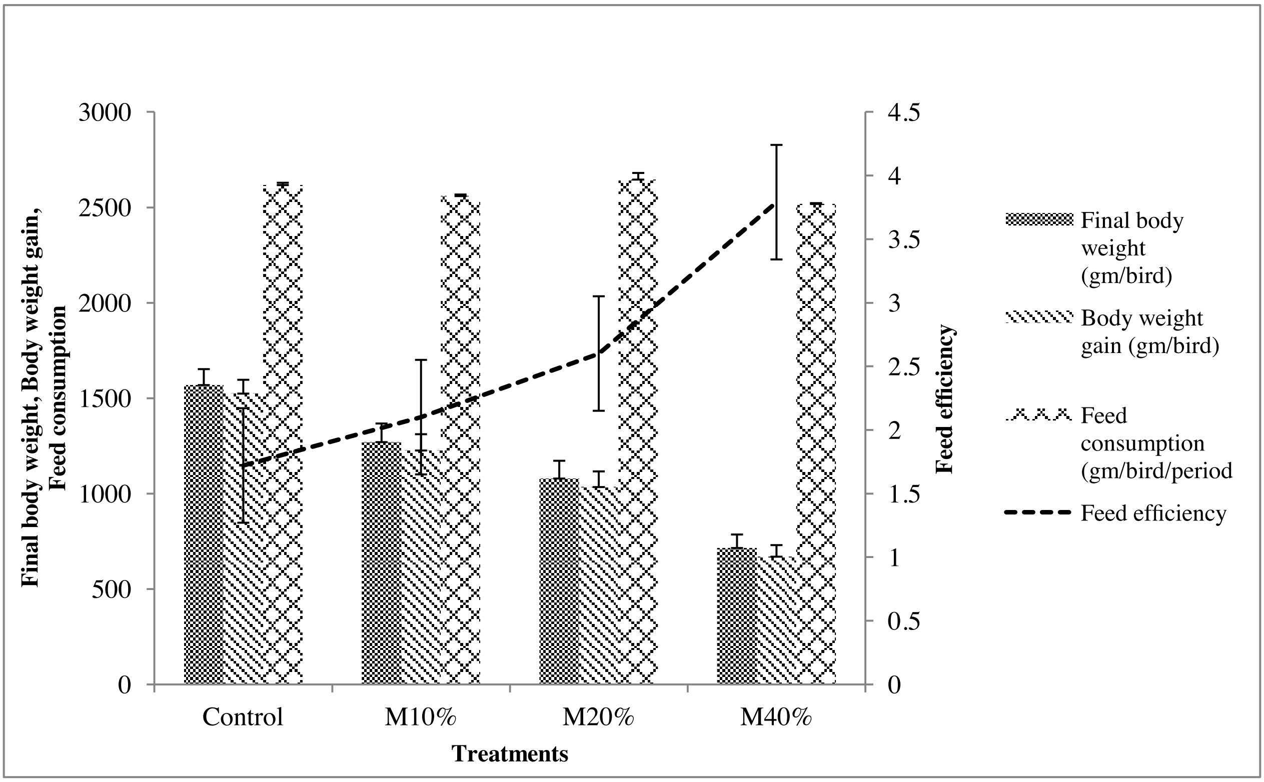

Fig. 1. The overall effect of adding different levels of Moringa leaves on broiler production performance.

5.6. Economic impact analysis

The results indicated that the substitution of Moringa leaves for soya-bean meal leads to decrease in average feed cost per bird (Table 6) and (Figure 2). However, considering the cost relative to economic benefits, it was found that the "Control" yielded the least cost by considering the economic benefits per unit of body weight gain (Figure3). Hence, the disadvantages from loss in body weight have outweighed the benefits obtained from cheaper feed cost.

Table 4. Prices of feed ingredients (fils/gm)

Ingredient	fils/gm
Corn	0.090
Soya-bean	0.230
Moringa leaves	0.167

Table 5. Moringa leaves costs (fils/gm) in the diets of broiler chickens

Diets	Control	M10%	M20%	M40%
Starters	0.1816	0.1799	0.1783	0.1707
Growers	0.1746	0.1736	0.1724	0.1648
Finishers	0.1702	0.1695	0.1684	0.1633

Computed from Tables 1 and 4.

