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UTILIZATION OF POTATO PEELS AS A FIBER SOURCE IN FEEDING TWO LINES OF GROWING RABBIT

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ABSTRACT: Total numbers of 300 growing V. and Alex. rabbits at age of 4-weeks were used to study the effect of dietary potato peels as a partial replacement at levels 5, 10, 15 and 20% of dietary fiber inclusion. Rabbits of each line were randomly classified into five equal groups (30 each). The 1th group received the basal diet and served as control diet. The other four groups received the basal diet with replacement potato peels meal at the studied levels, respectively. The chemical composition of the potato peels meal clearly shows that it contains 14% crude protein, 15.6% crude fiber and 57.1% nitrogen free extract and these compounds falls within ranges of studied wheat brain and Alfalfa hay. While, ether extract and ash content of potato peels meal were higher than those of other studied materials. Significant difference was recorded for body weight, gain, feed intake and feed conversion as a result of lines difference over all the experimental growth period (4-10) week old. In that, average body weight of Alex. rabbits and its gain were higher than those of V. line. The opposite was true with feed intake, where rabbits of V. line consumed more diet compared with those of Alex. line. Dietary potato peels meal treatments (10%) significantly increased body weight and weight gain and consequently feed intake was also increased. Meanwhile, the best score of feed conversion was attained with Alex. rabbits fed inclusion level of 10% potato peels meal. This trend did not continue but it significantly decreased as increasing inclusion level up to 20% and resulted to impaired feed conversion which being 3. 89 for V. rabbits and followed by 3.37 for Alex. rabbits. The relative economic efficiency of the different formulated diets as affected by dietary treatments of 5 and 10% were highly by 8.9 and 16.1% over the corresponding of the control group for Alex. rabbits and followed by 7.2 and 5.5% over the control group of V. rabbits, respectively. In conclusion, potato peel meal can be used as a good alternative source of fiber at levels of 5 and 10% in growing V. and Alex. rabbits diets, respectively with a good influence on productive performance and can be considered a cheap of fiber ingredients in rabbits diets formations.

Keywords: Potato Peels - Rabbits - Productive Performance - Economic efficiency**.**

INTRODUCTION

A rabbit production has become a major sector of the poultry production as well as its improvement is considered one of the main targets of both public and private sectors. Advances in genetic, nutrition and husbandry management over the same period have resulted in a phenomenal improvement in the productivity. In this respect, chronic feed deficient represent to animal production in many of the developing countries, especially Egypt, due to population increase and consequently allocation of available for cereal production, thereby reducing the availability of cultivated land for animal fodder production. Besides that, rabbits have high ability to consume forage and agricultural by-products contained high levels of fiber (Cheeke, 1986). This situation demands the use of unconventional feed resources in livestock ration, especially from Agro-industrial by-products. Inclusions of these materials are often severely limited because little information is available about their nutritive value **(**Shamma et al., 2014). Vegetable peels are usually considered waste, so they are obviously cost-effective (Parmar and Kar, 2009; Hamendra et al., 2010). Among these materials which may possess a considerable feeding value is the potato peels where, potato annual output is around 206 million tons which is the largest in Africa **(**FAO, 2006). In Egypt, the yield of potato crop was two million tons (A.E.S.I. 2008). Approximately 35% of total processed potato crop is discarded as a waste during processing (El-Boushy and Van der Poel, 1994). However, Smith and Huxsoll (1987) estimated the peeling losses of the potato chips industry which used abrasion peeling extensively to be 10%. This material is found to be a good source of dietary fiber and polyphenols (Singh et al., 2005), which is strongly antioxidant (Singh et al., 2008). In this respect, Chlorogenic (50.31%), gallic (41.67%), protocatechuic (7.82%) and caffeic acid (0.21%) were the major phenolic compounds detected in the study conducted by Rodriguez De Sotillo et al. (1994). Moreover, the extract of potato peel had both bactericidal and bacteriostatic effects but only at a high concentration. Researches on the use of vegetable and fruits peels are on the increased. Amber et al. (2002) showed that types of dietary fiber mainly affected the digestibility of the fibrous fractions of the diet. Thus, the digestibility of neutral detergent fiber (NDF) and acid detergent fiber (ADF) were significantly higher in diets containing sugar beet pulp and sweet potato tops than those of all other diets of mango bean hay and rice straw. Battaa et al. (2013) concluded that dietary acid detergent fiber (ADF) at level of 23.55% could be recommended to obtain the best growth performance growing rabbits. Along the same line, Safwat (2010) found that rabbit fed the control diet has significantly the highest value of feed intake, whereas the lowest was recorded by those received barley and Alfalfa; barley and berseem hay; barley and faba bean straw; corn-cob meal and Alfalfa as well as corn-cob meal and berseem hay respectively. Also, Sarhan (2005) showed that the live body weight at 9 weeks for rabbits fed diets contained pea vines hay and pea pods hulls at levels up to 30% were in significant higher than those of the control diet. With advancing age up to 13 weeks, the live body weight of rabbits received the same diet were significantly higher than that of the control. On the other hand, Genedy et al. (2000) revealed that body weight gain of rabbits fed dried water melon by – product at levels of 0, 4, 8 and 12% at 12 weeks of age did not significantly differ than those received the control diet. This result is well correlated with finding of Al-Shanti (2003) who found no significant differences in live body weight and weight gain among rabbits fed 5, 10, 15 and 20% olive cake meal with

using 0, 6.25, 12.5, 18.75 and 25% of wheat screening by-product in rabbits diet, Ismail (2004) found that there were no significant differences in body weight and weight gain. Soliman et al. (2005) reported that rabbits fed diet with 14 and 12% CF had higher feed intake than those fed diet contained 10% CF, while feed conversion ratio was not significantly affected by dietary fiber level. The objective for this study is to determine the chemical composition of PPM and consequently their effects on the productive performance and economic efficiency of the two lines of growing rabbits were also studied.

MATERIALS AND METHODS

The experimental work was conducted at Rabbit Production Unit, Poultry Production Department, Faculty of Agriculture, Alexandria University, Egypt, throughout the experimental growth period from November (2013) up to January, (2014). Fresh potato peal obtained from a commercial potato chip making units, were washed with tap water and dried by using sunshine. The dried peel was ground in a multi mill to obtain fine powder. Then, the meal kept in plastic bags until the preparation of experimental diets. Sample of the prepared potato peels meal was taken for estimating its chemical composition according to A.O.A.C. (2000). A total number of three hundred weaned rabbits, fifty-fifty between Alex. and V-lines, at 4 weeks of age having nearly equal live weights according to their guide line were used in this study. Rabbits of each line were individually weighted, randomly distributed into five equal groups (30 each treatment). Each group divided into ten replicates, each replicate contains 3 animals. Rabbits individually were housed in galvanized wire caged (30 × 35 × 40 cm). Each cage was equipped with an automatic drinker stainless steel nipple and a manual feeder allowing recording individually feed intake for each rabbit. All animals were kept under the same managerial, hygienic and environmental conditions throughout the experimental growth periods. A photoperiod of 14 to 16 hours of day light was also provided throughout the experimental periods. Feed and clean fresh water were offered *ad libitum.* The feeding period was extended for 10 weeks of age.

