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EFFECT OF DIETARY CRUDE FIBER LEVELS ON PERFORMANCE, DIGESTIBILITY, CARCASS QUALITY AND BLOOD CONSTITUENTS OF GROWING RABBITS

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SUMMARY

A number of thirty (mixed sex) growing New Zealand White rabbits were allocated into three equal groups. Rabbits were fed three iso nitrogenous and iso caloric diets for 7 weeks experimental period. Diets were formulated and pelleted to contain 12, 16 and 22% crude fiber (CF).

To study the effect of CF levels on performance, nutrients, digestibility, cecal microbial activity, carcass and blood constituents of rabbits. Results obtained could be summarized as follows:-

Final body weight (FBW) and average daily gain (ADG) were higher for rabbits fed 12% CF than those fed diets containing 16 and 22% without any significant differences.

Feed intake, digestible energy intake, crude protein intake decreased with increasing dietary CF 12 to 22%. Rabbits fed the diet containing 12% CF showed the best feed conversion efficiency FC, and nitrogen balance values.

The apparent digestibility of CP, EE and NFE significantly ($P< 0.05$ and $P< 0.01$) decreased with increasing CF level in the experimental diets. Crude fiber digestibility in the hindgut (C- F) was significantly higher in rabbits fed high fiber diets. The total amount of digested CF was significantly different among groups. Cecal contents increased from 54 to 59 gm by increasing CF level from 12, 16 and 22%. The volatile fatty acids (VFA) tended to be higher in cecum content of rabbits fed the high fiber diets, while ammonia concentration decreased insignificantly from 22.28 to 16.59 mg/g DM cecal content increasing dietary CF level from 12 to 22%. Dressing percentage and weights of other organs were not significantly different. Chemical analysis of meat indicated that CP was not affected by CF level in the diets, while EE and ash were significantly affected by the treatments. The blood components were not influenced by the treatments.

Keywords: Rabbit, growth, dietary crude fiber, digestibility, carcass quality

INTRODUCTION

Dietary fiber has an important role in prevention of enteritis in rabbits (Cheeke, 1987). Rabbits are true herbivorous and has enlarged cecum and colon with high bacterial population, therefore, it seems reasonable that these animals are capable of digesting and utilizing fiber quite efficiently. Hoover and Heitmann (1972) found that the high fiber diet increased the cecal volume in rabbits. Whereas, DeBlas *et al.* (1981) reported that CF did not appear to have much effect on the digestible energy intake or average daily gain of rabbits. Moreover, rabbits like most animals voluntarily adjust their feed intake to meet their energy needs National Research Council (NRC), 1977. Findings of Cheeke (1983), Cheeke *et al.* (1986) and DeBlas *et al.* (1986) indicated that the digestibility of fiber by rabbit is lower than that of most animals and rabbits performed better on the low fiber diet.

Probably the most suitable estimate of fiber in rabbit nutrition is the acid detergent fiber (ADF) which is primarily cellulose and lignin fractions so, it would be a good estimate of indigestible fiber (Cheeke 1987). Thus, DeBlas et al. (1984) and Battaglini and Grandi (1984) reported that the ADF content appears to be the most suitable index that predicts the digested energy (DE) content of the diet more accurately. Therefore, it will be interesting to use the ADF to formulate practical diets for rabbits.

The present work was planed to study the effect of feeding different dietary fiber levels on digestibility, microbial cecal activity and performance of growing rabbits.

MATERIALS AND METHODS

The present study was carried out at the Experimental Farm and Animal Nutrition Laboratory of the Faculty of Agriculture, Minoufia University. Thirty (mixed- sex) growing New Zealand White rabbits, seven weeks of age, were allocated into three equal groups, 10 rabbits each, to investigate the effect of dietary crude fiber (CF) level on performance of growth traits.

Three experimental pelleted diets including three levels of CF (12, 16 and 22%) were used in this study. The composition of the different experimental diets and their chemical analysis are shown in Table (1). The proportions of feed stuffs were altered in order to maintain the diets nearly isocaloric and isonitrogenous and to keep the level of essential nutrients similar to that recommended by NRC (1977) and Cheeke (1987). The experimental period continued for seven weeks.

Rabbits were housed in flat desk Italian type battery system with universal specification and provided with fodders and automatic drinkers. The patteries were placed in natural ventilated rabbitry. Diets were offered at libitum and fresh water was available all times. Feed intake and body weight were weekly recorded during the experimental period.

