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PRODUCTIVE PERFORMANCE OF GROWING NEW ZEALAND WHITE RABBITS FED DIETS CONTAINING DIFFERENT KINDS OF SILAGE.

Mohi-Eldin, A. M. A.; E. H. El-Ganzoury; M. E. Omara and M. M. Shehata

Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Giza, Egypt.

ABSTRACT

This study aimed to investigate effects of feeding growing rabbits on diets containing different types of silage on their productive performance. A total of 80 NZW weaned rabbits (5 weeks old) was allotted into 5 nearly equal groups, 16 in each group 8 females and 8 males. Rabbits in the 1st group were fed on 100% concentrate feed mixture (CFM) and was served as control group as compared to those fed different types of silage (30%) including carrot roots (CRS), carrot tops (CTS), berseem (BS) and corn (CS) silages. Results show that rabbits in all silage groups showed significantly ($P<0.05$) higher total DM intake than the control group. Digestibility coefficient of CP was higher for CRS, CTS and BS groups than the control group. While, rabbits in CS group was similar to the control group. The differences were significant ($P<0.05$) only between CR and each of CS and control groups. Values of OM, CF and NFE digestion were significantly ($P<0.05$) the lowest in BS as compared to the other groups. While digestion of EE was not affected significantly by dietary treatment. Rabbits in all groups showed insignificant differences in N-balance, being positive in all groups. Feeding rabbits on silage diets did not affect total protein and there fractions in blood plasma. However, a significant ($P<0.05$) increase was recorded in globulin concentration. There were no significant differences in LBW and feed conversion of growing rabbits at all feeding intervals. the effect of dietary treatment on average daily gain (ADG) of rabbits was significant ($P<0.05$) only during the interval from 11-16 weeks of age, being the highest in BS group and the lowest in CT group (14.1 and 11.9 g/day, respectively). Most carcass traits were not affected by dietary treatments. Content of DM in rabbit meat significantly ($P<0.05$) increased in all silage groups than the control group. However, contents of CP, EE and ash did not differ significantly in all silage groups than the control group. Rabbits fed CRS or CTS diets lowered total feed cost as compared to the other silage groups.

In conclusion, introducing 30% silage in diets resulted in increasing growth and economic feed efficiency of rabbits, being the highest for CRS and CTS groups.

Keywords: Rabbit, silage, growth performance, blood components and digestibility.

INTRODUCTION

The domestic rabbit is emerging as a viable livestock species due to its high prolificacy and growth rate and its better meat quality than for other farm animals. In addition, rabbits are able to consume forages containing high levels of fiber (Cheeke, 1986).

In many developing countries, good quality forage may only be available on a seasonal basis suggesting a need for forage preservation as silage or hay. Rabbits have the advantage of utilizing forages and by-products as major diet components, since forages represent an important part of the rabbits diet (Toson *et al.,* 1999).

Silage from tropical crops has higher levels of water soluble carbohydrates which make it appropriate for rabbit feeding (Partridge *et al.,* 1985). Several attempts have been successfully performed on ensiled agricultural by-products and forages in rabbit feeding and their reflexes on their growth performances, especially on berseem and sugar beet tops (Abd El-Lateif, 1996, Shetifa, 1999 and Abou-Ashour *et al.,* 2003).

Therefore, the current study aimed to evaluate the effects of feeding growing rabbits on diets containing different types of silage on their productive performance, digestibility coefficints and nutritive values as wall as composition of meat and economical efficiency during growth period.

MATERIALS AND METHODS

The present study was carried out on a flock of NZW rabbits belonging to Sakha Animal Production Station, Animal Production Research Institute, Agriculture Research center, Ministry of Agriculture during the period from Jun 2003 to March 2004.

Animals:

A total of 80 NZW growing rabbits having 5 weeks of age was divided into five equal groups, according to their weights, 16 animals in each (8 males and 8 females. All rabbits were individually housed in 30 cages (60 x 50 x 40 cm).

Rabbits in the 1st group were fed 100% concentrate feed mixture (CFM) and was considered as control group, while those in silage groups were fed on diets containing 70% CFM and 30% silage including carrot roots (CR), carrot tops (CT), berseem (BS) and corn (CS) silages.

