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THE INFLUENCE OF *Moringa peregrine* SEEDS SUPPLEMENT IN THE DIET ON GROWTH PERFORMANCE, NUTRINTS DIGESTIBILITY COEFFICIENTS AND CARCASS TRAITS IN GROWING RABBITS

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A total number of 36 California rabbits weaned at five weeks of age were used to study the influence of Moringa peregrine seeds (MPS) as a feed supplement on growth performance, digestibility coefficients, blood characteristics and carcass traits of rabbit. Rabbits were divided into three treatment groups. Each group contains four replicates with three rabbits each. The experimental period extended from 5 to 13 weeks of age. Moringa peregrine seeds were incorporated in the basal diet at levels, zero (control), 0.2 and 0.4 %. The experimental diets were formulated to be iso-nitrogenous (16.00 % CP) and iso-caloric (2500 kcal DE/ kg diet).

Results of the study revealed that MPS are rich in vitamin C and phenolic compounds which has antioxidant activity and antioxidant capacity.

Final live body weight and total body weight gain values recorded the highest (P<0.01) value with rabbits fed 0.4 % MPS diet (2300.00 g and 1690.84g), followed by those fed 0.2% MPS diet (2263.33g and 1652.92g), and rabbits fed the control diet (2089.16g and 1479.16g), respectively.

Feed conversation ratio was improved (P<0.05) when rabbits fed either 0.2 or 0.4% MPS in the basal diet. It recorded 2.51, 2.67 and 2.75 (g feed / g gain) for those fed 0.2, 0.4 and zero (control) % MPS diets, respectively.

Digestibility coefficient of CP and nutritive value of the diet expressed as DCP recorded the highest (P<0.01) with rabbits fed 0.4 % MPS diet compared with those fed either the control or 0.2% MPS diet.

Empty carcass weight and total giblets % showed the highest (P < 0.05) with rabbit its fed 0.4% MPS (1255.7g and 65.77%) compared

with those fed the control diet (1159.7g and 63.62%), or those fed o.2% MPS diet (1155.3 g and 64.1%).

To enhance the growth performance of growing rabbits, it is recommended to incorporate Moringa peregrine seeds in the diet at level of o.4%.

Key words: Rabbits, *Moringa peregrine* seeds, growth performance, Digestibility coefficients, Carcass characteristics

Rabbits with its higher relative growth rate and higher fertility can meet the increasing of human demands for animal protein. In current conditions, feeding costs for rabbits and poultry are considered the most expensive item, since it represents about 65-75% of the total cost of production (Esonu *et al.,* 2006). The seeking about the new alternative feed resources and full utilization of agriculture – by products are considered the main item to decrease the cost of animal feeding.

Moringa seeds are one of the best natural, antimicrobial properties and antioxidant effects. (Jabeen *et al*., 2008) found that extracts of *Moringa* seeds may contain antibiotic metabolites, such as carboxylic acid, 2, 4-diacetyl phloroglucinol, and cell wall-degrading enzymes and chitinases. Moreover, *moringa* have a medical importance for the treatment of high blood pressure, diarrhea, inflammation of colon, intestinal worms, skin antiseptic, as a diuretic agent (Lowell, 2002) and to maintain the levels of blood glucose in diabetic patients (Jaiswal *et al*., 2009, Chinwe and Isitua, 2010). Moreover, *moringa* was used as antimicrobial agent (Caceres *et al*., 1990), to treat ulcers (Pal and Sahib, 1995) and to promote the immune system against various infections (Jaiswal *et al*., 2009). In our laboratory, some previous research studies were carried out on the impact of physiological reaction of moringa *peregrine* ground seeds on hemato-biochemical parameters of rabbits (Ibrahim *et al*., 2014).

Complementing this work, the objective of the present study is to 1) determine the contents of amino acids, phenolic components, anti-oxidant capacity and antioxidant activity in MPS, 2) investigate the influence of dietary addition of varying levels of MPS on growth performance, digestibility coefficients and carcass traits of rabbits.

MATERIALS AND METHODS

Experimental design and animals:

The present study was carried out at Ras Sudr Experimental Station of Desert Research Center (DRC), South Sinai, Egypt.

A total number of 36 California rabbits weaned at five weeks of age were divided into three treatment groups. Each group contains four replicates with three rabbits each. The experimental period extended from 5 to 13 weeks of age. The growing rabbits were fed three test diets containing, 0.00 (control), 0.2 and 0.4 % *Moringa peregrine* seeds (MPS).