At the end of the experiment, four rabbits from each treatment were chosen at random and housed in individual metabolic cages for digestibility and nitrogen balance trial which continued for 10 days as a preliminary period followed by seven days as a collection period. Chromic oxide as marker was used to determine CF digestibility in two segments of the digestive tract, the first segment includes the stomach and small intestine, while the second one includes the cecum and colon.

At the end of the experimental period four rabbits were chosen randomly from each treatment and slaughtered to determine dressing percentage and weight of different organs. Samples of blood were taken immediately after slaughtered and kept for chemical analysis to determine blood components according to Armistrong and Corr (1964). The cecal contents were removed immediately after death and stored at -10° C until analyzed.

Table 1. Composition and chemical analysis of experimental diets

Ingredient	Experimental diets		
	I	II	III
Barley	33.5	21.5	10.0
Soybean	13.0	13.0	13.0
Yellow corn	10.0	10.0	5.5
Wheat bran	10.0	10.0	15.0
Clover hay	30.0	36.0	39.5
Corn oil	--	3.0	5.5
Saw dust	--	3.0	8.0
Molasses	2.5	2.5	2.5
Min. Vit. mix.*	0.75	0.75	0.75
Sodium chloride	0.25	0.25	0.25
Total	100.00	100.00	100.00
Chemical composition (on DM Basis)			
CP%	15.80	15.70	15.10
EE%	2.61	5.92	8.43
NFE%	59.36	53.83	44.85
CF%	12.23	16.05	21.62
ADF%	20.59	26.39	29.15
Ash %	10.00	8.50	10.00
DE (K cal/ g)**	2.80	2.84	2.80

* One Kilogram of mixture contains : Vit. A. 2000.000 IU; Vit. D3, 150.00 IU; Vit E, 8.33 g; Vit. K, 0.33 g; Vit. B1, 0.33 g; Vit. B2, 1.0 g; Vit. B6, 0.33 g; Vit B5, 8.33 g; Vit B12, 1.7 mg; Pantothenic acid, 3.33 g; Biotin 33 mg; Folic acid 0.83 g; Choline chloride, 200 g; Zn. 11.7 g; Fe, 12.5 g; Cu, 0.5 g; I, 33.3 mg; Fe 16.6 mg; Mg 66.7 g and Mn, 5 g.

** Calculated after cheeke (1987) as the following: DE (Kcal/Kg)= (% ash) =4253-32.6 (%crude fiber)- 144.4 (% ash).

Samples of feed, feces, urine and meat were analyzed according to A.O.A.C. (1980), ADF was determined according to Van Soest (1963) and chromic oxid according to Isichei (1980). Total volatile fatty acids in cecal contents were determined by steam distillation and titration according to Ahmed (1976).

Data were statistically analyzed according to Snedecor and Cochran (1982), Harvey (1987) and multiple range test of Duncan (1955).

RESULTS AND DISCUSSION

1- Performance of Rabbit

a- Body weight and daily gain

The average initial body weight (BW), final BW and average daily gain (DG) of rabbits during the experimental period are illustrated in Table (2). Data presented in this table showed that rabbits fed the diet containing 12 % CF resulted in heavier final BW than those fed diets with either 16 or 22 % CF, but the differences were not significant. Values of average DG followed the same trend (23.86, 21.74 and 21.29 g/d) for rabbits fed 12,16 and 22 % dietary CF levels, respectively, with no significant differences among treatments. The superiority of DG for rabbits fed 12 % CF could be due to more CP consumption than the other two groups- (Table 2) and also higher protein digestibility as well as more nitrogen retention (Table 3). Acid detergent fiber (ADF) in the experimental diets were 20.59, 26.39 and 29.15 % for 12, 16 and 22 % dietary CF, respectively (Table 1). The utilization of ADF by rabbits was investigated by many investigators, DeBlas *et al.* (1986) found that a decrease of DG was observed by rabbits fed diets containing ADF ranged between 12 and 24.6%. Also, Yono et al. (1990) found that rabbits fed a dietcontaining 11.93 % ADF were superior in their BWG compared with rabbits feed diets containing 17-24 and 24-76% ADF, respectively. The present results are in good agreement with those reported by Hoover and Heitmann (1972), Abd El- Rahman (1975), Radwan and Allam (1979), Anber (1986) and Khashaba (1988). Also, Afifi *et al.* (1990) found that increasing CF level from 10 to 16 % insignificantly decreased, in general, body weight and daily gain of rabbits. Moreover, Mokhtar (1994) showed that the addition of sawdust to rabbit diets up to 15 % (16.9 % dietary CF) had no significant detrimental effect on rabbit growth.