Feeding system:

Rabbits in all groups were fed on the tested rations from 5 up to 16 wk of age according to NRC (1977) requirements for growing rabbits. The CFM was composed of different feedstuffs as shown in table (1). The amounts of CFM for all groups were offered individually at morning. While in silage groups, rabbits were given the calculated amounts of silage afternoon. Feeding was biweekly adjusted according to the LBW of growing rabbits. Chemical composition of CFM and different types of the silage as well as calculated composition of the tested rations are shown in table (2).

Growth performance parameters:

Live body weight (LBW) and feed intakes of growing rabbits during the experimental period were weekly recorded. Then, average daily gain and feed conversion were calculated at different growth intervals (5-10, 11-16 and 5-16 wk of age).

Digestibility trial and nitrogen balance:

Digestibility trial was undertaken at the end of the experimental period (16 wk of age) on four animals (2 males and 2 females) from each group. Rabbits were housed individually in metabolism cages (40 x 35 x 30 cm) which allowed feces and urine separation. The experimental diets were offered daily and fresh water was provided all the time. Feed intake was accurately determined and coprophagy was not prevented. Quantitative

collection of urine and feces started 24 hours after offering the daily feed for 5 days as a collection period, then the feces was dried at 60°C for 12 h. All collected urine or feces for each animal were mixed, then feces were ground for chemical analysis and urine was kept (4-5 °C) for analysis. Chemical analysis of different foodstuffs, feces and nitrogen in urine was determined according to A.O.A.C. (1980). Values of total digestible nutrients (TDN) were calculated according to the classic formula described by Cheeke *et al.* (1982). However, digestible energy (DE) was calculated according to the equation of Schiemann *et al.* (1972) as follows:

TDN (%) = DCP (%) + DNFE (%) + DCF (%) + 2.25 (DEE%).

DE (kcal/kg) = 5.28 (DCP, g/kg) + 9.51 (DEE, g/kg) + 4.2 (DCF + DNFE, g/kg).

where: DCP, DEE, DCF and DNFE = digestible CP, EE, CF and NFE, respectively.

Table (1): Composition of concentrate feed mixture used in rabbit feeding.

Ingredient	%	Ingredient	%
Wheat bran	30.0	Limestone	1.0
Soybean meal, 44%	16.0	Premix*	0.5
Yellow corn	20.0	Sodium chloride	0.5
Barley grain	30.0	Di-Ca phosphate	2.0
Total			100

*** One kg of premix contained 3.3 x 10^6 IU Vit. A; 3.3 g Vit. E ; 3.3 x 10^6 IU Vit. D_3 ; 0.33 g Vit. K; 0.33 g Vit B_1 ; 1.33 Vit. B_2 ; 6.67 Vit B_5 ; 0.50 g Vit B_6 ; 3.3 g Vit. B_{12} ; 3.3 Pantothenic acid ; 0.33 Folic acid ; 16.67 mg Biotin ; 166.67 g Cholin ; 1 g Copper ; 10 g Iron ; 13.3 g Mn ; 15 g Zn ; 0.1 g Iodin ; 0.03 g Se and Carrier $CACO_3$ to 1 kg.**

Table (2): Chemical analysis on DM basis of concentrate feed mixture (CFM) and different types of silage used in rabbit feeding.

Item	DM %	Chemical analysis (%) on DM basis					
		OM	CP	EE	CF	NFE	Ash
Chemical composition of feed stuffs:							
CFM	91.4	89.6	18.0	1.9	12.6	57.1	10.4
Carrot	28.92	84.81	10.01	2.69	20.41	51.4	15.49
Carrot tops	31.85	69.08	8.83	1.06	25.9	34.01	30.2
Berseem	26.06	87.87	14.31	3.10	23.31	47.15	12.13
Corn	28.95	93.08	8.79	2.64	24.86	56.79	6.92
Calculated composition of tested rations:							
Control (CFM)	91.4	89.6	18.0	1.9	12.6	57.1	10.4
Carrot root silage (CR)	54.9	88.2	15.9	2.1	14.7	55.5	11.8
Carrot tops silage (CT)	57.9	83.9	15.4	1.6	16.4	50.5	16.1
Berseem silage (BS)	53.6	89.1	17.0	2.2	15.5	54.4	10.9
Corn silage (CS)	56.1	90.4	15.5	2.1	16.0	56.8	9.6