The experimental diets were formulated to be iso-nitrogenous (16.00 % CP) and iso-caloric (2500 kcal DE/ kg diet). All diets were pelleted and formulated to meet the recommended nutrient requirements of rabbits according to NRC (1977). Composition and chemical analysis of the experimental diets are presented in Table 1.

The experimental animals were housed in galvanized wire cages batteries (60 x 55 x 40cm), in a well-ventilated building (natural through the window). Feed was provided *ad libitum*. Fresh water was available all the time from automatic drinkers with nipples for each cage. All rabbits were kept under the same managerial, hygienic and environmental conditions. Live body weights were recorded individually at the beginning of the experiment (5 weeks of age) and biweekly till the end of the experiment (13 weeks of age). Body weight gains were calculated. Feed intake was recorded biweekly and feed conversion ratio was also calculated (g feed /g gains) for the same period.

Chemical analysis:

Moringa peregrine seeds were collected from Wadi Fieran in South Sinai, Egypt. The seeds were dried in dark area at room temperature and then grounded to be a fine powder.

a- Determination of free and total amino acids

Total amino acids in seeds content of *M. peregrine* were determined by using amino acid analyzer apparatus model (LC 3000 Eppendorf, Central Lab. of Desert Research Center) according to the method of Pellet and Young (1980).

b- Analysis of phenolic compounds

Total phenolic contents of the different methanolic extracts of *Moringa* seeds were determined using Folin-Ciocalteu (FC) reagent according to the method of Slinkard and Singleton (1997) .While, Phenolic compounds were determined by HPLC according to the method of Coupy *et al.*(1999).

c- Antioxidant activity and antioxidant capacity

Antioxidant activity and antioxidant capacity Radical scavenging activity of plants against stable DPPH (2,2-diphenyl-2-picrylhdrazylhydrate, Sigma-Aldrich Chem *ie,* Steinheim, Germany) was determined spectrophotometrically.

Table 1. Ingredients and chemical analysis of the experimental diets.

Ingredients (%)	**Control**	***Moringa* seed levels**	
		0.2%	**0.4%**
Yellow corn	11.5	11.0	11.0
Soya bean meal (44)%	16.8	16.8	16.7
Wheat bran	28.5	28.5	28.5
Clover hay	31.7	32.0	32.0
Barley	6.5	6.5	6.4
Moringa seeds	-	0.2	0.4
Molass	3.0	3.0	3.0
Limestone	1.3	1.3	1.3
Salt (Na Cl)	0.3	0.3	0.3
Premix*	0.3	0.3	0.3
DL-Methionine	0.1	0.1	0.1
Total	**100**	**100**	**100**
Chemical analysis (Determined %):			
CP	17.38	17.21	17.23
CF	13.77	13.60	13.57
EE	2.41	2.51	2.58
Ash	10.69	9.20	8.96
Chemical analysis (Calculated): **			
DE (kcal/kg diet)	2608	2612	2611
Ca, %	0.96	0.96	0.96
Available phosphorus, %	0.11	0.11	0.11
Total phosphorus, %	0.56	0.56	0.56
Lysine, %	0.66	0.65	0.65
Methionine + cystein, %	0.64	0.64	0.64
Methionine, %	0.29	0.29	0.29

* Commercial vitamin & premix contained (per 3 kg premix): 12000 000 IU Vit. A; 2000 000 IU Vit. D_3; 10 000mg Vit. E; 1000mg Vit. K_3; 1000mg Vit. B_1;5000mg Vit B_2; 1500mg Vit. B_6; 10mg Vit.B_{12}; 10 000mg Pantothenic acid; 1000 mg Folic acid; 50mg Biotin; 30 000 mg Fe; 60 000mg Mn ; 4000mg Cu; 50 000mg Zn; 300mg I; 100mg Co; 100 mg Se; Calcium carbonate to 3.0 kg.

**Calculated according to NRC (1977).

When DPPH reacts with an antioxidant compound, which can donate hydrogen, it is reduced .The changes in colour (from deep-violet to light-yellow) were measured at 515 nm on a Shimadzu spectrophotometer (UV-1601 PC). Radical scavenging activities of plants were measured by method of Brand-Williams *et al.,* (1995). Butylated hydroxyl anisol (BHA) and tert-butylated hydroxyl qunione (TBHQ) were used as reference compounds.