Table 2. Effect of dietary fiber level on rabbit performance

Item	Dietary fiber level %			Significance level
	12	16	22	
No.	10	10	10	–
Initial BW (g)	1169±62	1194±62	1157± 62	NS
Final BW (g)	2338±49	2259±49	2201±49	NS
Av. DM feed intake (g/d)	95.22	90.99	86.94	**
Av. DG (g)	23.86	21.74	21.29	NS
DE intake (Kcal/d)	266.62	258.40	243.43	–
CP intake (g/d)	15.04	14.29	13.12	–
Feed conversion +	3.99	4.18	4.1	–
Feed efficiency ++	0.25	0.24	0.24	–

+ Av. DM intake(g/d) / av. DG (g)
++ av. DG (g) / Av. DM intake(g/d)
NS Not significant ** Highly significant (P<0.01).

b- Feed intake

The present study showed that increasing the dietary fiber level from 12 to 22 % significantly (P< 0.01) decreased dry matter (DM) feed intake (Table 2). Similarly, daily digestible energy (DE) and crude protein (CP) intakes decreased with increasing the dietary fiber level (Table 2). The depression effect of CF on feed intake may be due to its relative bulkiness (Mc Intyre 1950).

c- Feed conversion efficiency

Data in Table (2) showed that dietary fiber level had a little effect on both feed conversion and feed efficiency values, and the differences between the obtained values were very limited. In spite of that, it was observed that rabbits fed the diet containing 12 % CF resulted in a better FC value than those fed the other two dietary CF levels, whereas the FE values were almost the same for all tested dietary CF levels. In agreement with the present results, Evans (1983), Anber (1986) and Afifi *et al.* (1990) observed that there were no significant differences in FC and FE values among rabbits fed diets with 10, 13 and 16 % CF. Similar results were obtained by Abou- Ashour and Ahmed (1986) by feeding rabbits on diets with 13.6 to 30 % CF.

2- Digestibility and nitrogen balance

Digestion coefficients of nutrients as affected by dietary CF level indicated that the apparent digestibility of DM, CP, EE and NFE decreased with increasing the dietary CF level from 12 to 22 % (Table 3). The diet containing 12 % CF expressed the highest digestibility values followed by that of 16 % CF and being the least with the 22 % dietary CF levels. The differences in digestibility values between diets containing either 12 % or 16 % CF level and that of 22 % level were significant (P< 0.05 and P< 0.01), whereas those between the 12 % and 16 % dietary fiber levels were not significant (Table 3). In this respect, Robinson *et al.* (1988) found that apparent digestibility of DM and N (CP) decreased with increasing CF level in the experimental diets. While, Afifi *et al.* (1990) indicated that the differences in dietary CF level did not show any significant effect on digestibility of CP, EE and NFE.

Table 3. Nutrient digestibility and nitrogen balance as affected by dietary CF level

Item	Dietary crude fiber level %			Signifi-cance level
	12	16	22	
Digestibility%				
DM	69.25 ± 5.10	68.83 ± 14.67	57.00 ± 3.59	NS
CP	66.08 ± 5.45 a	61.00± 1.15 a	58.25 ± 3.50 b	*
EE	68.50 ± 8.64 a	67.70 ± 5.48 a	52.72 ± 8.82 b	*
NFE	71.68 ± 5.69 a	71.10 ± 3.12 a	55.10 ± 5.65 b	**
Nitrogen balance (g/day)	0.95 ± 0.24 a	0.84 ± 0.23 b	0.73 ± 0.22 c	**

a, b, c values not sharing the same superscript within column are significantly different (P< 0.05) and P < 0.01).