Table 6. Moringa leaves costs per bird (fils/week/bird)

Diets	Control	M10%	M20%	M40%
Starter (1st week)	22	20	21	17
Grower (2nd week)	45	42	44	39
Grower (3rd week)	87	84	89	79
Finisher (4th week)	117	116	122	109
Finisher (5th week)	178	176	186	169

Table 7. Moringa leaves cost per unit of body weight gain (fils/gm)

	Control	M10%	M20%	M40%
Moringa leaves cost	0.29	0.36	0.44	0.61

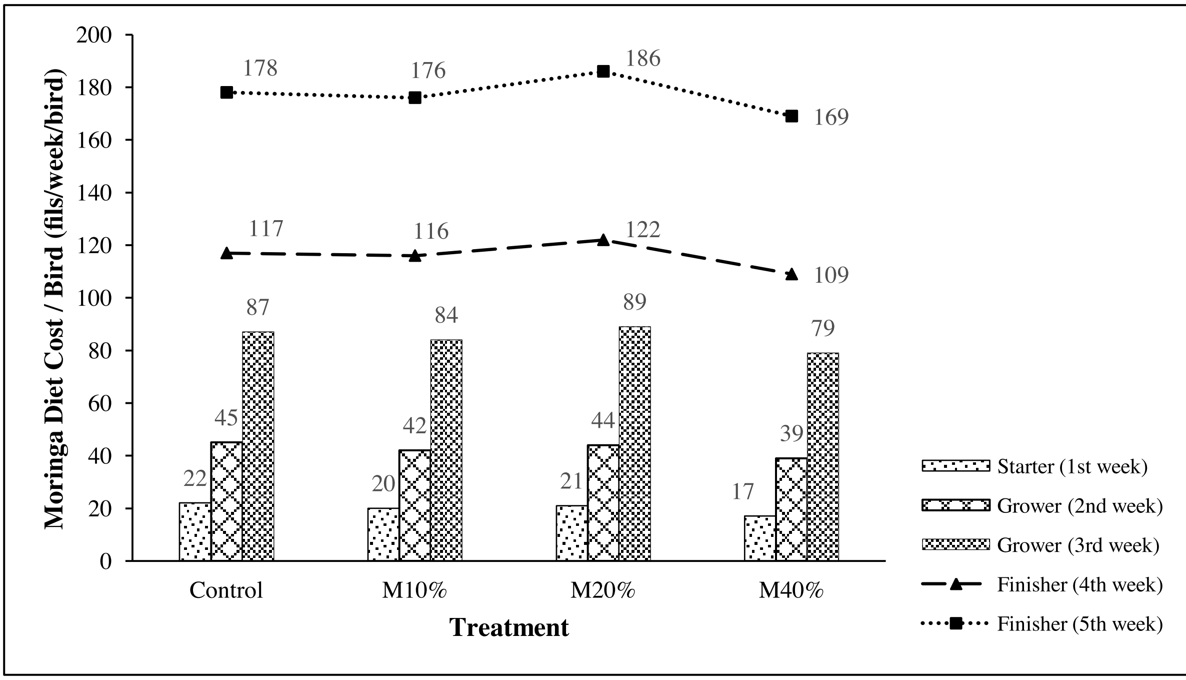

Fig. 2. The cost of different levels of Moringa diets per bird (fils/week/bird)