Blood parameters:

Blood samples were collected in heparinized test tubes from the ear vein of five rabbits in each group. Thereafter, blood plasma were separated by centrifugation at 3000 rpm for 15 min and stored at -20°C until chemical analyses. Concentration of total protein (Gornall *et al.*, 1949), albumin (Weichselaum, 1946) and creatinine (Henry, 1965) as well as activity of aspartate (AST) and alanine (ALT) transaminases (Reitman and Frankal,

1957) in blood plasma were determined using commercial kits (Diagnostic System Laboratories, Inc USA). Plasma globulin concentration was calculated by subtracting concentration of albumin from total proteins.

Slaughter procedure:

Three males from each group were randomly taken and weighed before slaughter. After complete bleeding, the head, pelt, viscera, feet and tail were removed. Weight of carcass (dressed weight) was recorded, then dressing percentage was calculated. Weights of edible and non-edible organs were recorded. Samples from meat from the right caudal side of the carcass were taken for analysis according to A.O.A.C. (1980).

Economic feed efficiency:

Economic feed efficiency (EFE%) was calculated according to the following equation:

$$EFE\% = (A-B / B) \times 100$$

Where:

A = Price of kg gain in Egyptian pound (L.E.)

B = Feed cost per kg gain (L.E.)

Statistical analysis:

Results were statistically analyzed according to Snedecor and Cocharn (1982). However, the significant differences among treatments were tested using Duncan's Multiple Range Test (1955).

RESULTS AND DISCUSSION

Feed intake:

Table (3) show that dry matter intake (DMI) from CFM at all feeding intervals was significantly ($P<0.05$) higher for control group than those in all silage groups, which was in accordance with the designed feeding system for the experimental groups. However in silage groups, rabbits significantly ($P<0.05$) increased their intakes from CTS during intervals from 5-11 wk of age and from berseem silage during the interval from 11-16 wk of age. This reflected in significantly ($P<0.05$) higher intake from carrot tops and berseem silages during the whole feeding interval from 5 to 16 wk of age. Rabbits in all silage groups showed significantly ($P<0.05$) higher total DMI than the control group.

The present results regard to feed intake from different types of silage are similar to that reported by Abd El-Lateif (1996); Shetiefa (1999) and Omara (2005).

Feed consumption of rabbits depends basically on nutrient contents in accordance with the actual energy need of the animal (Dehalle, 1981) or/and protein and fiber level of its ration (Fekete and Bokori, 1985). The lower intake from corn silage might be in relation to the higher content of OM and CF (Shetiefa, 1999).

Table (3): Average daily DM (g) of CFM and different types of silage intaked by growing rabbits during different experimental intervals.

Item	Control	CRS	CTS	BS	CS
5-10 wk of age:					
CFM	80.4±0.0^{a}	61.6±0.06^{b}	62.0±0.01^{b}	63.4±0.01^{b}	62.1±0.01^{b}
Forage	---	25.0±0.08^{b}	27.2±0.07^{a}	25.4±0.09^{b}	25.5±0.08^{b}
Total	80.4±0.0^{b}	86.6±0.17^{a}	89.2±0.07^{a}	88.7±0.05^{a}	87.6±0.08^{a}
11-16 wk of age:					
CFM	131.9±0.0^{a}	100.4±0.04^{b}	100.6±0.0^{b}	100.6±0.0^{b}	100.6±0.0^{b}
Forage	---	44.2±0.06^{b}	44.5±0.07^{b}	46.0±0.09^{a}	43.3±0.09^{b}
Total	131.9±0.0^{b}	144.6±0.04^{a}	145.1±0.07^{a}	146.7±0.09^{a}	144.0±0.08^{a}
Overall mean (5-16 wk of age):					
CFM	104.14±0.05^{a}	79.46±0.03^{b}	79.82±0.12^{b}	83.06±0.22^{b}	79.87±0.0^{b}
Forage	---	33.86±0.18^{b}	35.18±0.13^{a}	34.90±0.21^{a}	33.72±0.13^{b}
Total	104.14±0.3^{b}	13.32±0.14^{a}	115.0±0.12^{a}	17.96±0.22^{a}	13.59±0.13^{a}

a, b and c: **Group means denoted with different superscripts within the same row are significantly different at P<0.05.**

Digestibility coefficients and nutritive values:

Data in table (4) show that digestibility coefficient of CP was higher for CR, CT and BS groups than the control group. While, rabbits in CS group was similar to the control group. Values of OM, CF and NFE digestion were significantly (P<0.05) the lowest in BS as compared to the other groups. While digestion of EE was not affected significantly by dietary treatment.

