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SOME BLOOD CONSTITUENTS AND CHARACTERISTICS OF GASTROINTESTINAL TRACT IN NEW ZEALAND WHITE RABBITS FED DIETS CONTAINING SILAGE

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SUMMARY

The present investigation aimed at studying effects of feeding rabbits on diets containing concentrate feed mixture with different types of silage (70:30 ratio) including silage from sugar beet tops + berseem (1:1) (T2), berseem (T3) and maize (T4) as compared to fresh berseem (T1) on some blood constituents and characteristics of gastrointestinal tract of rabbits. Total of 48 weaned New Zealand White (NZW) rabbits, 6 wk of age were allocated at random to 4 dietary groups, 12 rabbits in each (6 males and 6 females) for 12 wk experimental period..

Results obtained revealed that live body weight (LBW) and total body gain were not affected by dietary treatments, while females showed significantly (P<0.05) heavier LBW than males. T4 showed significantly the lowest forage (P<0.05) and total intake (P<0.01), and the best (P<0.05) feed efficiency. Inclusion of silage resulted in significantly (P<0.01) higher GOT and lower (P<0.05) GPT activity and wider (P<0.01) GOT/GPT ratio. Females showed significantly (P<0.05) higher count of red blood cells count (RBCs) and concentration of total protein in plasma than males. The dietary treatments significantly (P<0.05) affected the full weight of gastrointestinal tract, total weight of their contents, or their weights as a percentage of pre-slaughter weights of male rabbits. Silage treatments led to significantly (P<0.05) higher tissue weight for small intestine and lower for caecum and significantly (P<0.05) lower weight of colon contents or their weights as a percentage of total weight of the gastrointestinal tract. Rabbits in T3 showed significantly (P<0.05) the highest concentration of volatile fatty acids (VFAs) and the lowest pH value in their caecal material.

Keywords: Rabbits, silage, blood constituents, gastrointestinal tract, caecal activity

INTRODUCTION

Forages are considered as an important portion of rabbit rations (McNitt, 1992). Rabbit production using dietary sources, in particular forages can help to overcome the dietary protein gap (Lebas, 1983).

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In Egypt, although there is a great attention towards the use of ensiled forages and agricultural by-products in diets of ruminants (Bendary and Omar, 1997), only few attempts have been successfully performed on ensiled materials in rabbit feeding and their effects on growth performance (Attiya, 1996). Therefore, further information are needed on the effect of ensiled forages and agricultural by-products on blood parameters and characteristics of gastrointestinal tract of growing rabbits.

The present study aimed at investigating the possible effects of different types of silage in diets on growth performance and some haematological and biochemical blood parameters of growing NZW rabbits, as well as their effects on some anatomical characteristics of gastrointestinal tract and caecal activity of male rabbits.

MATERIALS AND METHODS

The present study was conducted at the Department of Animal Production, Mansoura University, while the experimental work was carried out on a flock of NZW rabbits belonging to Sakha Animal Production Station, Animal Production Research Institute, Ministry of Agriculture during the period from February to May, 1997.

Experimental animals and feeding system

Total of 48 weaned NZW rabbits 6 wk old with an average initial live body weight of 0.721± 0.01 kg were divided into four similar dietary treatment groups. Each group was alloted into two subgroups, males and females, six animals in each. The rabbits were housed in separate wire cages (60 x 50 x 40 cm), two rabbits in each cage, representing one replicate.

Rabbits in all groups were fed diets containing concentrate feed mixture (CFM) in mash form and forage (70:30 ratio) to meet the NRC (1977) rabbit nutrient requirements for growth. The experimental diets were fed to rabbit groups *ad libitum* once daily in the morning. Four kinds of forage were used including silage from sugar beet tops + berseem (1:1) (SBT+B)S, berseem (BS) and maize (MS) as compared to fresh berseem (B).The chemical analysis of the different feed stuffs used is shown in Table (1).

Table 1. Chemical analysis of different feed stuffs

Analysis %	CFM	B	(SBT+B)S	BS	MS
Dry matter	91.40	16.96	29.95	26.68	36.86
Chemical analysis (%) of DM:					
Crude protein	20.64	15.80	16.12	14.43	11.19
Crude fiber	07.23	17.75	21.44	23.58	24.74

- Berseem in fresh form (B) was from the 2nd and 3rd cuts, while in silage mixture (SBT+B)S and berseem silage (BS) was from the 3rd cut.
- All silages were prepared by adding 5% on fresh basis from El-Mufeed except maize silage (MS) which was prepared without any additives.