Percent inhibitions *vs*. sample volume (µL) curves were used to determine the concentration at which 50% radical scavenging occurred (EC_{50}). Finally, the antioxidant capacity of the plants were compared to that of a synthetic antioxidant 6-Hydroxy-2, 5, 7, 8-tetramethylchromane-2-carboxylic acid (Trolox) and expressed as Troloxequivalent antioxidant capacity values (TEAC).

d- Determination of tocopherol and viamin C

Total tocopherols of *Moringa* seeds were spectrophotometrically determined as described by Wong *et al*.(1988), while vitamin C was quantified using the spectrophotometric method reported by Hussain *et al*. (2008).

Digestibility trail:

At the end of the experimental feeding period (13 weeks of age), a digestibility trial was conducted using 9 animals (three male rabbits from each treatment group), which were taken randomly. Rabbits were housed individually in metabolic cage to facilitate the collection of all droppings throughout the digestibility trial. Feed intake was recorded daily during five days. Feces were collected throw 24 hours from offering the daily feed and weighed, dried at 60- 70 °C, bulked, finely ground and stored for chemical analysis. Accordingly, the digestion coefficients of dry matter (DM), crude protein (CP), ether extract (EE), crude fiber (CF) and nitrogen free extract (NFE) of the tested diets were estimated. Digestible crude protein (DCP %) and total digestible nutrients (TDN) were calculated according to the classic formula of Cheeke *et al.* (1982). Samples of tested diets and feces were analyzed using the method described by AOAC (1990).

The gross energy content of *Moringa* seeds meal sample was determined by completely combusting the sample in a bomb calorimeter, using benzoic acid as stander.

Digestible energy of *Moringa* seed meal, Kcal/kg (DE) were Calculated according to Fekete and Gippert (1986) as follows:

DE (Kcal/kg) = 4253-32.60 (CF%)-144.40(Ash %).

Carcass characteristics:

At the end of the feeding trial (13 weeks of age), three rabbits were randomly chosen from each treatment. All rabbits were fasted for approximately 12 hours before slaughtering and then individually weighed (to record the pre-slaughter weight). After complete bleeding and skinning, the empty carcass without head, liver, kidneys, heart and spleen were weighed separately according to Cheeke (1987).

Statistical analysis:

Data were analyzed by SAS (2003) Program, using the General Linear Model (GLM) procedure. All the data were subjected to one way analysis of variance model. The significant differences among treatments means were measured by Duncan's New Multiple Range-Test (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition of Moringa peregrine seeds (MPS)*:*

Total amino acids and vitamin contents of MPS are listed in Table (2). Data show the magnitude of the most of amino acid levels in MPS, particularly glutamic acid (4.578 mg/g) and arginine (4.217mg/g). El-lamey (2015) reported that the content of total amino acids and the oil of *M. peregrina* seeds were affected by growing conditions and geological conditions of the regions.

The seeds of *Moringa peregrine* contain vitamin C and E, with higher amounts of vitamin C (0.24 µg/g) than E (0.02 µg/g). However total lipids recorded the highest value (45.67%). This results agree with those obtained by (Dahot, 1988; Odeyinka *et al*., 2008 and Faye *et al.*, 2011) who found that *M. oleifera* seeds are rich in amino acids, vitamins such as A, B, C and E . The results indicated that the seeds of *M peregrine* are rich of vitamin C and phenolic compounds which has antioxidant activity (Koheil *et al.*, 2011 and Wilson, 1999).The total phenol content of *moringa* seeds was 0.939 mg /g DW and Gallic acid was the most abundant phenolic acids in *Moringa* seeds (0.55mg/g DW).

Antioxidant systems have evolved to protect the body against the free-radicals. In this investigation, DPPH radical is scavenged by antioxidants through the donation of proton forming the reduced DPPH and the colour changes from purple to yellow after reduction.

As shown in Table (3), seeds of *M. peregrine* extracts showed high scavenging ability and antioxidant activity and an increase in their scavenging ability when the concentration of extracts was increased. Comparing antioxidant activity of *Moringa* seeds extracts with synthetic antioxidant, BHA (200µg/ml) and TBHQ (200µg/ml) indicated that its extracts have potential antioxidant activity but its ability of reducing power was lower than BHA and TBHQ. The EC_{50} values (the amount of antioxidant necessary to decrease the initial DPPH absorbance by 50%) were calculated and listed in Table (3). The lower the EC_{50} value, indicate the higher antioxidant activity.