Results of nitrogen balance (NB) are presented in Table (3). Rabbits fed the 12 % dietary CF level had the highest NB value (0.99 g/d) while those fed the 16 % CF level resulted in an intermediate value (0.84 g/d) and the lowest NB value was obtained with the 22 % CF level (0.73 g/d). Such differences in NB values due to dietary CF level effects were significant (P< 0.01). However, the differences in NB values are mainly due to differences in CP digestibility among different groups. With higher CP digestibility (Table 3), it was expected that rabbits fed 12 % CF could retain more nitrogen and grow faster. These results confirm those obtained by DeBlas *et al.* (1981); Abou- Ashour and Ahmed (1986) and Taie and Zanaty (1993). The CF digestibility data in different segments are shown in Table (4). Rabbits fed the diet containing 22 % CF consumed more CF being 18.8 g/d vs 11.65 and 14.60 for those fed diets containing 12 and 16 % CF, respectively. Regardless of CF content of the diet, the differences in CF digestibility (M- F) were ranged between 48.60 and 42.85 (P> 0.05) in Table (4). Abou- Ashour and Hamed (1986) reported similar findings. Differences in CF digestibility may be attributed to CF constituents which may have different digestibilities. Moreover, the digestibility of CF varies considerably depending on the feed stuffs involved and the associated effects occurred between ingredients composing the experimental diets. With respect to CF digestibility in the hind gut (C- F), results in Table (4) showed that CF digestibility in that segment was significantly (P< 0.05) higher in rabbits fed the high fiber diet, with corresponding digestibilities of 84.25 vs 66.74 and 53.50 % for rabbits fed 22, 16 and 12 % CF, respectively. The total amounts of CF digested in whole digestive tract (g/d; Table 4) was significantly (P< 0.05) different among the groups. They were 8.10 vs 6.58 and 5.66 g/d for rabbits fed the diets containing 22, 16 and 12 % CF, respectively. The same trend was observed with digested fiber by large intestine (C- F). The cecal CF digested were 6.79 vs 4.39 and 3.03 g/d for groups fed 22, 16 and 12 % CF containing diets, respectively.

Table 4. Effect of dietary fiber level on fiber digestibility in different segments, cecal volume and microbial activity.

Item	Dietary crude fiber level %			Signific -ance level
	12	16	22	
CF intake (g/d)	11.65	14.60	18.8	
CF digestibility (%)				
M- F	48.60±8.90	45.10±11.02	42.85 ± 9.80	NS
C- F	26.10±5.81a	30.10 ± 6.10b	36.10 ± 4.00c	*
Relative cecal digestibility (%)	53.05 a	66.74 b	84.25 c	*
CF digested (g/d)	5.66 a	6.58 ab	8.10 c	*
Cecal CF digested (g/d)	3.03 a	4.39 b	6.79 c	*
Cecal volume (g)	54.00 ± 5.00	56.00± 7.00	59.00±10.00	NS
VFA (µmol/g DM cec contents)	293.29± 73.50	367.35±67.50	351.82±45.40	NS
NH3(mg/gDM cecal contents).	22.28 ± 3.46	20.65 ± 6.87	16.59 ± 4.00	NS

M- F = Mouth to feces; C- F = Cecum to feces.

It is well known that there is a competition between rate of passage and rate of digestion for extent digestion, thus the relative digestibility of diets with similar digestion rates will depends on rate of passage. Therefore, the high fiber diets with longer retention time in the large intestine than the lower fiber diet, would be expected to show a greater of CF digestion. Similar findings in pigs were reported by Ehle *et al.* (1982).

3- Cecal microbial activity

Digestion of CF in rabbits required the presence of microbial activity in the cecum and/or colon, since no cellulase enzyme is secreted in the digestive tract of the rabbit. Microbial population of rabbits cecum are mainly bacteroids species (Vernary and Marty, 1984). Many bacteroids are cellulose digester (Smith, 1965 and Hungate, 1966).

The magnitude of the effect of dietary CF levels on cecal volume is variable (Champe and Maurice, 1983 and DeBlas *et al.* 1986). The cecal volume increased from 54 to 59 g for rabbits fed diets with 12 up to 22 % CF, with no significant differences. However, Hoover and Heitmann (1972) reported that the high dietary CF resulted in an insignificant increase in cecal volume/ kg body weight.

The VFA's are also produced as end products of bacterial fermentation in the rabbit cecum (Cheeke, 1987). Using of VFA as source of energy has been estimated to provide 40 % of the maintenance energy source for metabolism of the hind gut tissue (Marty and Vernary, 1984). Champe and Maurice (1983) noticed that with increasing dietary CF, the butyrate/ propionate ratio increased.

Data in Table (4) showed the effect of dietary CF levels on microbial activity represented as VFA's and ammonia production in the cecum. Total VFA's tended to be higher in the cecum content of rabbits fed the high fiber level in their diets. However, the differences were not significant. This finding agreed with the extent of CF digestibility in the cecum (C-F, Table 4). These results are in accordance with those obtained by Abou- Ashour and Ahmed (1986) and Luick *et al.* (1992) who reported that the increase in dietary CF level was accompanied with an increase in VFA production in rabbits.

