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A STUDY ON USING DIFFERENT ENERGY LEVELS FOR GROWING RABBITS IN EGYPT.

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SUMMARY:- *Fourty eight male NZW rabbits of 49 day-old, with nearly equal live body weight at the beginning of the experiment were randomly allotted to three treatment groups of 16 rabbits each. Treatment groups fed diets with different energy levels. The first group was used to be fed on a high energy diet (2707 Kcal De/Kg) and the other two groups served to be fed on medium (2436 Kcal DE/Kg) and low (2276 Kcal De/Kg) energy diets; respectively. The rabbits were raised under the same managerial and hygienic conditions, in windowed rabbitry and in flat-deck batteries under semi-intensive production system.*

The results did not show any significant difference due to different dietary energy levels on live weight, weight gain, feed conversion. The results show that the economical efficiency was higher for low energy diet than the correspondigng in high and medium energy diets.

The digestibility of the nutrients, carcass traits and most of blood constituents did not differ significantly among the three dietary energy levels fed to the three rabbit groups. The low energy diet is more profitable than the medium and high energy ones for growing rabbits up to marketing age (13 weeks).

Key words: Growing rabbits; dietary energy level; growth, feed conversion, economical efficiency carcass traits, blood constituents.

INTRODUCTION:-

Although a high energy diet is expensive and subjected to rancidity under the Egyptian subtropical climatic conditions, it has been shown to improve efficiency of feed conversion in rabbits **(Parigi-Bini, 1968).** However, **Maertens (1992)** recommended lower energy requirments (2250 DEKAL /kg Feed) for weanling rabbit to avoid the digestive disorders since early weaning is required.

This study aimed to investigate using different energy levels in the weanling rabbit diets on the digestibility, growth performance, blood constituents and carcass traits of growing New

Zealand White rabbits under Egyptian conditions.

MATERIALS AND METHODS:

This study was carried out on the rabbit flock, National Rabbit Project, Animal Production Department, Faculty of Agriculture, Zagazig University, from January to March, 1993.

Fourty eight male NZW rabbits of 49 day -old, with nearly equal live body weight at the beginning of the experiment were randomly alloted to three treatment groups of 16 rabbits each. Treatment groups fed diets with different energy levels (Table 1). The first group was used to be fed on a high energy diet and the other two groups served to be fed on medium and low energy diets , respectively.

The rabbits were housed in batteries provided with feeders and automatic drinkers. The batteries were located in a conventional confined and windowed building, naturally ventilated and provided with electric fans.

Rabbits were weighed at weekly intervals, while daily feed consumption was recorded. Feed and water were available ad libitum all time. At the end of the feeding period four rabbits from each treatment (13 week old) were housed in individual metabolism cages. Feaces and urine were quantitatively collected for 5 days. Samples were prepared for chemical analysis according to **A.O.A.C (1980)**.

Economical efficiency % calculated, at marketing age (13 wk-old) according to the following equation:

$$\text{Economic efficiency \%} = \frac{\text{sale price of the obtained gain} - \text{feeding cost of the obtained gain}}{\text{feeding cost of the obtained gain}} \times 100$$

At the end of the experimental period, 3 rabbits from each group were randomly taken for slaughter after being fasted for 12 hours. After complete bleeding, the same carcass and non-carcass components were weighed. Blood samples were taken at the time of slaughter to estimate blood components.

The data of digestibility trial, body weight and gain, blood components and slaughter traits were statistically analysed **(Snedecor and Cochran, 1982)** according to the following model:

$y_{iJ} = U + t_i + e_{iJ}$

Where

y_{iJ} = An observation

U = The over mean,

t_i = The fixed of the dietary energy sources (i = 1, ..., 3),

e_{iJ} = Random error.

The differences between experimental groups were separated by **Duncan's** multiple range test **(Duncan, 1955).**

RESULTS AND DISCUSSION:

The feed intake was higher for the lower dietary energy groups, which may explain its lower digestibility of DM, OM, CP and CF.

The digestibility of DM, OM and CF was significantly ($p<0.05$) higher in the high energy group than in the low energy group, but the difference was not significant when compared with the medium energy group (Table 2). **Deshmukh and Pathak (1992)** obtained similar results. Digestibility of CP decreased ($P<0.05$) with groups fed on medium and low energy when compared to the high energy diets. The EE and NFE digestibilities for the three experimental levels of energy did not differ significantly (P <0.05). Results presented in Table 2 showed that the groups of rabbits which fed low energy level in the diet had higher values (P<0.05) of urinary - N and total N-excreted (g/h/d) than in groups fed high and medium energy diets.

Rabbits fed on low energy level showed similar (25.7g) insignificant values of live weight at marketing age (13 weeks), daily weight gain and were of similar growth with the other rabbits fed high (25.5g) and medium (26.6g) energy diet (Table 3).