Five experimental diets were formulated and pelleted to cover the nutrient requirements of rabbits according to NRC (1994) and De Blas and Mateos (1998) as shown in Table (1). In that, graded levels of the ground potato peel meal were incorporated into experimental diets which were classified as follow:

Diet (1): Basal diet without replacement and served as control diet.
Diet (2): Basal diet replaced PPM at level 5% of dietary fiber.
Diet (3): Basal diet replaced PPM at level 10%ofdietary fiber.
Diet (4): Basal diet replaced PPM at level 15 of dietary fiber.
Diet (5): Basal diet replaced PPM at level 20% dietary fiber.

All diets had nearly iso-nutritive value but differ in their components according to the purpose study. The performance parameter included live body weight and feed consumption which were weekly determined and then weight gain and feed conversion ratio were calculated. At the end of the experimental period, the economic efficiency of studied experimental diets was calculated according to the local market price of ingredient and rabbit live body weight as following:

Net revenue = total revenue – total feed cost.

Economic efficiency (%) = net revenue/ total feed cost %.

Statistical analysis:

Collected data were subjected to statistical analyses by using the international software

program (SAS, 2003). The application of the least significant ranges among different treatment means was done according to Duncan (1955).

The following statistical model was used:

$Y_{ijk} = \mu + L_i + T_j + LT_{ij} + e_{ijk}$

Where:

Y_{ijk} = The observation of the parameter measured،

μ = The overall mean،

L_i = The effect of line،

T_j = The effect of dietary treatment, j = (1, 2,3,4,5)

LT_{ij} = Interaction between lines and treatment،

e_{ijk} = The experimental random error.

RESULTS AND DISCUSSION

Chemical Composition of PPM:

Determined analysis on DM basis of studied materials as a dietary fiber is listed in Table (2). It is clearly shows that dry matter of potato peel meal had an intermediate score (89.9%) between that of wheat bran and Alfalfa hay which being 88 and 90%, respectively. However, dry matter of potato peel had a higher percentage compared with that of wheat bran. The opposite was true with organic matter, where the tested material had an approximately equal percentage 92% with that of Alfalfa hay and lower value than that of wheat bran which being 94%.

Inspection in data, it is clearly shows that potato peel meal contained 14% crude protein compared with those of wheat brain and Alfalfa which being 15 and 15.5%, respectively. In connection, result of crude protein was equal to that obtained by Omer et al. (2011). On the other hand, values of crude fiber and nitrogen free extract of the tested material fall within ranges of wheat brain and Alfalfa hay (15.6 vs. 11.0 or 25 and 57.1 vs. 64.0 or 49.5), respectively. Concerning the ether extract and ash content of potato peel meal, it were higher than those of other studied materials. Similar results were attained with values of gross energy and digestible energy which being 4296.85 vs. 1300 or 3950 Kcal /kg DM and 2574.8 vs. 2550 or 2175 Kcal /kg DM, respectively. So it is of a great importance to note that nutrient substances of potato peel meal are of relatively suitable values to its rank as a dietary fiber for growing rabbit's.

Productive Performance of the Experimental Groups:

Data of tables (3 and 4), clearly shows that Alexandria rabbits recorded the heaviest weight and gain compared with those of V-line throughout the entire experimental ages up to 10 weeks. This may be due to the wide genetic variation between rabbits of the two studied lines (El-Raffa, 2007; Khamis, 2014). Irrespective of lines differences, it is obvious that rabbits fed diet contained 10% potato peel meal recorded the heaviest weight and gain compared with those received experimental diets of other studied levels through the most studied ages. This trend did not continue but it followed a reduction trend when animal fed either of diets contained 15 or 20 % potato peel meal. The reported improvement in final live body weight with increasing dietary potato peel containing experimental diet up to 10% could be partially attributed to its effect on suppression of pathogenic organisms in the rabbit cecum (Omer et al., 2011). On the other hand, the significant decrease in body weight and gain with increasing the tested material may be due to increase neutral detergent fiber, acid detergent lignin and hemicelluloses contents in experimental diets. Generally, the best weight and gain were obtained from Alex. rabbits when fed diet of 10% potato peel being 2010.74 and 1329.44 g. followed by those of V-line received diet containing 5% potato peel which being 1959.73 and 1296.27g as shown in Tables (4 and 6). In accordance with the present results, Elazab et al. (2011) reported that the highest growth rate came with rabbits

on the 15% dried tomato pomace, while the lowest growth rate came with rabbits fed 20% the same tested material. So, the down word trend observed from diet contained 15 or 20% potato peel meal could be attributed to the effect of ant nutritional factors becoming more pronounced as the quantity of the test ingredient increased (Eka, 1977; Osagie, 1998).

Rabbits of V-Line consumed more diet compared with those of Alex- Line by about 5.13% through the whole period of (4-10) weeks as shown in Table (7). This result supported by the previous findings of Khamis (2014) who reported that animal of Alex. line consumed the least amount of diet as compared with those of V-Line but without significant. Also, it is obvious that increasing inclusion levels of tested ingredient up to 15%, irrespective of lines difference, resulted to increase the amount of feed consumed by about 0.93% over that of the control diet but without significant. The opposite was recorded as feeding diet of 20% potato peel meal, where feed intake was significantly decreased compared with the studied inclusion levels. However, the highest amount of feed intake was recorded by V. rabbits at level of 5% being 3556.2 g. whereas; the lowest amount was recorded by Alex. rabbits which being 3304.6 at 5% followed by 3331.4g for 10% tested material (Tables 8). On the other hand, feed conversion ratio expressed as feed intake (kg)/unit weight gain (kg) in Table (9) clearly shows that Alex. rabbits had the best feed conversion ratio compared with those of V-Line over all studied period from 4 to 10 weeks. Along the same line, rabbits received diets of 5 or 10% dietary potato peel gave statistically similar values compared with those fed the control diet. Meanwhile, rabbits fed diet contained 10% tested ingredient recorded the superior score compared with rabbits of the other treatments. This trend did not continue but it significantly decreased as increasing inclusion level of dietary potato peel. It may be attributed to poor nutrient utilization as results of anti-nutrients as the quantity of the tested ingredient increased in the diet. Moreover, Offor et al. (2011) reported that potato contain solanine and chaconine which are more concentration in the peel which cause gastrointestinal upsets and neurological disorders (Osagie and Eka, 1988). Along the same line, Fapohunda et al. (2008), Adeyemi et al. (2010) and Aboh et al. (2013) observed the tendency trend when increasing inclusion levels of pineapple peel increased up to 40%. So, it is clear from Table (10) that the best feed conversion ratio was obtained by Alex. rabbits fed experimental diet contained 10% tested ingredient, whereas those of V-Line gave the best score as feeding inclusion level 5%. From this finding, it might be concluded that the experimental diet contained 5% and 10% dietary potato peels seems more efficient for growing rabbits of V. and Alex. lines as indicated by the presence of high gain as well as more beneficial growth rate, respectively.