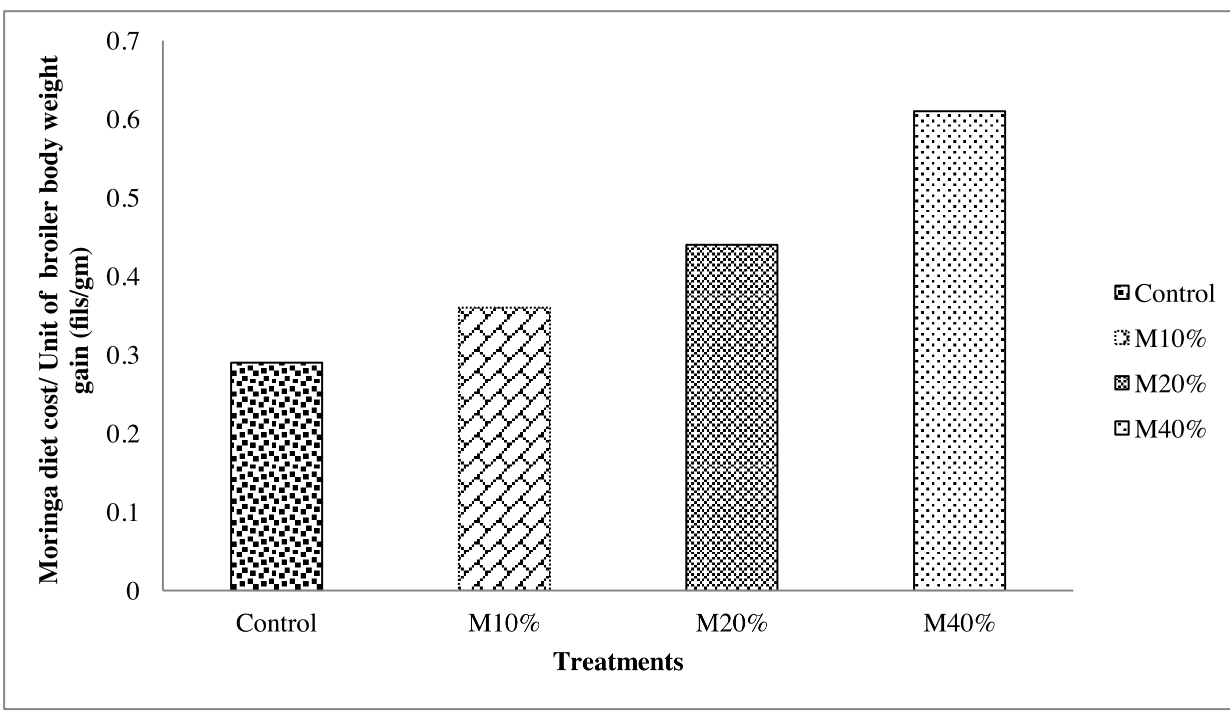

Fig. 3. The cost of different levels of Moringa diets per unit of broiler body weight gain (fils/gm)

6. Conclusion

The overall results indicated that the Moringa leaves could be added up to 10% level in the diet without any negative effect on the production performance parameters of broilers. Furthermore, it is important to mention that the higher level of Moringa leaves in the diet have no adverse effect on the health of the birds. This indicates the potential of using these locally available alternative as a source of protein in the poultry feed rations.

7. Acknowledgements

The author would like to thank the management of the Kuwait Institute for Scientific Research for their support.

References

Abbas, T.E. & Ahmed, M.E. (2012). Use of *MoringaOleifera* seeds in broilers diet and its effects on the performance and carcass characteristics. International Journal of Applied Poultry Research, **1**:1-4.

Adejinmi, O.O., Hamzat, R.A., Raji, A.M. & Owosibo, A.O. (2011). Performance, nutrient digestibility and carcass characteristics of Broilers fed cocoa pod husks-based diets. Nigerian Journal of Animal Science, **13:**61-68.

AOAC (2005). Official methods of analysis. In: W. Horowitz, Editor, Official methods of analysis (17th ed.), Association of Official Analytical Chemists, Gaithersburg, USA.

Ashong, J.O. & Brown, D.L. (2011). Safety and efficacy of *MoringaOleifera* powder for growing poultry. Journal of Animal Science, **89**:84, E-supplement 1.

Atuahene, C.C., Attoh-Kotoku, V., Fosu, K.D., Amissah, S.E., Sarfo, F.K. *et al.,* (2010). Preliminary study of the effect of feeding *MoringaOleifera* leaf meal as a feed ingredient on the growth performance of broiler chickens. Proceedings of the 28th and 29th Ghana Animal Science Association, 72-75.

Aye, P.A. & Adegun, M.K. (2013). Chemical composition and some functional properties of Moringa, Leucaena and Gliricidia leaf meals. Agriculture and Biology Journal of North America, **4**(1):71-77.

Banjo, O.S. (2012). Growth and performance as affected by inclusion of *Moringaoleifera* leaf meal in broiler chicks diet. Journal of Biology, Agriculture and Healthcare, **2**(9):35-39.

Chanda, V. & Nagani, K.V. (2010). Antioxidant capacity of Manilkarazapota L. leaves extracts evaluated by four in vitro methods S. Nature and Science, **8**(10):260-266.

Du, P.L., Lin P.H., Yang, R.Y. & Hsu, J.C. (2007). Effect of dietary supplementation of *Moringaoleifera* on growth performance, blood characteristics and immune response in broilers. Journal of Chinese Society of Animal Science, **36**(3):135-146.

Foidl, N.& Paul, R. (2008). *Moringaoleifera*. In: The Encyclopedia of fruit and nutrition. ABI, Oxfordshire, 509-512.

Gadzirayi, C.T., Masamha, B., Mupangwa, J.F. & Washaya, S. (2012). Performance of broiler chickens fed on mature *MoringaOleifera* leaf meal as a protein supplement to soyabean meal. International Journal of Physical Sciences, **11**(1):5-10.

Gakuya, D.W., Mbugua, P.N., Mwaniki, S.M., Kiama, S.G., Muchemi, G.M. *et al.,* (2014). Effect of supplementation of *MoringaOleifera* leaf meal in layer chicken feed. International journal of poultry science, **13**(7):379-384.

Lannaon, W.J. (2007). Herbal plants as source of antibiotics for broilers. Agriculture Magazine, **11**(2):55.

Makkar, H.P.S. & Becker, K. (1997). Nutrients and anti-quality factors in different morphological parts of the *MoringaOleifera* tree. The Journal of Agricultural Science, **128**:311-322.

NRC, (1994). National Research Council. Guide for the care and use of laboratory animals, ed. 7. National Academy Press, Washington, D.C., USA.

Okanović, D., Čolović, R.,Tasić, T., Zekić, V. & Ikonić, P. (2014). The impact of probiotics additives added into diet on economic results of broilers production. Journal of Hygienic Engineering and Design,150-153.