Table (4): Nutrients digestibility and nutritive value of the experimental rations.

Item	Control	CRS	CTS	BS	CS
Digestion coefficients:					
OM	75.86±1.1^{a}	75.54±1.0^{a}	74.30±1.3^{ab}	70.13±1.7^{b}	73.38±0.7^{ab}
CP	72.94±0.4^{b}	78.91±1.4^{a}	73.68±0.4^{ab}	74.31±2.7^{ab}	72.86±1.5^{b}
EE	79.52±4.1	75.14±3.7	71.94±3.8	73.39±1.1	72.91±0.4
CF	58.77±2.3^{a}	65.27±1.6^{a}	56.92±4.3^{ab}	52.89±3.9^{b}	56.67±2.4^{ab}
NFE	80.43±1.8^{a}	79.10±0.5^{a}	80.23±1.0^{a}	68.43±2.9^{b}	78.27±0.7^{a}
Nutritive values (%):					
TDN	69.79±0.97^{a}	69.57±0.16^{a}	63.84±1.16^{b}	61.67±1.69^{b}	68.33±0.7^{a}
DCP	13.16±0.06^{a}	12.52±0.27^{a}	11.36±0.02^{b}	12.63±0.46^{a}	11.29±0.2^{b}

a and b: **Group means denoted with different superscripts within the same row are significantly different at P<0.05.**

The observed reduction in digestion of OM, CF and NFE may be attributed to significantly (P<0.05) feed intake from berseem silage diet during feeding interval from 11-16 wk of age. The present results were similar to those obtained by Abd El-Lateif (1996); Shetiefa (1999); Abou-Ashour *et el*. (2003) and Omara *et al.* (2005) on NZW rabbits fed different types of silage.

The present study indicated beneficial effect of inclusion carrot roots and corn silages in rations of rabbits in term of insignificant differences in nutritive value as TDN as compared to the control diet, however, inclusion of

carrot tops or berseem silages significantly decreased nutritive values as TDN%. On the other hand, nutritive values as DCP% were significantly lower only in carrot tops and corn silage diets as compared to the control group.

Nitrogen balance:

Results in table (5) revealed no significant differences among dietary groups in N-balance (g/head/day). Differences in N-intake, N-fecal, N-urinary, N-digested and N-retained as g/head/day were not affected by dietary treatments. Generally, N-balance was positive in all dietary groups.

Table (5): Nitrogen (N) balance of growing rabbits fed different dietary treatments.

Item	Control	CRS	CTS	BS	CS
N-intake (g/h/d)	3.17±0.01	3.18±0.9	3.15±0.12	3.18±0.12	3.08±0.05
N-exerted (g/head/day).					
Feces	0.92±0.05	0.91±0.06	0.95±0.03	0.96±0.10	0.88±0.03
Urine	1.22±0.02	1.15±0.06	1.13±0.06	1.24±0.03	1.26±0.06
Total	2.14±0.05	2.06±0.10	2.08±0.10	2.20±0.12	2.14±0.04
Digested	2.26±0.04	2.26±0.05	2.20±0.08	2.22±0.06	2.20±0.08
Retained	1.03±0.03	1.12±0.02	1.07±0.03	0.98±0.08	0.94±0.07

Blood biochemical parameters:

Feeding rabbits on silage diets did not affect protein metabolism in liver. However, a significant ($P<0.05$) increase was recorded in globulin concentration, which was association with tendency of higher concentration of total protein (Table 6).

The normal function of liver in rabbits fed silage diets was indicated from the insignificant differences in activity of AST and ALT in plasma. In addition, disappearance of significant differences in concentration of creatinine between all silage groups and control one may suggest normal function of kidney in all groups. So, inclusion different types of silage is in the save side without any harmful effects on liver and kidney function. Similar finding were obtained on NZW rabbits fed on different types of silage by Abd El-Lateif (1996), Shetifa (1999) and Abou-Ashour *et al.* (2003).