Economic Efficiency of dietary treatments:

From the economic point of view the profitability, it is worth to note that the profitability of using dietary potato peel meal in rabbit diets depends on the price of tested diets and growth performance of rabbits fed these diets. Inspection in Table (11), it is obvious that costing of one kg feed (LE) was gradually decreased as increasing dietary potato peel containing experimental diets. So, the dietary inclusion levels of tested ingredient 5 and 10% scored less feed cost per kg body gain, being 7.07 and 7.15 (LE) for V. rabbits and 6.57 and 6.58 (LE) for those of Alex. Line, when compared with the other dietary treatments inclusion through growth period from 4 to 10 weeks old. Meanwhile, the least values were attained with Alex. rabbits in this respect. Consequently, by gradually increasing the rate of PPM as a

replacement of wheat bran and Alfalfa up to 10%, the total revenue, net revenue, economic efficiency and relative economic efficiency increased. The opposite was true with using the tested ingredient up to 15 or 20%, respectively. It may be due to the low price of potato peel meal and the improvement of growth performance of growing rabbits for studied treatments compared to the control groups.

Generality, the relative economic efficiency (REE) of the different formulated diets as affected by dietary treatments of 5 and 10% were highly by 8.9 and 16.1% over the corresponding of the control group for Alex. Rabbits and followed by 7.2 and 5.5% over those the control group of V. rabbits, respectively. In connection, a result of Khamis (2014) is in agreement with our finding where the superiority rate of the economic efficiency was attained with Alex-rabbits compared with those of V-line. Along the same line, Sarhan (2005) and Safwat (2010) indicated that using faba bean straw as a source of fiber instead of Alfalfa and berseem hay gave the superiority rate in this respect.

Table (1): Composition and chemical analysis of experimental diets.

Ingredient, %	Potato peel meal replacement levels,%				
	0.0	**5**	**10**	**15**	**20**
Yellow corn	7.00	7.00	7.00	7.00	7.00
Wheat bran	20.00	17.50	15.00	12.50	10.00
Barely	18.30	18.20	18.00	17.90	17.80
Alfalfa	22.50	20.00	17.50	15.00	12.50
Soybean meal, 44%	18.20	18.40	18.50	18.60	18.70
Straw	8.00	8.00	8.00	8.00	8.00
Potato Peel	-	5.00	10.00	15.00	20.00
Di-calcium phosphate	1.9	1.7	1.7	1.7	1.7
Limestone	0.2	0.3	0.4	0.4	0.4
Methionine	0.15	0.15	0.15	0.15	0.15
Lysine	0.05	0.05	0.05	0.05	0.05
Salt	0.4	0.4	0.4	0.4	0.4
Premix*	0.3	0.3	0.3	0.3	0.3
Molasses	3.00	3.00	3.00	3.00	3.00
Total	**100**	**100**	**100**	**100**	**100**
Determined analyses on DM basis:					
Crude protein %	17.50	17. 43	17.48	17.45	17.51
Crude fiber %	13.40	13.30	13.30	13.20	13.10
Ether extract %	2.10	2.20	2.30	2.20	2.20
Calculated values:					
Digestible energy (kcal/kg)**	2545	2544	2543	2546	2547
Ash %	7.20	7.08	7.07	7.02	7.01
DE/P	145.42	145.95	145.48	145.90	145.45
Calcium%	0.92	0.91	0.92	0.94	0.93
Phosphorus available %	0.60	0.60	0.60	0.60	0.60
Methionine %	0.40	0.40	0.40	0.40	0.40
Lysine %	0.91	0.91	0.91	0.91	0.91

* Vitamin-mineral premix provide per kg of diet vit. A, 13.340 iu; vit. D3, 2680. i.u; vit. E, 10 i.u; vit. K, 2.68 mg; Calcium pantothenate, 10.68 mg; vit. B12, 0.022 mg; folic acid, 0.668 mg; choline chloride, 400 mg; chlorotetracycline, 26.68 mg; manganese, 133.34 mg; iron, 66.68 mg; zinc, 53.34 mg; copper, 3.2 mg, iodine, 1.86 mg; cobalt, 0.268 mg, selenium, 0.108 mg.

** Calculated DE (Kcal/kg) = TDN ×44.3 (Schneider and Flatt, 1975).

Table (2): Chemical Composition of Dried potato peel, Wheat bran, and Alfalfa hay as an ingredient in rabbits diets.

Item	Potato peels	Wheat bran*	Alfalfa hay*
Chemical analyses (%)			
Dry matter (DM)	89.90	88.00	90.00
Chemical analyses on DM basis			
Organic matter (OM)	91.90	94.00	92.00
Crude protein (CP)	14.00	15.00	15.50
Crude fiber (CF)	15.60	11.00	25.00
Ether extract (EE)	5.20	4.00	2.00
Nitrogen free extract (NFE)	57.10	64.00	49.50
Ash	8.10	6.00	8.00
Gross energy (kcal/kg DM)	4296.85	1300.00	3950.00
Digestible energy (kcal/kg DM)	2574.80	2550.00	2175.00

*****Source : NRC 1994

Table (3): The main effect of two lines of growing rabbits fed different inclusion levels of Potato Peel meal on live body weight during experimental growth ages.