Feed conversion was in favour with the high and medium energy level however, economical efficiency was higher for low energy diet than for high and medium ones. **Partridge (1986), Deshmukh and Pathak (1991), Fernandez and Maria (1992) and Castello and Gurri (1992)** obtained similar results and revealed significant differences due to different energy levels. However **Essie Evans (1981) and Beynen (1988)** found greater weight gain with high energy diet when compared to the low energy diet. **Ayyat (1991)** also found that the average of body weight of growing NZW rabbits treated with 10% vegetable oils (Soyabean oil or cotton seed oil) were higher significantly (p<0.01) than control animals.

Serum total protein or its fractions (albumine and globulin) decreased significantly (p<0.05) as the level of energy increased (Table 4). The present results are in agreement with the finding of **Mohamad (1993)** who found that the lowest mean values of total protein and globulin were recorded for rabbits given the highest palm oil value (9%).

Serum thyroxine (T_4), total lipids, colesterol and creatinine concentrations were not affected due to the three studied energy levels (high, medium and low).

Results of carcass traits and chemical analysis of meat (Table 5) showed that the different dietary energy levels did not affect these traits (p<0.05) in the present study.

It could be concluded that the low energy diet (2278 kcal/kg) is more profitable than the other two studied levels (medium 2436 and high 2707 kcal/kg diet)from the economical point of view in the present study. The recommendation of **Maertens (1992)** may support the present findings, concerning the favourable effect of lower energy diet for the weanling rabbits, as the young kits have immature pancreatic enzyme system which is not only dependent on age but also on the energy dietary levels.

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

Energy levels Items	1 High	2 Medium	3 Low
Ingredients %			
Berseem hay	20.50	29.00	28.00
Soybean meal	18.00	14.50	12.50
Wheat bran	9.50	28.00	42.00
Yellow corn	40.00	20.00	7.50
Peanut hull	7.50	2.00	2.00
Phenas	1.35	3.35	4.85
Mixture of vitamins and minerals	0.30	0.30	0.30
Bone meal	2.25	2.50	2.50
Sodium chloride	0.25	0.25	0.25
DL- Methionine	0.10	0.10	0.10
Total	**100.00**	**100.00**	**100.00**
Chemical analysis			
Calculated DE(kcal/kg diet).	2707	2436	2278
DM%	90.60	89.40	90.00
OM%	81.97	79.87	81.88
CP%	15.57	15.75	16.10
CF%	12.00	11.80	12.40
EE%	2.00	2.30	2.20
NFE%	52.40	50.02	51.18
Ash%	8.63	9.53	8.12
C/P ratio	173.86	154.67	141.49
Cost of each kg diet (L.E)	0.55	0.48	0.43

*Each 1 kg of the mixture contains:

Vit. A 2000.000 IU- Vit.D_3 150.000 Iu-vit E8333.33 mg-vit 333.3 mg vit B1 333.3 mg-vit-B2 1000 mg-vit bb 333.3 mg-vit B12 1.67 mg. Pantothenic acid 333.3 mg-Nicotinic acid 833.3 mg-Folic acid 833.3 mg Choline chloride 200.000 mg-Biotin 33.3 Manganese 500 mg Zinc 11666.67 mg-Iron 12500 mg-Copper 500 mg-Cobalt 16.67 mg Iodine 33.33 mg-Selenium 16.67 mg-Magnisium 66666.67 mg.

Table (2): Digestion coefficient and N-utilization of growing NZW rabbits (7-13 weeks of age) as affected by different energy levels.

Energy levels / Items	1 (2707 Kcal De/Kg diet) High	2 (2346 Kcal De/Kg diet) Medium	3 (2278 Kcal De/Kg diet) Low
Digestion coefficient (%)			
DM	71.87±2.06 [a]	68.68±1.74 [ab]	63.49±2.25 [b]
OM	72.34±2.05 [a]	69.08±1.86 [ab]	63.40±2.19 [b]
Cp	76.37±1.02 [a]	72.76±1.41 [b]	71.88±0.62 [b]
CF	23.92±1.20 [a]	22.32±1.18 [a]	17.61±0.74 [b]
EE	74.65±1.36 [a]	70.63±3.09 [a]	73.40±1.70 [a]
NEF	82.04±2.72 [a]	78.92±2.37 [a]	71.37±3.60 [a]
N-utilization:			
N- intake:			
g/h/d	2.66±0.33 [a]	2.93±0.27 [a]	3.47±0.22 [a]
$g/kg/W^{0.75}$	1.52±0.15 [a]	1.67±0.17 [a]	1.95±0.12 [a]
N-excreted (g/h/d)			
Fecal-N	0.63±0.10 [a]	0.80±0.09 [a]	0.98±0.06 [a]
Urinary-N	1.09±0.05 [b]	1.14±0.12 [b]	1.53±0.07 [a]
Total-N	1.72±0.12 [b]	1.94±0.14 [b]	2.51±0.13 [a]
N-absorbed (g/h/d)	2.03±0.23 [a]	2.13±0.19 [a]	2.49±0.16 [a]
N-balance:			
g/h/d	0.94±0.24 [a]	0.99±0.29 [a]	0.96±0.10 [a]
$g/kgW^{0.75}$	0.54±0.11 [a]	0.57±0.17 [a]	0.54±0.07 [a]

a, b means with different superscripts in the same row differ significantly at ($P < 0.05$).