Table (6): Average values of some biochemical concentrations and transaminases activity in blood plasma of growing rabbits fed different dietary treatments.

Item	Control	CRS	CTS	BS	CS
Total protein (g/dl)	7.10±0.3	7.82±0.2	7.33±0.2	7.73±0.3	7.96±0.3
Albumin (g/dl)	3.46±0.1	3.58±0.1	3.60±0.3	3.73±0. 1	3.66±0.1
Globulin (g/dl)	3.54±0.1^{c}	4.24±0.2^{a}	3.73±0.1^{bc}	4.0±0.1^{ab}	4.30±0.2^{a}
Creatinine (mg/dl)	1.65±0.2	1.70±0.3	1.68±0.2	1.75±0.1	1.80±0.1
AST (U/l)	41.6±2.1	42.6±2.4	39.2±2.5	43.6±3.1	42.9±2.3
ALT (U/l)	26.3±1.4	27.3±1.6	25.3±1.4	26.9±1.2	27.6±1.2

a and b: Group means denoted with different superscripts within the same row are significantly different at $P<0.05$.

Level of protein in blood may reflect the nutritional status of the animals. Concentration of total protein (TP) and their fractions in blood were affected by feed consumption and consequently protein intake (Khalil, 1988

and Abd El-Moty, 1991) and by level of dietary protein (Ayyat, 1991). The significantly ($P<0.05$) higher total DMI in all silage groups than the control group (Table 4) was associated with significant differences in nutritive values of different silage rations (Table 5) and insignificant differences in concentration of total proteins and their fractions among dietary groups (Table 6). Such findings may indicate a higher protein utilization for rabbits fed silage diets, particularly rabbits in CTS, than the control group.

Concentration of creatinine in plasma did not differ significantly among dietary groups (Table 6). Increases in creatinine levels in blood of rabbits may cause or induce kidney dysfunction. The present levels of creatinine may indicate a normal function of kidneys in rabbits of all silage groups.

The present activity of transaminases in plasma is within the normal ranges which indicate normal function of liver and heart (Ayyat, 1991 and Abd El-Rahim, 1996). Metwally and Mohsen (1997) reported positive correlation of AST activity and negative correlation of ALT activity with body weight. This may explain the absent of significant differences in activity of transaminases (AST and ALT) in blood plasma of rabbits in all dietary groups (Table 6).

Growth parameters:

Data in table (7) show insignificant differences in live body weight and feed conversion (FC) of growing rabbits at all feeding intervals, although there was a tendency of the heaviest weight for rabbits in CRS group as compared to the control.

It is of interest to note that the effect of dietary treatment on average daily gain (ADG) of rabbits was significant ($P<0.05$) only during the interval from 11-16 weeks of age, being the highest in BS group and the lowest in CT group (14.1 and 11.9 g/day, respectivily). The present values of ADG are similar to those reported by Shetiefa (1999); Abdel-Latif (1996) and Omara, (2005) in growing NZW rabbits fed different types of silage diets.

Generally, satisfactory growth rates were achieved by rabbits fed on different rations at all intervals (17.6-18.7 g/h/d). Similar values of ADG were recorded by Abd El-Lateif (1996) for NZW rabbits fed on diets containing silage.

Table (7): Growth parameters of growing rabbits fed different dietary treatments at different intervals of the experimental period.

Item	Control	CRS	CTS	BS	CS
Live body weight:					
5 wk	655±15	650±22	641±17	659±18	659±15
10 wk	1541±36	1632±38	1608±33	1585±33	1587±38
16 wk	2101±39	2200±42	2097±38	2166±45	2113±37
Average daily gain (g):					
5-10 wk	21.63±0.6	23.72±0.7	23.61±0.6	22.41±0.6	22.66±0.9
11-16 wk	13.66±0.4^{ab}	13.74±0.8^{ab}	11.92±0.5^{b}	14.14±0.7^{a}	12.83±0.7^{b}
5-16 wk	17.64±0.4	18.79±0.4	17.76±0.4	18.29±0.5	17.74±0.5
Feed conversion (g) feed /(g) gain:					
5-10 wk	3.75±0.1	3.65±0.2	3.82±0.1	4.00±0.1	3.97±0.2
11-16 wk	9.83±0.4	10.50±0.5	12.48±0.5	10.78±0.6	12.20±1.3
5-16 wk	7.25±0.3	7.94±0.6	8.68±0.3	7.87±0.6	8.27±0.4

Carcass traits:

Data in table (8) show that preslaughter weight and other carcass traits were not affected significantly by silage diets as compared to the control group.