Items	Live Body weight (g./ rabbit)						
	4 wks	**5 wks**	**6 wks**	**7 wks**	**8 wks**	**9 wks**	**10 wks**
Lines							
V.	658.85 ±12.60	804.66 ±16.18	961.38 ±17.06	1145.65 ^{b} ±20.79	1341.32 ^{b}±21.46	1564.38 ^{b}±23.52	1805.23 ^{b}±22.84
Alex.	675.90 ±11.72	823.69 ±13.47	990.97 ±15.91	1190.76 ^{a} ±20.14	1390.16 ^{a}±21.02	1623.89 ^{a}±22.12	1859.79 ^{a}±22.07
Dietary Potato Peel meal %							
0.0	668.06 ±20.65	825.51 ±25.25	990.59^{b}±26.35	1189.95 ^{b}±36.07	1395.19 ^{b}±35.74	1648.84 ^{a}±38.31	1900.01 ^{b}±37.55
5	666.21 ±15.85	828.06 ±18.08	1024.55^{a}±22.46	1226.30 ^{a}±24.76	1441.50 ^{a}±24.98	1688.28 ^{a}±27.66	1955.33 ^{a} ±31.59
10	666.73 ±18.55	827.45 ±24.31	994.90^{b}±28.34	1201.65 ^{ab}±39.25	1418.54 ^{ab}±37.06	1679.76 ^{a}±38.25	1946.86 ^{a}±36.77
15	673.71 ±16.52	826.43 ±18.09	1007.39^{a}±19.17	1201.24 ^{ab}±19.44	1390.36 ^{b}±23.32	1591.69 ^{b}±25.11	1802.85 ^{c}±28.51
20	662.16 ±24.09	763.42 ±30.11	863.46^{c}±31.97	1021.87 ^{c}±38.23	1182.72 ^{c}±41.31	1362.11 ^{c}±45.27	1557.51 ^{d}±42.23
Significance							
Lines	**NS**	**NS**	**NS**	*	*	*	*
Dietary Potato Peel meal	**NS**	**NS**	*	*	**	**	*

*= Significant at p≤ 0.05 **= Significant at p≤ 0.01 N.S= not significant

Different letters (a, b, c) in the same column indicate significant differences p≤ 0.05

Table (4): The interaction effect between two lines of growing rabbits by different inclusion levels of Potato Peel meal on live body weight during experimental growth ages.

Items	Live body weight (g./ rabbit)						
	4 wks	5 wks	6 wks	7 wks	8 wks	9 wks	10 wks
V-line × control	660.33±29.54	809.43±39.33	969.69 ^{b} ±40.23	1157.10 ^{c} ±52.29	1358.54 ^{b} ±51.05	1616.39 ^{c} ±57.04	1887.46 ^{c} ±54.53
V-line × 5% Potato Peel	663.46±27.96	839.16±30.61	1033.52 ^{a} ±34.07	1236.85 ^{a} ±39.09	1458.91 ^{a} ±37.75	1694.15 ^{b} ±41.07	1959.73 ^{b} ±44.89
V-line × 10 % Potato Peel	652.16±26.29	819.00±36.75	975.89 ^{b} ±39.92	1167.99 ^{c} ±52.47	1374.95 ^{b} ±47.07	1626.70 ^{c} ±47.82	1882.98 ^{c} ±45.43
V-line × 15% Potato Peel	666.90±27.39	808.00±29.40	990.40 ^{b} ±29.49	1192.60 ^{b} ±33.06	1384.91 ^{b} ±39.58	1584.84 ^{d} ±42.52	1804.87 ^{d} ±42.18
V-line × 20% Potato Peel	651.40±31.28	747.71±44.33	837.43 ^{d} ±45.46	973.72 ^{d} ±43.33	1129.32 ^{d} ±48.80	1299.85 ^{f} ±50.81	1491.14 ^{f} ±54.10
Alex-line×control	675.80±15.41	841.60±18.38	1011.50 ^{a} ±20.81	1222.81 ^{a} ±21.88	1431.84 ^{a} ±24.47	1681.29 ^{b} ±26.74	1912.56 ^{b} ±32.74
Alex-line×5 % Potato Peel	668.96±29.35	816.96±32.03	1015.58 ^{a} ±34.70	1215.76 ^{a} ±50.55	1424.09 ^{a} ±50.96	1682.42 ^{b} ±52.01	1950.93 ^{b} ±52.20
Alex-line×10% Potato Peel	681.30±26.36	835.91±31.62	1013.91 ^{a} ±38.47	1235.32 ^{a} ±59.09	1462.14 ^{a} ±57.44	1732.82 ^{a} ±59.60	2010.74 ^{a} ±58.22
Alex-line×15% Potato Peel	680.53±18.89	844.86±21.03	1024.39 ^{a} ±24.79	1209.89 ^{b} ±20.05	1396.62 ^{b} ±23.99	1598.54 ^{cd} ±23.88	1800.84 ^{d} ±34.25
Alex-line×20% Potato Peel	672.93±37.09	779.13±41.47	889.50 ^{c} ±44.58	1070.02 ^{e} ±56.03	1236.13 ^{c} ±59.83	1424.38 ^{e} ±58.87	1623.89 ^{e} ±54.65
Significance	NS	NS	**	**	**	**	***

**= Significant at p≤ 0.01 N.S= not significant

Different letters (a, b, c, d, e) in the same column indicate significant differences p≤ 0.05

Table (5): The main effect of two lines of growing rabbits fed different inclusion levels of Potato Peel meal on live body weight gain during experimental growth periods.

Items	Live body weight gain (g./week)						
	(4-5) wks	(5-6) wks	(6-7) wks	(7-8) wks	(8-9) wks	(9-10) wks	(4-10) wks
Lines							
V.	145.80±7.66	147.72 ^{b}±5.60	184.26^{b}±9.54	195.68±5.79	223.06 ^{b}±6.68	240.85±6.81	1146.38^{b}±16.09
Alex.	147.78±5.61	167.28 ^{a}±5.85	199.78 ^{a}±10.49	199.40±6.30	233.71 ^{a}±5.77	235.90±6.57	1183.88^{a}±17.87
Dietary Potato Peel meal%							
0.0	157.45 ^{b}±12.60	165.08 ^{b}±7.38	199.36 ^{a}±19.00	205.23 ^{a}±8.61	253.63 ^{a}±10.65	251.17 ^{b}±9.68	1231.92^{b}±27.79
5	161.85 ^{a}±11.56	196.49 ^{a}±9.73	201.75 ^{a}±8.25	215.19 ^{a}±8.54	246.78 ^{b}±12.19	267.04 ^{a}±11.21	1289.12^{a}±24.13
10	160.72 ^{a}±13.46	167.44 ^{b}±9.48	206.75 ^{a}±21.66	216.89 ^{a}±9.98	261.21 ^{a}±9.25	267.10 ^{a}±9.23	1280.12 ^{a}±26.68
15	152.69 ^{c}±15.94	180.96 ^{a}±8.87	193.85 ^{b}±8.41	189.54 ^{b}±7.77	200.92 ^{c}±8.57	211.16 ^{c}±8.36	1129.14 ^{c}±26.70
20	101.25 ^{d}±10.6	100.04 ^{c}±8.71	158.40 ^{c}±15.71	160.85 ^{c}±9.28	197.39 ^{c}±9.64	195.40 ^{d}±9.69	895.35 ^{d}±25.90
Significance							
Lines							
Dietary Potato Peel	NS	***	**	NS	***	NS	***
meal	***	***	***	**	***	***	***

= Significant at p≤ 0.01 *=Significant at p≤ 0.001 N.S= not significant

Different letters (a, b, c, d) in the same column indicate significant differences p≤ 0.05.