Beside CFM in all treatments, the 1st group (T1) received green berseem (*Trifolium alexandrinum*) (Control treatment, B), the 2nd group (T2) received silage mixture (SBT+B) S, the 3rd group (T3) received berseem silage (BS) and the 4th group maize silage (MS).

Experimental procedure

Daily feed intakes from forage and CFM and individual live body weights were recorded from 6 up to 18 wk of age, then total body gain and feed efficiency were calculated.

Blood samples were collected into heparinized tubes from the marginal ear vein from three males and three females of each group before feeding at the end of the experimental period (18 wk of age). Blood plasma was separated by centrifugation of the blood at 3500 rpm for 15 min, and kept frozen at -20°C until analysis.

Red blood cells (RBCs) and white blood cells (WBCs) counts were immediately estimated per mm^3 from fresh blood using haemocytometer. Packed cell volume (PCV%) was also determined using haematocrite centrifuge at 4000 rpm for 15 min.

Slaughter procedure

Three males from each group were randomly chosen for slaughter 3 h after morning feeding. Pre-slaughter weights were recorded and then rabbits were slaughtered. After complete bleeding, plet, viscera, feet and tail were removed and then weight of carcass plus head was recorded as a dressed weight. The different segments of the gastrointestinal tract including the stomach, small intestine, caecum and colon were weighed either full or empty. Weight of contents in different segments was calculated by subtracting the empty from full weight of each. Values of pH were estimated in fresh caecal materials and samples from them were taken for determination of total concentration of volatile fatty acids (VFAs) and dry matter content (DM%).

Analytical methods

Chemical analysis of feed stuffs was carried out according to A.O.A.C. (1980). Total concentration of VFAs was determined in fresh caecal material using the method of Warner (1964).

Concentration of glucose in fresh plasma and total protein, albumin, urea-N and creatinine and activity of transaminases (GOT and GPT) in plasma were determined using spectrophotometer (Spectronic 21 D, USA, 1988) and commercial kits produced by Pasteur Lab. Egypt-USA. Concentration of globulin was computed by subtracting albumin from total protein.

Statistical analysis

Data were statistically analyzed according to Snedecor and Cochran (1982). For parameters of growth performance and blood constituents, a factorial design (4 treatments x 2 sexes) was used and the statistical model was:

$Y_{ijk} = U + A_i + B_j + A_{bij} + e_{ijk}$

For characteristics of gastrointestinal tract and caecal activity, completely randomized design was used and the statistical model was:

$Y_{ij} = U + A_i + e_{ij}$

Where: Y = observed values

U = overall mean

A_i = effect of dietary treatments (i = 1→ 4)
B_j = effect of sex (J = 1→ 2)
Ab_{ij} = interaction of treatment x sex
e = random error

The differences among means were tested by Duncan's new multiple range test (1955).

RESULTS AND DISCUSSION

Growth performance

The results presented in Table 2 revealed that final body weight (LBW) and total body gain (TBG) insignificantly improved in T3 and T4 and decreased in T2 as compared to the control (T1). Similar trend of differences was obtained by Attiya (1996) on growing NZW rabbits fed diets contained 70% CFM and 30% sugar beet tops silage (SBTS) or berseem silage (BS) as compared to berseem hay (BH).

Table 2. Growth performance and feed efficiency of NZW rabbits as affected by dietary treatment and sex during the experimental period from 6 up to 18 wk of age

Item	Initial body weight (kg)	Final body weight (kg)	Total body gain (kg)	Total feed intake (kg DM)			Feed efficiency
				Forage	CFM	Total	
Group:							
T1(B)	0.724	2.274	1.550	1.66^{b}	6.78^{a}	8.44^{B}	0.184^{b}
T2(SBT+B)S	0.716	2.215	1.499	2.32^{a}	6.55^{b}	8.87^{A}	0.169^{c}
T3(BS)	0.722	2.347	1.625	2.17^{a}	6.92^{a}	9.09^{A}	0.179^{b}
T4(MS)	0.721	2.322	1.602	1.04^{c}	6.91^{a}	7.95^{C}	0.201^{a}
	0.011	0.058	0.042	0.16	0.08	0.09	0.003
Sex:							
Male	0.706	2.230	1.523	1.79	6.81	8.61	0.177
Female	0.735	2.350^{*}	1.614	1.81	6.76	8.56	0.189
	0.023	0.034	0.034	0.10	0.06	0.06	0.005