Table (8): Carcass traits of rabbits fed different dietary treatments.

Item	Control	CRS	CTS	BS	CS
Preslaughter weight (g).	2073±185	2163±120	2138±120	2305±126	2090±80
Carcass weight (g).	1063.3±95	1105±70	1083.7±52	1179.6±49	1065.3±45
Dressing%(1)	51.3±0.14	51.1±0.63	50.7±0.50	51.2±0.73	51.0±0.43
Weight of edible offals (g):					
Head	120.3±	138.9±	130.0±	124.3±	129.3±
Heart	4.8±0.33	5.2±0.31	4.8±0.42	7.2±0.89	5.1±0.09
Liver	52.5±6.3	58.6±4.14	56.8±3.61	60.6±3.1	62.2±6.6
Kidney	14.4±0.57	15.8±0.24	13.1±1.52	15.3±0.86	14.1±0.8
Testes	6.9±0.4^{bc}	5.4±0.67^{c}	6.5±0.13^{bc}	7.6±0.64^{ab}	8.9±0.76^{a}
Total*	198.9	223.5	211.1	215.0±	219.3
Drawn weight	1262.2	1328.5	1294.8	1394.6	1284.7
Dressing%(2)	60.88	61.41	60.55	60.50	61.47
Weight of non-edible offals (g):					
Skin	365.7	371.7	361.7	384.0±	372.7
Lungs	10.4±0.74	13.6±1.67	13.4±0.82	14.2±2.1	9.8±0.94
Blood	70.0±2.89	56.7±6	68.3±3.34	68.3±4.42	69.0±6.6
Digestive tract	365.0±73	392.9±21	400.2±24.5	443.8±51	353.8±17
Total**	811.1	834.9	843.6	910.4	805.3

a and b: **Group means denoted with different superscripts are significantly different at P<0.05.** * **Weight of edible organs (g)** ** **weight of in-edible offals(g).**

In agreement with the present results, feeding rabbits on diets containing sugar beet tops silage (SBTS) or BS (Abd El-Lateif, 1996) and maize cob silage (Succi *et al.*, 1974) did not affect weight of edible organs as compared to the control diets. Also, Abd El-Lateif (1996) found no dietary effect on full weight of the digestive tract of NZW rabbits fed on SBTS and BS diets as compared to berseem hay diet.

Chemical composition of meat:

Concerning the chemical composition of rabbit meat, content of DM significantly (P<0.05) increased in all silage groups than the control group (Table 9).

In accordance with the present results, Malhate (1992) and Abd El-Lateif (1996) mentioned that feeding NZW rabbits on diets containing silage did not affect meat composition. Generally, the present composition is within the normal range reported Gad-Allah (1997) on rabbit meat.

Table (9): Chemical composition of meat samples of rabbits fed the different dietary treatments.

(%)	Control	CR	CT	BS	CS
DM	25.1±0.42^{b}	28.82±0.28^{a}	28.33±0.45^{a}	28.73±0.38^{a}	28.36±0.25^{a}
CP	75.86±0.17	76.18±0.76	75.20±0.38	75.93±0.81	74.26±0.68
EE	15.85±0.27	16.58±0.40	16.30±0.30	16.68±0.49	15.85±0.57
Ash	8.59±0.69^{ab}	7.23±0.63^{b}	8.49±0.61^{ab}	7.39±0.43^{b}	9.89±0.12^{a}

a and b: **Group means denoted with different superscripts are significantly different at P<0.05.**

Economic feed efficiency:

In comparing price of different treatment diets, incorporation of forage in silage diets resulted in marked reduction in total feed cost, being 78.7, 77.3, 84.3 and 81.4% in CRS, CTS, BS and CS, respectively, of that in the control group (Table 10).