Table (6): The interaction effect between two lines of growing rabbits by different inclusion levels of Potato Peel meal on live body weight gain during experimental growth periods.

Items	Live body weight gain (g./week)						
	(4-5) wks	(5-6) wks	(6-7) wks	(7-8) wks	(8-9) wks	(9-10) wks	(4-10) wks
V-line × control	149.10 ^{b}±12.29	160.26 ^{c}±9.83	187.41 ^{b}±25.75	201.44 ^{b}±19.67	257.85 ^{b}±17.24	271.07 ^{a}±9.87	1227.13 ^{c}±21.45
V-line × 5% Potato Peel	175.70 ^{a}±11.93	194.36 ^{a}±11.57	203.33 ^{a}±11.96	222.06 ^{a}±10.14	235.24 ^{c}±10.95	265.58 ^{a}±12.44	1296.27 ^{b}±22.74
V-line × 10 % Potato Peel	166.83 ^{a}±23.52	156.89 ^{c}±10.96	192.10 ^{a}±11.91	206.96 ^{b}±26.38	251.75 ^{b}±16.77	256.28 ^{b}±14.73	1230.81 ^{c}±19.85
V-line × 15% Potato Peel	141.06 ^{b}±6.78	182.40 ^{ab}±11.95	202.20 ^{a}±11.96	192.35 ^{c}±10.31	199.93 ^{d}±11.03	220.03 ^{c}±10.46	1137.97 ^{d}±19.75
V-line × 20% Potato Peel	96.31 ^{c}±12.56	89.72 ^{e}±9.14	136.29 ^{c}±16.53	155.60 ^{e}±12.04	170.53 ^{f}±16.68	191.29 ^{d}±16.53	839.74 ^{f}±17.35
Alex-line×control	165.80 ^{a}±9.34	169.90 ^{c}±13.21	211.31 ^{a}±11.05	209.03 ^{b}±11.62	249.41 ^{b}±11.52	231.27 ^{c}±15.79	1236.72 ^{c}±20.70
Alex-line×5 % Potato Peel	148.00 ^{b}±14.67	198.62 ^{a}±28.37	200.18 ^{a}±13.39	208.33 ^{b}±9.22	258.33 ^{b}±12.64	268.51 ^{a}±14.45	1281.97 ^{b}±22.47
Alex-line×10% Potato Peel	154.61 ^{ab}±34.64	178.00 ^{b}±15.77	221.41 ^{a}±12.92	226.82 ^{a}±13.98	270.68 ^{a}±10.71	277.92 ^{a}±9.37	1329.44 ^{a}±24.78
Alex-line×15% Potato Peel	164.33 ^{a}±8.84	179.53 ^{b}±9.16	185.50 ^{b}±23.64	186.73 ^{c}±10.38	201.92 ^{d}±10.39	202.30 ^{d}±14.36	1120.31 ^{d}±19.45
Alex-line×20% Potato Peel	106.20 ^{c}±12.10	110.37 ^{d}±11.06	180.52 ^{b}±11.49	166.11 ^{d}±12.29	188.25 ^{e}±14.08	199.51 ^{d}±13.06	950.96 ^{e}±16.23
Significance	**	***	***	*	***	***	***

*= Significant at p≤ 0.05 **= Significant at p≤ 0.01 ***=Significant at p≤ 0.001

Different letters (a, b, c, d, e) in the same column indicate significant differences p≤ 0.0

Table (7): The main effect of two lines of growing rabbits fed different inclusion levels of Potato Peel meal on feed intake during experimental growth periods.

Items	Feed Intake (g./week/rabbit)						
	(4-5) wks	(5-6) wks	(6-7) wks	(7-8) wks	(8-9) wks	(9-10) wks	(4-10) wks
Lines							
V.	338.60 ±3.99	465.76±5.60	439.08±8.83	620.00 [a]± 7.92	700.52 [a]±5.49	910.96 [a]±11.46	3474.92 [a]±114.52
Alex.	314.76±2.18	486.08±5.75	418.24±8.94	565.36 [b]±10.11	640.88 [b]±6.57	880.12 [b]±13.95	3305.44 [b]±101.57
Dietary Potato Peel meal%							
0.0	322.20±2.45	473.90±2.34	428.40±14.76	600.40 [a]±12.97	679.80±14.64	910.70 [a]±18.46	3415.40 [a]±99.45
5	340.50±3.42	476.40±9.43	430.90±15.01	599.70 [a]± 8.71	666.10±13.38	916.80 [a]±18.23	3430.40 [a]±89.45
10	320.10±3.72	474.00±7.76	429.80±10.62	601.30 [a]±19.45	679.40±11.10	916.00 [a]±18.26	3420.60 [a]±94.47
15	334.80±8.24	490.70±10.52	435.70±12.02	600.10 [a]±22.05	683.10±10.84	902.70 [a]±20.23	3447.10 [a]±104.52
20	315.80±9.31	464.60±13.03	418.50±19.94	561.90 [b]±18.46	645.10±17.47	831.50 [b]±25.67	3237.40 [b]±101.85
Significance							
Lines	**NS**	**NS**	**NS**	***	***	**	***
Dietary Potato Peel meal	**NS**	**NS**	**NS**	**	**NS**	**	**

= Significant at p≤ 0.01 *=Significant at p≤ 0.001 **N.S**= not significant

Different letters (a, b) in the same column indicate significant differences p≤ 0.05

Table (8): The interaction effect between two lines of growing rabbits by different inclusion levels of Potato Peel meal on feed intake during experimental growth periods.