Table 2. Total amino acids, total lipids, phenolic components and vitamins C and E contents in *Moringa peregrine* seeds (MPS)

Amino acid	***Moringa* seeds (mg/g)**	**Phenolic components (mg/g)**	
Aspartic acid	1.803	Gallic	0.550
Threonine	0.956	Pyrogallol	0.210
Serine	0.975	Protocatechuic	-
Glutamic	4.578	Vanillic	0.020
Glycine	0.813	Chlorogenic	-
Alanine	1.444	Catechol	0.130
Cystine	0.773	Caffiene	0.003
Valine	1.097	Catechine	-
Methionine	0.593	Ferulic	0.02
Isoleucine	0.888	Salicylic	-
Leucine	1.973	Coumarine	-
Tyrosine	1.242	Cinnamic	0.002
Phenylalanine	1.777	Chrysin	0.004
Histidine	1.480	Benzoic	-
Lysine	0.817	**Vitamins** (µg/g)	
Arginine	4.218	C	0.24
Total lipids %	45.64	E	0.02

Table (3). Radical scavenging activity of *M. peregrina* extracts and standard antioxidants on DPPH free radical, total phenol content and Trolox equivalent antioxidant capacity (TEAC)

Conc. of sample (µg/ml)	**Inhibition %**	**BHA (200µg/ml) %Inhibition**	**TBHQ (200µg/ml) %Inhibition**	**Total Phenols mg/gDW**	**TEAC (mmol/g)**	**EC_{50} (g)**
300	36.68±0.11	72.3±0.85	86.3±0.22	8.01±0.17	0.22	2.35
500	55.65±0.59					
700	59.03±0.38					

Finally, the antioxidant capacity of the seeds methanolic extract was compared to that of a synthetic antioxidant 6-Hydroxy-2,5,7,8-tetramethylchromane-2-carboxylic acid (Trolox) and expressed as Trolox equivalent antioxidant capacity values (TEAC).In the method for determination of antioxidant capacity, a colour solution of $ABTS^{+\bullet}$ free radical was used. Expressing seed extract's antioxidant capacity in **(**nmol/g)

Trolox equivalent has the benefits that the antioxidant capacity is quantified. It has been demonstrated that the extract from the tested seeds of *M. peregrina* is capable of scavenging $ABTS^{+\bullet}$ free radical and had Trolox equivalent of 0.22 mmol/g.

Growth performance and feed utilization:

Live body weight (LBW) and body weight gain (BWG) are shown in Table 4. Final live body weight and total body weight gain values recorded the highest (P<0.01) with rabbits fed 0.4 % MPS diet (2300.00 g and 1690.84g) followed by those fed 0.2% MPS diet (2263.33g and 1652.92g) and rabbits fed the control diet (2089.16g and 1479.16g), respectively.

Table 4. Growth performance and feed utilization (Mean ± SE) of Califorina rabbits as affected by feeding different *Moringa peregrina* seed level

Parameters	**Control**	***Moringa* seed levels**		**Sig.**
		0.2%	**0.4%**	
Initial body weight (g)	610.00 ±72.9	610.41 ±58.94	609.16 ±45.9	NS
Final body weight (g)	2089.16[b] ±4.97	2263.33[a] ±44.6	2300.00[a] ±39.4	*
Weight gain (g)	1479.16[b] ±75.1	1652.92[a] ±34.5	1690.84[a] ±22.8	*
Feed intake (g)	4077.9[b] ±85.44	4414.9[a] ±53.8	4254.3[a] ±45.0	*
Feed conversion ratio	2.75[a] ±0.20	2.67[ab] ±0.19	2.51[b] ±0.26	*

[a, b] Means bearing different superscripts within the same row are significantly different (P<0.05).