Olugbemi, T.S., Mutayoba, S.K. & Lekule, F.P. (2010). Effect of *MoringaOleifera* inclusion in cassava based diets fed to broiler chickens. International Journal of Poultry Science, **9**: 363-367.

Portuguliza, H.P. & Fernandez, T.J. (2011). Growth performance of Cobb broilers given varying concentrations of Malunggay (*MoringaOleifera* Lam.) aqueous leaf extract. Online Journal of Animal and Feed Research, **2**(6):465-469.

Raphael, K. J., Keambou, T. C., Raquel, S. J., Frederico, L., Mfopou, Y.S., *et al.* (2015). Effects of substituting soybean with *MoringaOleifera* meal in diets on laying and eggs quality characteristics of KABIR chickens. Journal of Animal Physiology and Animal Nutrition, **1**:1-6

Rajput, A.B., Shisodiya, J.M., Chandankhede & Chahande, J.M. (2009). Effect of vitamin A, vitamin C, vitamin E, and levamisole on performance of broilers. Veterinary World, **2**:6.

Reddy, N.R., Sathe, S.K. & Salunkhe, D.K. (1982). Phytates in legumes and cereals. Advance Food Research, **28**:1-92.

Sodamade, A., Bolaji, O.S. & Adeboye, O.O. (2013). Proximateanalysis, mineral contents and functional properties of *MoringaOleifera* Leaf Protein Concentrate. IOSR Journal of Applied Chemistry, **4**:47-51.

Tesfaye, E., Animut, G., Urge, M. & Dessie, T. (2013). *Moringa Olifera* leaf meal as an alternative protein feed ingredient in broiler ration. International Journal of Poultry Science, **12**(5):289-297.

Thompson, L.U. (1993). Potential health benefits and problems associated with anti-nutrients with foods. Food Research International Journal, **26**:131-149.

Zanu, H.K., Aseedu, P., Tampuori, M., Abada, M. & Asante, I. (2011). Possibilities of using Moringa (*MoringaOleifera*) leaf meal as a partial Substitute for Fishmeal in Broiler Chickens Diets. Online Journal of Animal and Feed Research, **2**(1):70-75

Submitted **:** 29/05/2016
Revised **:** 11/08/2016
Accepted **:** 19/11/2016

تأثير إضافة مستويات متنوعة من أوراق المورينجا كبديل لوجبة حبوب الصويا في غذاء فروج اللحم

مريم الباحوح[1,*]، عفاف الناصر[2]، فاتن خليل[1]، جيهان راغب[1]، محمد بوعركي[1]
مركز أبحاث علوم الحياة البيئية، برنامج زراعة الصحراء والنظام الايكولوجي
معهد الكويت للأبحاث العلمية، الشويخ، ص.ب.: 24885، 13109 صفاة
[*]المؤلف المراسل: mrbahouh@kisr.edu.kw

ملخص

تم إجراء هذا البحث لتقييم تأثير إضافة مستويات متنوعة من أوراق المورينجا على أداء إنتاج فروج اللحم، وإجراء تحليل للأثر الاقتصادي بالنسبة لبدائل العلف. تم تقسيم ما مجموعه 80 فروج لحم عشوائياً إلى أربع مستويات معالجة غذائية على النحو التالي: C (مشاهدة محكومة)، M10% (مورينجا 10%)، M20% (مورينجا 20%)، و M40% (مورينجا 40%). وقد احتوت أوراق المورينجا على البروتين الخام بنسبة 25.15%، دهون بنسبة 6.49%، ألياف خام بنسبة 8.86% ورماد بنسبة 9.81% من المادة الجافة. خلال 0 d إلى 35، التأثير الإجمالي على فروج اللحم المُغذى على حمية غذائية مُضاف إليها 10% مورينجا كمكمل نتج عنها وزن جسم نهائي مقبول، زيادة في وزن الجسم وذبيحة عالية الجودة. إدراج أوراق المورينجا في غذاء فروج اللحم لم يتسبب في حدوث أي حالة وفيات في الطيور التجريبية. ويمكن استنتاج أنه يمكن إضافة أورق المورينجا بمستوى يصل إلى 10% في النظام الغذائي بدون أي تأثير ضار على معايير أداء الإنتاج من الفراريج. وكذلك، من الضروري أن نذكر أن إضافة المستوى الأعلى من أوراق المورينجا في النظام الغذائي ليس له أي تأثير عكسي على صحة الطيور. علاوة على ذلك، لوحظ أن إدراج مستوى أعلى من أوراق المورينجا في النظام الغذائي (<10%) أدى إلى انخفاض في متوسط تكلفة العلف، ولكنه بدون مكاسب اقتصادية بسبب انخفاض في وزن الجسم.