Items	Feed Intake (g./week/rabbit)						
	(4-5) wks	(5-6) wks	(6-7) wks	(7-8) wks	(8-9) wks	(9-10) wks	(4-10) wks
V-line × control	334.00±1.22	467.40 ^{b} ±0.74	440.80±17.66	630.00 ^{a}±11.44	708.00 ^{a}±3.72	926.00 ^{a}±21.90	3506.20 ^{c}±79.26
V-line ×5% Potato Peel	357.20±9.92	477.40 ^{b}±21.22	450.00±31.65	633.40 ^{a}±20.60	706.40 ^{a}±16.56	931.80 ^{a}±22.02	3556.20 ^{a}±101.20
V-line × 10 % Potato Peel	328.40±3.42	465.80 ^{b} ±3.33	440.40±17.50	634.00 ^{a}±10.67	705.20 ^{a}±7.72	936.00 ^{a}±19.28	3509.80 ^{c}±69.78
V-line × 15% Potato Peel	352.00±11.04	474.60 ^{b}±16.77	440.00±18.99	629.00 ^{a}±18.06	709.40 ^{a}±11.68	931.40 ^{a}±21.90	3536.40 ^{b}±98.10
V-line × 20% Potato Peel	321.40±3.04	443.60 ^{c} ±4.72	424.20±16.58	573.60 ^{b}±14.50	673.60 ^{b}±13.85	829.60 ^{c}±6.72	3266.00 ^{g}±81.23
Alex-line×control	310.40±5.33	480.40 ^{b}±14.46	416.00±27.03	570.80 ^{b}±11.42	651.60 ^{c}±23.54	895.40 ^{b}±30.17	3324.60 ^{e}±98.23
Alex-line×5 % Potato Peel	323.80±3.55	475.40 ^{b} ±4.01	411.80±23.75	566.00 ^{b}±10.69	625.80 ^{c}±10.32	901.80 ^{b}±31.33	3304.60 ^{f}±96.01
Alex-line×10% Potato Peel	311.80±4.04	482.20 ^{b}±15.04	419.20±12.05	568.60 ^{b}±32.48	653.60 ^{c}±12.74	896.00 ^{b}±30.48	3331.40 ^{e}±97.12
Alex-line×15% Potato Peel	317.60±5.98	506.80 ^{a} ±9.36	431.40±16.73	571.20 ^{b}±38.01	656.80 ^{c}±6.82	874.00 ^{b}±30.85	3357.80 ^{d}±90.20
Alex-line×20% Potato Peel	310.20±3.96	485.60 ^{b}±17.48	412.80±24.80	550.20^{b}±15.64	616.60^{c}±9.54	833.40 ^{c}±35.65	3208.80 ^{h}±93.75
Significance	NS	**	NS	**	**	**	**

**= Significant at p≤ 0.01 N.S= not significant

Different letters (a, b, c, d,…., h) in the same column indicate significant differences p≤ 0.05

Table (9): The main effect of two lines of growing rabbits fed different inclusion levels of Potato Peel meal on feed conversion ratio during experimental growth periods.

Items	Feed conversion ratio (kg feed/kg gain)						
	(4-5) wks	(5-6) wks	(6-7) wks	(7-8) wks	(8-9) wks	(9-10) wks	(4-10) wks
Lines							
V.	2.41 ^{a}±0.06	3.17 ^{a}±0.23	2.43 ^{a}±0.48	3.20 ^{a}±0.06	3.21 ^{a}±0.09	3.83±0.22	3.08 ^{a}±0.08
Alex.	2.18 ^{b}±0.09	3.02 ^{b}±0.15	2.10 ^{b}±0.09	2.86 ^{b}±0.07	2.79 ^{b}±0.08	3.78±0.12	2.82 ^{b}±0.05
DietaryPotato Peel meal %							
0.0	2.05 ^{c}±0.08	2.86 ^{b}±0.10	2.15 ^{c}±0.08	2.92 ^{c}±0.04	2.68 ^{b}±0.05	3.64 ^{b}±0.30	2.76 ^{c}±0.02
5	2.10 ^{c}±0.18	2.42 ^{b}±0.35	2.13 ^{c}±0.08	2.78 ^{c}±0.04	2.71 ^{b}±0.08	3.43 ^{b}±0.14	2.67 ^{c}±0.09
10	1.98 ^{c}±0.04	2.83 ^{b}±0.12	2.09 ^{c}±0.11	2.78 ^{c}±0.09	2.60 ^{b}±0.06	3.43 ^{b}±0.09	2.67 ^{c}±0.04
15	2.21 ^{b}±0.10	2.71 ^{b}±0.08	2.24 ^{b}±0.07	3.16 ^{b}±0.12	3.39 ^{a}±0.17	4.27 ^{a}±0.14	3.04 ^{b}±0.07
20	3.13 ^{a}±0.03	4.67 ^{a}±0.46	2.70 ^{a}±1.00	3.50 ^{a}±0.06	3.61 ^{a}±0.26	4.26 ^{a}±0.19	3.63 ^{a}±0.12
Significance							
Lines	***	***	***	***	***	NS	**
Dietary Potato Peel meal	***	***	***	***	***	***	**

= Significant at p≤ 0.01 *=Significant at p≤ 0.001 **N.S**= not significant

Different letters (a, b, c) in the same column indicate significant differences p≤ 0.05

Table (10): The interaction effect between two lines of growing rabbits by different inclusion levels of Potato Peel meal on feed conversion ratio during experimental growth periods.

Items	Feed conversion ratio (kg feed/kg gain)						
	(4-5) wks	(5-6) wks	(6-7) wks	(7-8) wks	(8-9) wks	(9-10) wks	(4-10) wks
V-line × control	2.24 ^{c}±0.02	2.91 ^{c}±0.05	2.35 ^{b}±0.09	3.12 ^{b}±0.04	2.75 ^{c}±0.02	3.41 ^{d}±0.14	2.85 ^{c}±0.03
V-line × 5% Potato Peel	2.03 ^{c}±0.02	2.46 ^{d}±0.02	2.21 ^{b}±0.08	2.85 ^{c}±0.06	3.01 ^{c}±0.06	3.51 ^{cd}±0.02	2.77 ^{c}±0.10
V-line × 10 % Potato Peel	1.96 ^{d}±0.02	2.96 ^{c}±0.03	2.29 ^{b}±0.07	3.06 ^{b}±0.03	2.80 ^{c}±0.02	3.65 ^{c}±0.09	2.85 ^{c}±0.05
V-line × 15% Potato Peel	2.49 ^{c}±0.07	2.60 ^{c}±0.09	2.17 ^{c}±0.08	3.27 ^{b}±0.09	3.54 ^{b}±0.05	4.23 ^{a}±0.10	3.10 ^{c}±0.08
V-line × 20% Potato Peel	3.34 ^{a}±0.04	4.94 ^{a}±0.24	3.11 ^{a}±0.55	3.69 ^{a}±0.10	3.95 ^{a}±0.08	4.34 ^{a}±0.08	3.89 ^{a}±0.03
Alex-line × control	1.87 ^{d}±0.06	2.82 ^{c}±0.12	1.96 ^{d}±0.14	2.73 ^{c}±0.05	2.61 ^{d}±0.11	3.87 ^{b}±0.13	2.68 ^{d}±0.09
Alex-line×5 % Potato Peel	2.18 ^{c}±0.02	2.39 ^{d}±0.03	2.05 ^{c}±0.12	2.71 ^{c}±0.03	2.42 ^{d}±0.04	3.35 ^{de}±0.15	2.57 ^{d}±0.02
Alex-line×10% Potato Peel	2.01 ^{d}±0.03	2.70 ^{c}±0.08	1.89 ^{d}±0.08	2.50 ^{d}±0.11	2.41 ^{d}±0.05	3.22 ^{e}±0.17	2.50 ^{d}±0.04
Alex-line×15% Potato Peel	1.93 ^{d}±0.03	2.82 ^{c}±0.06	2.32 ^{b}±0.07	3.05 ^{b}±0.17	3.25 ^{b}±0.04	4.32 ^{a}±0.12	3.00 ^{c}±0.01
Alex-line×20% Potato Peel	2.92 ^{b}±0.02	4.39 ^{b}±0.09	2.28 ^{b}±0.12	3.31 ^{b}±0.07	3.27 ^{b}±0.04	4.17 ^{a}±0.18	3.37 ^{b}±0.06
Significance	***	***	***	***	***	***	***

***=Significant at p≤ 0.001

Different letters (a, b, c, d, e) in the same column indicate significant differences p≤ 0.05

Table (11): Economic efficiency of growing rabbits lines as feeding dietary Potato Peel meal containing diets during experimental growth periods.