Rabbit fed 0.2 or 0.4% MPS diet recorded the highest (P<0.05) feed intake value (4414.9 and 4254.3 g), followed by those fed the control diet (4077.9g) Table (4). The increased of feed intake might be due to the presence of *moringe* seeds in the diet which made the feed it more palatable. The variation in feed intake after addition of MPS in the diet may also related to the variation in the amino acid profiles of the diet Forbes (1995). Feed conversion ratio was improved (P<0.05) by adding MPS in the basal diet. The values of feed conversion ratio recorded 2. 51, 2. 67, and 2.75 (g feed/g gain) for those fed 0.2, 0.4 and zero % MPS diets. The obtained results were in contrary with those obtained by Abbas and Ahmed (2012) who observed that during the starter period (8–21 days), useing of 1.5% *moringa oleifera* seeds (MS) in broiler diets significantly (P < 0.05) reduced the weight gain, body

weight, and feed efficiency, while during finisher period (22–35 days) and whole (8–35 days) periods, supplementation of different levels (0.37%, 0.75%, or 1.5%) of *moringa* seeds had no effects on weight gain, final live body weight and feed efficiency. Ochi *et al*., (2015) found that during starter period, adding 2 % *moringa oleifera* seeds powder (MOSP) in broilers diet reduced the weight gain, body weight and feed efficiency, but during finisher and the whole periods, addition of different levels (0.5, 1, 1.5 and 2%) of MOSP showed no significant effects (P>0.05) on weight gain, feed efficiency and final live body weight.

The improving in growth performance of growing rabbits may be due to that MPS are rich in minerals especialy iron, vitamins A, B, C and E and protein which contents eight essential amino acids (Odeyinka *et al.,* 2008; Faye *et al*., 2011 and Dougnon *et al.,* 2012). Grubben and Denton (2004) attributed the improvement of rabbit growth performance to the higher level of vitamin A in *moringa* seeds.

Digestibility coefficients and nutritive values:

Data in table (5) show that adding *moringa* seeds in the basal diet decreased (P<0.01) the DM digestibility, while it significantly (P<0.01) elevated the digestibility coefficients of CP and the nutritive value of the diet expressed as DCP, especially with those fed 0.4% MPS diet. The other nutrients digestibility were not affected significantly by the treatments.

Table 5. Digestibility coefficients and nutritive values of (Mean ± SE) experimental diets as affected by dietary supplementation with different level of *Moringa peregrine* seed.

Parameters	Control	*Moringa peregrine* seed levels		Sig.
		0.2%	0.4%	
Digestibility coefficients*(%)*				
DM	65.36^{a}±0.07	63.85^{b} ±0.05	64.57^{b}±0.03	**
OM	68.05±0.80	67.60±0.22	68.19±0.95	NS
CP	68.97^{b} ±0.44	67.04^{c} ±0.01	75.04^{a} ±0.42	**
EE	84.55±1.21	84.73±1.93	81.62±1.30	NS
CF	30.27±2.25	29.84±0.94	29.50±1.38	NS
NFE	76.68^{a}±0.64	76.78^{a} ±0.01	74.26^{b} ±0.83	*
Nutritive values *(%)*				
DCP	11.99^{b}±0.08	11.54^{b} ±0.01	12.93^{a} ±0.09	**
TDN	60.59±2.45	61.86±3.1	62.08±1.65	NS

$^{a, b}$ Means bearing different superscripts within the same row are significantly different (P<0.05).

Carcass characteristics:

Data in Table (6) show that dressing weight % had not significantly affected by MPS addition. Rabbits fed 0. 4% MPS diet showed the highest (P<0.05) empty carcass weight and total giblets weight (1255.7g and 65.77%) as compared with rabbits fed the control diet (1159.7g and 63.62%) and those fed 0.2% MPS (1155.3 and 64.10%). Moreover, Rabbits fed 0.2 or 0.4% MPS diet and the higher (P<0.05) liver weight (5.54 and 5.35 %) compared with those fed the control diet (4.77%). However the other organs were not affected significantly by MPS supplementation.

In this connection, Abbas and Ahmed (2012) observed that during finisher (22–35 days) and whole (8–35 days) periods, supplementation of different *moringa* seeds levels (0.37%, 0.75%, and 1.5% in broiler diet) in the diet had no significant (P > 0.05) effect on dressing percentage, liver and heart weights. Also, Ochi *et al*., (2015) reported that during finisher and the whole period, feeding broiler chicks on diet containing 0.5, 1.0 and 2.0 % *moringa olifera* seeds had no significant effects (P>0.05) on dressing percentage, liver weight and heart weight. It was observed that the values tended to be increased with increasing levels of MPS in the diets. This observation may be a reflection of the relatively higher feed intake recorded by rabbits fed the MPS diets resulting, in higher daily weight gain.

Table 6. Carcass characteristics of California rabbits (Mean ± SE) fed a basal diet containing different *Moringa peregrine* seeds levels.