Table (10): Economical efficiency of rabbits fed different dietary treatments at the end of the experimental period.

Item	Control	CRS	CTS	BS	CS
Feed intake as fed (kg):					
CFM	9.48	7.23	7.26	7.56	7.27
Forage	-	3.08	3.20	3.18	3.07
Cost of feed intake (L.E./kg)					
CFM	12.42	9.47	9.51	9.90	9.52
Forage	-	0.308	0.096	0.572	0.592
Total feed cost (L.E.)	12.42	9.778	9.606	10.472	10.112
Reduction of feed cost	100	78.7	77.3	84.3	81.4
Total weight gain (kg)	1.45	1.55	1.46	1.51	1.45
Feed cost/kg gain	8.57	6.31	6.58	6.94	6.79
Net revenue (LE)/head	3.43	5.69	5.42	5.06	5.21
Economic feed efficiency (%)	40	90.2	82.4	72.9	76.7
EFE (%) Relative to control	100	225.5	206	182.3	191.7

Price /kg (LBW) LE was 12.0 L.E. Price of CFM, CRS, CTS, BS and CS was 1310, 100, 30, 180 and 160 L.E., respectively

The lowest total feed cost of CRS and CTS groups and higher total weight gain of rabbits fed these rations led to higher EFE% for both groups as compared to the other silage groups as well as the control group. Similar results were reported by Mutetikka *et al.* (1990) using agroindustrial by-products in ration of rabbits and by Abdel-Latif (1996) and Shetiefa (1999) using different types of silage.

In conclusion, introducing 30% silage in diets resulted in increasing growth and economic feed efficiency of rabbits, being the highest for CRS and CTS groups.

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الأداء الإنتاجي للأرانب النيوزلاندى النامية المغذاة علي غذاء يحتوى علي أنواع مختلفة من السيلاج.

عبد الحليم محمد عبد السلام محي الدين، النبوي حامد الجنزوري، محمد عيسى عمارة و ممتاز محمد شحاتة

معهد بحوث الإنتاج الحيواني - مركز البحوث الزراعية – وزارة الزراعة- مصر.

تهدف هذه الدراسة تأثير تغذية الأرانب النامي علي علائق محتوية علي أنواع مختلفة من السيلاج علي كفاءتها الإنتاجية. استخدم في هذه الدراسة ٨٠ أرنب النيوزلاندى نامي عمر ٥ أسابيع مقسمة إلي خمس مجموعات تجريبية مغذاة علي عليقه مصنعة بكل مجموعة ١٦ أرنب (٨ ذكور و ٨أيناث). المجموعة الأولي غذيت علي ١٠٠% عليقه مصنعة بينما المجاميع الأخرى غذيت علي ٧٠% عليقه مصنعة و٣٠% سيلاج (المجموعة الثانية غذيت علي سيلاج الجزر والمجموعة الثالثة علي سيلاج عروش الجزر والمجموعة الرابعة علي سيلاج البرسيم والمجموعة الخامسة علي سيلاج الذرة الكامل). وغذيت كل المجاميع من عمر ٥ أسابيع وحتى عمر ١٦ أسبوع ويمكن تلخيص النتائج المتحصل عليها كالتالي:-

1- أظهرت كل المجاميع المعاملة زيادة معنوية في المادة الجافة المأكولة مقارنة بالكنترول.
2- ارتفع معامل هضم البروتين في مجموعات السيلاج عن مجموعة المقارنة ماعدا مجموعة سيلاج البرسيم التي لم تختلف معنويا عن المجموعة المقارنة.
3- لم يتأثر ميزان الطاقة بين المجموعات التجريبية.
4- لم يتأثر البروتين الكلي في سيرم الدم بالمعاملات في مجموعات السيلاج مقارنة بمجموعة المقارنة.
5- إدخال السيلاج في علائق الأرانب أدى إلي زيادة في معدلات النمو وخاصة في الفترة من ١١ حتى ١٦ أسبوع بينما وزن الجسم ومعدل استهلاك الغذاء اليومي لم يختلف معنويا في كل المجموعات التجريبية.

عموما فإن الدراسة المقدمة توصى بإدخال سيلاج البرسيم والذرة والجزر في علائق الأرانب النوزلاندى النامية لتحسين كفاءتها الإنتاجية.