Items	Dietary Potato Peel meal, %									
	V-Line					Alex. Line				
	0.0	**5**	**10**	**15**	**20**	**0.0**	**5**	**10**	**15**	**20**
Average feed intake/rabbit (kg)	3.506	3.595	3.509	3.536	3.266	3.325	3.305	3.331	3.358	3.209
Price/kg diet (L.E)	2.594	2.550	2.506	2.462	2.418	2.594	2.550	2.506	2.462	2.418
Total feed cost/ rabbit (L.E)[1]	9.095	9.167	8.794	8.706	7.897	8.625	8.428	8.347	8.267	7.759
Average body weight gain (kg)	1.227	1.296	1.230	1.137	0.839	1.237	1.282	1.329	1.120	0.951
Price/kg body weight (L.E)	22	22	22	22	22	22	22	22	22	22
Selling price (L.E)[2]	26.99	28.51	27.06	25.01	18.45	27.214	28.204	29.238	24.640	20.920
Net revenue (L.E)[3]	17.895	19.343	18.266	16.304	10.553	18.589	19.776	20.891	16.373	13.163
Economical efficiency[4]	1.968	2.110	2.077	1.873	1.336	2.155	2.346	2.503	1.981	1.696
Relative economical efficiency[5]	100	107.22	105.54	95.17	67.89	100	108.88	116.14	91.90	78.72

1- Feed cost = feed intake × price of kg of diet.
2- Selling price = body weight gain × 22 L.E/kg.
3- Net revenue = Selling price – feed cost.
4- Economic efficiency = Net revenue / feed cost.
5- Relative economic efficiency = (EE / EE of control) × 100.

REFFRENCES

A. E. S. I., Agriculture Economic and Statistics institute, 2008. Agric., Economics, Pub. By Agric. Res. Center, Egypt.

Aboh A. B.; Zoffoun, G. A.; Djenontin, A. J. P.; Babatound; and Mensah, S. G., 2013. Effect of graded levels of dry pineapple peel o digestibility and growth performance of rabbit. J. Appl. Biosci.

Adeyemi, O. A; Ajado, A. O.; Okubanjo, A. O.; and Eniolorunda, O. O., 2010. Response of growing rabbits to graded levels of fermented and unfermented pineapple peel. ejeafche, 20: 898-909.

Al-Shanti, H. A., 2003. Effect of feeding olive cake on growth performance, nutrients digestibility, carcass traits and blood constituents of growing rabbits. Egypt. J. Rabbit Sci., 13(2): 103 – 116.

Amber, K. H.; Isshak, N. S.; and EL-Niamat, M.; and EL-Abd, M., 2002. Effect of dietary fiber source on performance of growing New Zeland White rabbits. Egypt. J. Poult. Sci., 22: 127-146.

A. O. A. C., Official methods of analysis Association of Official Analytical Chemists, 2000. Washington, DC, USA.

Battaa, A. M. El-Neney; Nasra, B. Awaden; Nehad, A. Ramadan; and Rizk A. M., 2013. The impact of using different levels of miswak on reproductive performance and immunity system of Dokki 4 laying hens. Egypt. Poult. Sci., 33: 865-888.

Cheeke, P. R., 1986. Potential of rabbit production in tropical and subtropical agricultural system. J. Anim. Sci., 63: 1581 – 1586.

De Blas, J. C.; and Mateos, G. G.; 1998. Feed formulation. In: De Blas, J. C. and Wiseman, J. (Eds.), The nutrition of the rabbit. CABI Pub I., Wallingford, UK. Chapter 13: 241–253.

Duncan, D. B., 1955. Multiple range and Multiple F-test Biometrics 11:1-42.

Eka, O. U., 1977. Studies on levels of oxalic acid and phytic acid in traditional foods of northern Nigerians. West Afri. J. Biol. Appl. Chem., 20: 26-30.

Elazab, M. A.; Zahran, S. M.; Ahmed, M. H.; and Elkomi, A. E.; 2011. Productive Performance of growing rabbits fed diet containing different levels of tomato pomace. Benha Vet. Med. J., 22(2): 44-55.

El-Boushy, A. R. Y.; and Van der Poel, A. F. B., 1994. Poultry feed from waste processing and use. Chpman and hall (Ed).

El-Raffa, A. M., 2007. Formation of a rabbit synthetic line (Alexandria line) and primary analysis of its productive and reproductive performance. Egypt. Poult. Sci., 27: 321-334.

FAO, 2006. World agriculture: towards 2030/2050 – Interim report. Rome. (http://www.fao.org/fileadmin/user_upload/esag/docs/Interim_report_AT2050web.pdf).

Fapohunda, J. B.; Iji, O. T.; Makanjuola, B. A.; Omole, A. J., 2008. Effect of different levels of dry pineapple waste in the diet of growing rabbits.Proc. 33rd Annual Conf. Nig. Soc. Anim. Prod, pp. 195– 198.

Genedy, G. K. Salwa; Radwan, M. S. M; Zeid, A. E.; and Zanaty, G. A. 2000. Feeding rabbits dried watermelon by-product (Citrullus Lanatus Var.) as a replacing feed for clover hay. 8th Agricultural Development Research Conference, November, 20-22, Fac. Agric., Ain Shams Univ., Egypt.

Hamendra, S. P.; Yamini, D.; and Anand Kar, 2010. Fruit and vegetable peels: Paving the way towards the development of new generation therapeutics. Drug Discov. Ther., 4(5):314-325.

Ismail, F. S. A., 2004. Wheat screening by-product in growing rabbit diets. Egypt. Poult. Sci., 14:65-79.

Khamis, M., 2014. Impact of garlic (*Allium Sativum*) on growth traits for two lines of rabbits under hot climates condition .M. Sc. Thesis, Fac. Agri., Alex University, Egypt.