Ammonia concentration decreased insignificantly from 22.28 to 16.59 mg/g DM cecal contents with increasing the dietary CF level from 12 to 22 % (Table 4). This notation may be attributed to the higher microbial activity in cecum of rabbits fed the higher dietary CF level and thus required more nitrogen (Hungate, 1966).

4- Carcass characteristics

Data presented in Tables (5) and (6) showed fasted weight, carcass weight, dressing percentage, different carcass cuts and organs varied slightly with increasing the dietary CF level, but the differences in all carcass traits due to dietary CF level effects were not significant.

Similar results were reported by Abou- Ashour and Ahmed (1983). Leto *et al.* (1984), Anber (1986), Khashaba (1988) and El-Sayed *et al.* (1990). They concluded that the CF level did not show any significant effect on carcass quality, dressing percentage and organs weights of growing rabbits at different slaughter ages.

Table 5. Fasted weight, dressed weight and dressed percentage of rabbits fed different dietary CF levels

Item	Dietary crude fiber level %			Significance level
	12	16	22	
No. of rabbit	4	4	4	–
Carcass traits				
Fasted Wt.	2238.0 ± 36.0	2308.0±151.0	2291.0±307.0	NS
Dressed Wt.	1080.0±138.0	1144.0±105.0	1106.0±113.0	NS
Dressing, %	48.3	49.6	48.3	NS

The chemical analysis of meat showed that EE and Ash content were increased ($P< 0.05$ and < 0.01) while CP followed an opposite trend ($P> 0.05$) with increasing the dietary CF level as shown in Table (7). These results tended to support the findings of Taie and Zanaty (1993). Results of El-Sayaad et al. (1990) indicated that CF level had a significant effect on CP, EE and Ash at 8 and 12 weeks of age. However, Khashaba (1988) found no effect of dietary CF on meat chemical composition.

Table 6. Effect of different dietary CF levels on slaughter data of rabbits

Item	Dietary crude fiber level %			Significance level
	12	16	22	
No. of rabbits	4	4	4	
Fore quarters Wt.	154.0 ± 17.0	161.0 ± 9.0	150.0 ± 18.0	NS
Chest Wt.	248.0 ± 28.0	260.0 ± 51.0	265.0 ± 52.0	NS
Lion Wt.	313.0 ± 92.0	360.0 ± 55.0	330.0 ± 41.0	NS
Hind quarters Wt.	360.0 ± 61.0	375. ± 31.0	366.0 ± 29.0	NS
Liver Wt.	74.0 ± 5.0	66.0 ± 8.0	73.0 ± 13.0	NS
Heart Wt.	6.0 ± 3.0	6.0 ± 3.0	6.0 ± 3.0	NS
Lung Wt	9.0 ± 3.0	11.0 ± 3.0	11.0 ± 3.0	NS
Kidney Wt.	18.0 ± 5.0	23.0 ± 6.0	23.0 ± 6.0	NS
Head Wt.	166.0 ± 13.0	186.0 ± 3.0	189.0 ± 16.0	*
Coat Wt.	345.0 ± 86.0	344.0 ± 20.0	361.0 ± 56.0	NS
Stomach full Wt.	136.0 ± 13.0	129.0 ± 18.0	145.0 ± 41.0	NS
Stomach empty Wt.	48. ± 3.0	50.0 ± 0.0	49.0 ± 3.0	NS
Small intestine full	94.0 ± 34.0	101.0 ± 22.0	103.0 ± 13.0	NS
Small intestine empty	73.0 ± 26.0	64.0 ± 11.0	79.0 ± 17.0	NS
Large intestine full	201.0 ± 27.0	200.0 ± 41.0	215.0 ± 29.0	NS
Large intestine empty.	81.0 ± 20.0	68.0 ± 18.0	75.0 ± 17.0	NS

5- Blood constituents

The effect of dietary CF levels on blood constituents is presented in Table (8).

Table 7. Chemical composition of meat of growing rabbits fed different dietary CF levels (on dry matter basis).

Item	Dietary crude fiber level %			Significance level
	12	16	22	
CP %	63.35	58.81	58.37	NS
EE %	27.82	31.50	29.65	**
Ash %	8.83	9.70	11.98	*

The total blood plasma proteins contents were 7.90, 8.33 and 7.27 g/dl for rabbits fed 12, 16 and 22% CF, respectively. Although there were slight differences in plasma protein due to level of fiber, these differences were not appreciated. Similar results were obtained by Coppings *et al.* (1988) and El-Sayaad *et al.* (1990).