Table (3): Growth performance and enconomical efficiency of growing NZW rabbits (7-13 weeks of age) as affected by different energy levels.

Energy levels Items	1 2707 Kcal De/Kg diet High	2 2436 Kcal De/Kg diet Medium	3 2278 kcal DE/kg diet Low
Initial number of rabbit	16	16	16
Live weight (g)			
Initial (7 wk. old)	849.0±14.0	849.0±13.0	850.0±13.0
At 13 weeks of age	1922.0±50.0	1965.0±42.0	1928.0±61.0
Daily gain (g/d)			
7-13 week of age	25.5±0.9	26.6±0.8	25.7±1.1
Body gain (g) per 100g live weight			
7-13 week of age	77.44	79.32	77.61
Feed intake (g/d)			
7-13 weeks of age	83.0±3.2	89.0±2.5	94.0±2.9
Feed conversion (g feed/g gain)			
7-13 weeks of age	3.3	3.3	3.7
Feed cost*			
7-13 weeks of age	1.95	1.77	1.72
Economical efficiency %	202.56	246.89`	244.77

All the differences between means were not statistically significant (P<0.05).

* Price 1 kg of ration, 0.55, 0.48 and 0.43 LE for groups 1, 2 and 3 respectively.

** Price of selling 1 kg rabbit live weight = 5.5 L.E.

Table (4): Blood components of growing NZW rabbits (7-13 week of age) as affected by different energy levels.

Energy levels / Items	1 (2707 Kcal DE/kg diet) High	2 (2436 Kcal DE/kg diet) Medium	3 (2278 Kcal DE/kg diet) Low
Thyroxine (T4)	1.30±0.15 [a]	1.40±0.06 [a]	1.30±0.06 [a]
Total protein (g/100 ml)	5.36±0.07 [c]	5.64±0.09 [b]	5.94±0.04 [a]
Albumin (A) (g/100 ml)	2.76±0.02 [b]	2.87±0.03 [a]	2.96±0.04 [a]
Globulin (G) (g/100 ml)	2.60±0.05 [c]	2.77±0.07 [b]	2.98±0.02 [a]
A/G ratio	1.06±0.01 [a]	1.04±0.02 [a]	0.99±0.02 [a]
Total lipids (mg/100 ml)	283.0±6.57 [a]	304.33±3.34 [a]	314.33±7.75 [a]
Cholesterol (mg/100 ml)	92.0±2.65 [a]	101.67±6.37 [a]	107.67±5.49 [a]
Creatinine (mg/100 ml)	0.99±0.01 [a]	1.03±0.04 [a]	1.03±0.04 [a]

a, b, c means with different superscripts in the same row differ significantly at ($P < 0.05$).

Table (5): Carcass traits and chemical analysis of meat for growing NZW rabbits (7-13 weeks of age) as affected by different energy levels.

Energy levels Items		1 (2707 Kcal De/Kg diet) High	2 (2436 Kcal De/kg diet) Medium	3 (2278 Kcal De/kg diet) Low
Pre-slaughter weight	(g)	2200.0±57.7	2188.3±32.4	2211.7±60.16
Dressing weight	(g)	1258.3±36.3	1201.7±34.7	1206.7±69.5
	(%)	57.2±0.2	54.9±0.8	24.6±1.9
Liver weight	(g)	60.0±2.9	58.3±3.3	61.7±1.7
	(%)	2.7±0.1	2.7±0.1	2.8±0.1
Kidney fat weight	(g)	18.3±1.7	20.0±2.9	21.7±1.7
	(%)	0.8±0.1	0.9±0.1	1.0±0.1
Abdominal fat weight	(g)	11.7±1.7	15.0±2.8	16.7±1.7
	(%)	0.5±0.1	0.7±0.1	0.8±0.1
Forelimbs weight	(g)	275.0±5.8	253.2±3.3	253.3±25.9
	(%)	12.5±0.3	11.6±0.2	11.6±0.9
Trunk weight	(g)	356.7±24.5	338.3±24.6	350.0±10.0
	(%)	16.1±0.8	15.5±0.09	15.8±0.2
Hindlimbs weight	(g)	450.0±10.0	428.3±10.9	430.0±20.8
	(%)	20.4±0.3	19.9±0.3	19.4±0.2
Chemical analysis	(%)			
Moisture		68.8±0.6	68.6±0.3	68.7±0.7
CP		20.8±0.1	20.9±0.1	21.0±0.1
EE		6.5±0.4	6.7±0.3	6.7±0.6
Ash		2.9±0.1	2.9±0.1	2.6±0.2

All the differences between means were not statistical significant (P<0.05).