NRC, Nutrition Requirements of Rabbits. National Research Council, 1994. 2nd Ed. Nat. Acad. Sci., Washington, DC, USA.

Offor, C. E.; Nweke, F. N.; Okaka, A. N. C.; Igwenyi, I. O.; and Onwe, V. N., 2011. Analysis of the ant nutrients levels in staple food crops in three different local government areas of ebony state, Nigeria. J. Food Sci. Tech., 5(1):26-30.

Omer, H. A. A.; Ali, F. A. F.; and Ibrahim, Sh. A. M., 2011. Strawberry By-Products as a Partial Replacement of Clover Hay in Rabbit Diets. American-Eurasian J. Agric. Environ. Sci., 11(6): 815-823.

Osagie, A. U., 1998. Anti-nutritional factors. Nutritional Quality of Plant Food, pp: 221-224.

Osagie, A. U.; and Eka, O. U., 1988. Antinutritional factors (Oxalate, Saponins, trypsin inhibitor and Alkaloid). Nutritional Quality of Plant foods. post harvest unit. University of Benin. Benin City. Nigeria, pp. 233-235.

Parmar, H. S.; and Kar, A., 2009. Comparative analysis of free radical scavenging potential of several fruit peel extracts by in vitro methods. Drug Disc. Ther., 3:49-5.

Rodriguez De Sotillo, D.; Hadley, M.; Holm, E. T., 1994. Phenolics in aqueous potato peel extract: stressed rabbits. In: Proc. of the 4th International Conference on Rabbit Production in Hot Climate, Sharm El-Sheikh, Egypt, 24-27 February, pp. 325- 333.

Safwat, A. M., 2010. Effect of using corn-cobs meal and dried offal of field bean in growing rabbit diets on growth performance, digestibility coefficient, carcass traits and economic efficiency. M.Sc. Thesis, Fac. Agric. Alexandria Univ., Egypt.

Sarhan, M. A., 2005. Utilization of agro-industrial by-products of pea (*Pisum Sativum*) in growing rabbit diets. Egypt. J. rabbit Sci., 15(2): 157 – 172.

SAS, 2003. SAS/STAT Users Guide: Version 8 for Windows. SAS Istitute Inc., Cary, NC., USA.

Schneider, B. H.; and flatt, W. P., 1975. The evaluation of feed through digestibility expermints. University of Georgia press Athens, Georgia, USA. P. 423 and terminal cross rabbits. J. App. Rabbit Res., 4:66.

Shamma, T., A.; Abdel-Azeem, F. Abdel-Azeem; and Said, M. Ismail, 2014. The effect of Incorporating treated jojoba meal in broiler diets on productive and physiological performance . Egypt. J. Poult. Sci. (34) (1): 305-331.

Singh, N.; Kamath, V.; and Rajini, P. S., 2005. Attenuation of hyperglycemia and associated biochemical parameters in STZ-induced diabetic rats by dietary supplementation of potato peel powder. Clin. Chim. Acta., 353(1-2): 165-175.

Singh, N.; Kamath, V.; Narasimhamurthy, K., Rajini, P. S., 2008. Protective effect of potato peel extract against carbon tetrachloride-induced liver injury in rats. Environ. Toxicol. Pharmacol., 26(2): 241-246.

Smith, T. J.; and huxsoll, C. C., 1987. Peeling potato for processing (Eds W.F. Talburt and O. smith) AVI-Van Nostrand rein hold Company, New

Soliman, A.Z.; Selim, A.D. and A.M. Abdel-Khalek (2005). Effect of dietary crude fiber levels and supplemental lipid sources on performance of heat stressed rabbits. In: Proc. of the 4th International Conference on Rabbit Production in Hot Climate, Sharm El-Sheikh, Egypt, 24-27 February, pp. 325- 333.

الملخص العربي

الاستفادة من قشور البطاطس كمصدر للألياف في تغذية خطين من الأرانب النامية

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استخدم بالتجربة عدد ٣٠٠ أرنب عمر ٤ أسابيع من خطي الأرانب الإسكندرية وV لدراسة تأثير استبدال قشور البطاطس كمكون علفي بمستوى صفر- ٥ – ١٠- ١٥ -٢٠% كمصدر للألياف بالأعلاف. تم تقسيم الأرانب إلى خمس مجموعات بكل واحدة ٣٠ أرنب واعتبرت المجموعة الأولى مجموعة المقارنة وتم تغذيتها على العلف الخالي من المادة المختبرة موضوع الدراسة. والمجموعات الأربعة الاخرى غذيت على أعلاف الاستبدال محل كل من الردة والألفا ألفا بالمستويات المذكورة. وكانت نتائج التحليل الكيميائي لمادة العلف المختبرة ١٤% بروتين- ١٥% ألياف – ٥٧,١% المستخلص الخالي من النيتروجين حيث مثلت بقيم وسطية ما بين الألفا ألفا والردة والعكس صحيح لكل من المستخلص الاثيري والرماد والذي مثل بقيم أعلى من المواد المستبدل منها. وكانت الاختلافات معنوية فى وزن الجسم والزيادة المكتسبة وكمية العلف المستهلكة والكفاءة الغذائية خلال فترة الدراسة حيث وجد أن متوسط وزن الجسم والزيادة المكتسبة لأرانب الاسكندرية أكبر من أرانب خط V والعكس صحيح لكمية العلف المستهلكة فاستهلكت أرانب خط V أكبر كمية علف مقارنة بأرانب الإسكندرية موضحا بذلك تأثير الاختلافات ما بين الخطوط. كما وجد أن التغذية بمستوى ١٠% من قشور البطاطس أدى إلى زيادة كل من وزن الجسم والزيادة المكتسبة مما ترتب عليها زيادة في كمية العلف المستهلكة فسجلت خط أرانب الإسكندرية أحسن قيم للكفاءة التحويلية للأعلاف مقارنة بمثيلتها لأرانب خط V عند ذلك المستوى من الإضافة. وبزيادة مستوى الإضافة حتى ٢٠% أدى إلى تدهور تلك القيم فكانت بقيم ٣,٨٩ لأرانب خط V وكذا ٣,٣٧ لأرانب الإسكندرية. كما تحسنت قيم الكفاءة الاقتصادية النسبية من استخدام مستوى ٥ أو ١٠% لأرانب خط الإسكندرية بمقدار ٨,٩ – ١٦,١ % على الترتيب وبقيم ٧,٢ – ٥,٥ % لأرانب خط V مقارنة بمجموعة الكنترول الخاصة بكل منهما. وعليه يمكن استخدام مخلف قشور البطاطس كمصدر غير تقليدي للألياف بمستوى ٥ و١٠% في أعلاف الأرانب النامية لخط V والإسكندرية لما لها من تأثيرجيد كمصدر الألياف في تكوين أعلاف الأرانب.