Plasma cholesterol decreased with increasing dietary CF level. Cholesterol concentration was not significantly lower for rabbits fed 22 % CF level compared with that of rabbits fed the 12 % level, whereas increasing the dietary CF level from 16 to 22 % had no significant effect on plasma cholesterol concentration. These results supported the findings of Usha *et al.* (1984) and Lo *et al.* (1987) who found that high levels of neutral detergent fiber (NDF) or CF in the diet caused low plasma cholesterol.

Table 8. Total protein and cholesterol contents in blood plasma of growing rabbits fed different dietary CF levels.

Item	Dietary crude fiber level %			Significance level
	12	16	22	
No. of rabbits	4	4	4	--
Total protein(g/dl)	7.90 ± 0.46	8.33 ± 0.87	7.27 ± 0.67	NS
Cholestrol (mg/dl)	91.00 ± 42.89	76.17 ± 19.96	75.33 ± 23.03	NS

From the results reported herein, it is apparent that growing rabbits could utilize dietary crude fiber up to 16 % efficiently without any adverse effect on performance of rabbits

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تأثير مستويات الألياف الخام على أداء ومعامل الهضم وخواص الذبيحة ومكونات الدم للأرانب النامية

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أجرى هذا البحث بمزرعة قسم الانتاج الحيوانى بكلية الزراعة بشبين الكوم جامعة المنوفية وكلية الزراعة بمشتهر لدراسة تأثير مستويات مختلفة من الألياف الخام (١٢، ١٦، ٢٢٪) على الوزن النهائى للجسم والزيادة اليومية ومعاملات الهضم للمركبات المختلفة، ومعدل التحويل الغذائى والكفاءة الغذائية والنشاط الميكروبى للأعور وخواص الذبيحة ومكونات الدم فى الأرانب الناميه.

أستخدم فى هذة التجربة ٣٠ أرنب نيوزيلندى أبيض من عمر ٧ أسابيع حتى ١٤ أسبوع (طول فترة التجربة ٧ أسابيع).

تم تقسيم الأرانب إلى ثلاث مجموعات متساوية طبقاً لوزن الجسم وتوزيعهم عشوائياً على ثلاث علائق تجريبية متساوية فى البروتين والطاقة واختلفت فى نسبة الألياف الخام. وتتلخص النتائج فى الآتى:

أوضحت النتائج تفوق وزن الجسم النهائى ومعدل الزيادة اليومية للأرانب المغذاه علـى علائق تحتوى على ١٢٪ ألياف خام على المجموعات الأخرى بدون تأثير معنوى.

نقص الغذاء المأكول، الطاقة المهضومة والبروتين المهضوم بزيادة مستوى الألياف فى العليقة من ١٢ إلى ٢٢٪.

أظهرت الأرانب المغذاه على عليقة بها ١٢٪ ألياف خام افضل قيم لمعامل التحويل الغذائى والكفاءة الغذائية وميزان الأزوت عن الأرانب التجريبية الأخرى.

كانت قيم معاملات الهضم الظاهرى للبروتين الخام والألياف الخام والكربوهيدرات الذائبة تقل معنوياً بزيادة مستوى الألياف الخام فى العلائق التجريبية.

كان معامل هضم الألياف الخام فى الجزء الخلفى من القناه الهضمية عالى المعنوية فى الأرانب المغذاه على علائق عالية فى الألياف الخام.

إختلفت الكمية الإجمالية للألياف الخام المهضومة معنوياً بين المجموعات.

زاد حجم الأعور من ٥٤ إلى ٥٩ جرام للأرانب المغذاه على علائق بها ١٢، ١٦، ٢٢٪ الياف خام.

زاد مستوى الأحماض الدهنية الطيارة فى أعور الأرانب المغذاه على علائق عالية فى مستوى الالياف الخام بها.

نقص مستوى تركيز الأمونيا من ٢٢،٢٥ إلى ١٦،٥٩ ملى جرام/ جرام مادة جافة من محتويات الأعور بزيادة مستوى الألياف من ١٢ إلى ٢٢٪ فى العلائق التجريبية للأرانب النامية بدون تأثير معنوى.

لم تتأثر معنوياً صفات الذبيحة ومعظم الأعضاء المختلفة للأرانب المغذاه على مستويات مختلفة من الألياف الخام.

تأثر الدهن الخام والرماد الخام فى لحم الأرانب المغذاه على علائق بها مستويات مختلفة من الألياف الخام بينما لم يتأثر البروتين الخام فى اللحم ومكونات الدم للأرانب التجريبية معنوياً بالمعاملات التجريبية.