Parameters	Control	*Moringa* seeds levels		Sig.
		0.2%	0.4%	
Live weight (g)	2073.3±52.4	2068.3±84.6	2143.3±48.1	NS
Empty carcass wt. (g)	1159.7^{b}±12.6	1155.3^{b}±42.6	1255.7^{a}±32.7	*
Dressing wt. %	55.97±0.84	55.88±0.59	57.57±1.19	NS
Total giblets wt.%	63.62^{b}±0.69	$64.10a^{b}$±0.52	65.77^{a}±0.45	*
Organs				
Liver wt.%	4.77^{b}±0.24	5.54^{a}±0.17	5.35^{a}±0.75	*
Heart wt.%	0.59±0.02	0.50±0.03	0.53±0.10	NS
Kidneys wt.%	1.26±0.08	1.14±0.02	1.28±0.04	NS
Fat wt.%	1.02±0.06	1.04±0.17	1.05±0.19	NS

[a, b] Means bearing different superscripts within the same row are significantly different (P<0.05).

Conclusively, ground *Moringa peregrine* seeds could be recommends to incorporate to the diet at level of 0.2 or 0.4% as a feed supplement to enhance the growth performance, digestibility and feed utilization by growing rabbits.

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تأثير إضافة بذور المورينجا بريجنينا فى العليقة على كفاءة النمو ومعاملات هضم المركبات الغذائية وصفات الذبيحة فى الأرنب النامية

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استخدم فى هذه الدراسة عدد ٣٦ ارنب كاليفورنيا عمر ٥ اسابيع بهدف دراسة تأثير إضافة مسحوق بذور المورينجا بريجنينا فى العليقة على معدل النمو ومعاملات هضم المركبات الغذائية وصفات الذبيحة فى الارانب النامية. تم تقسيم الارانب عشوائيا الى ثلاث مجاميع تجريبية وكل مجموعة تحتوى على ٤ مكررات بكل مكرر ٣ ارانب واستمرت التجربة من ٥ الى ١٣ اسبوع. تم تغذية الارانب على ٣ علائق تجريبية عليقة الكنترول (صفر مسحوق مورينجا) و العليقة الثانية والثالثة تحتويان على٠,٢ و ٠,٤% مسحوق بذور المورينجا.

وكانت اهم النتائج المتحصل عليها:

- ارتفاع محتوى بذور المورينجا فى المركبات المضادة للاكسدة مثل فيتامين C و E ومركبات فينولية عديدة أخرى وقد ثبت من التجارب فعالية نشاط هذه المركبات كم ضادات للأكسدة.

- ارتفاع محتوى بذور المورينجا فى الاحماض الامينية الضرورية وخصوصا الاحماض الامينية الاساسية.
- سجلت معنويا مجموعة الارانب التى تم تغذيتها على ٠,٤% مسحوق بذور المورينجا اعلى وزن جسم نهائى (٢١٧٠جم) وزيادة وزنية (١٥٦٠,٨جم) يليها المجموعة التى تم تغذيتها على ٠,٢% مسحوق بذور المورينجا ثم مجموعة الكنترول.
- سجلت معنويا الارانب التى تم تغذيتها على ٠,٢ و ٠,٤% مسحوق بذور المورينجا أعلى كمية غذاء مأكول (٥٤٠٣ و ٥٣٣٠ جم). ايضا سجلت معنويا الارانب التى تم تغذيتها على ٠,٤ أو ٠,٢ % مسحوق بذور المورينجا أفضل معدل تحويل غذائى (٢,٥١ و ٢,٦٧ جم غذاء / جم زيادة وزنية).
- سجلت معنويا مجموعة الارانب التى تم تغذيتها على ٠,٤% مسحوق بذور المورينجا أعلى معامل هضم للبروتين للخام (٧٥,٠٤%) وقيمة غذائية للبروتين (٦٨,٩٧%).
- سجلت معنويا مجموعة الارانب التى تم تغذيتها على ٠,٤% مسحوق بذور المورينجا أعلى وزن زبيحة ١٢٥٥,٧ جم وأعلى وزن أحشاء مأكول ٦٥,٧٧% مقارنة بمجموعة الكنترول ١١٥٩,٧ جم و ٦٣,٦٢ %.

التوصية: خلصت الدراسة انه يمكن إستخدام٠,٢ او ٠,٤% مسحوق بذور المورينجا بريجنينا كأضافات غذائية لتحسين كفاءة النمو والهضم ومعدل الاستفادة من الغذاء فى الارانب النامية.