A, B, C and a, b, c Mean values in the same column bearing different letters differ significantly at P<0.01 and P<0.05, respectively.
* Significant sex differences P<0.05.

In spite of the insignificant higher LBW and TBG, T4 showed significantly the lowest forage (P<0.05) and total intake (P<0.01), while the opposite was observed in T2 and T3, but T2 showed significantly (P<0.05) the lowest concentrate intake (Table 2). Since all dietary treatments had different forage sources, it was expected to obtain varying trends of feed intake, which could be attributed to palatability and/or fiber content in the silage used in rabbit feeding (Attiya, 1996). Rabbits have a preference for sweet materials and prefer diets containing sucrose or molasses rather than those without added sugar (Cheek, 1974). Maize silage used in this study (T4) did not contain molasses (El-Mufeed) during ensiling process, which made it less palatable for rabbits as compared to other kinds of silage containing El-Mufeed.

Rabbits in T4 showed significantly (P<0.05) the highest feed efficiency (FE) than the others, while T2 had the lowest FE (Table 2) and this can be attributed to the level of feed intake.

Females were significantly (P<0.05) heavier by about 5.4% and tended to be nutritionally more efficient by about 6.8% than males (Table 2). Superiority of the females in body weight and FE was reported by El-Gaafary *et al.* (1991), Abd El-Moty *et al.* (1991) and El-Husseiny *et al.* (1997).

Blood constituents

Effect of dietary treatments

Data illustrated in Table 3 show that the inclusion of different kinds of silage as forage in diets of rabbits resulted in significant changes only in WBCs count and activity of transaminases in plasma. All silage treatments led to significantly lower GPT activity (P<0.05) and higher GOT activity (P<0.01) as compared to the control treatment, while WBCs count significantly (P<0.01) decreased only in T3 and T4. However, RBCs count, PCV% and concentration of protein, urea-N, creatinine and glucose did not differ significantly among dietary treatments.

The significantly (P<0.01) higher WBCs count and the tendency of higher RBCs count in T1 and T2 were reflected in tendency of higher PCV% in both treatments than in T3 and T4. Generally, the haematological parameters presented herein are within the physiological norms obtained by Parkanyi *et al.* (1988) in Nitra rabbits and Abd El-Moty (1991) in NZW rabbits.

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). This means that level of proteins in blood may reflect the nutritional status of the animals. The significantly (P<0.01) lower DM intake in T4 (Table 2), which was associated with insignificant differences in concentration of protein fractions among dietary treatments (Table 3) may indicate a higher protein utilization for rabbits fed MS than the other treatments.

In comparing silage treatments, T4 showed significantly the highest (P<0.01) GOT activity and relatively lower (P<0.05) GPT activity in plasma (Table 3). Metwally and Mohsen (1997) reported that body weight is found to be highly and positively correlated with GOT activity and negatively with GPT activity. This may explain the significantly (P<0.01) higher feed efficiency in T4 than the others (Table 2). The present activity of transaminases in plasma are within the normal ranges which indicates normal function of liver and heart (Ayyat, 1991 and Abdel-Rahim, 1996).

Concentration of urea-N and creatinine in plasma did not differ significantly among dietary treatments (Table 3). Increases in both urea-N and creatinine levels

Table 3. Blood constituents of NZW rabbits as affected by dietary treatment and sex at the end of the experimental period (18 wk of age)

Parameter	Dietary treatment					Sex		
	T1 (B)	T2 (SBT+B)S	T3 (BS)	T4 (MS)		Male	Female	
Haematological parameters:								
RBCs count (x 10^6/mm^3)	5.09	5.50	4.88	4.86	0.29	4.83	5.34*	0.14
WBCs count (x 10^3/mm^3)	7.21^A	7.60^A	6.60^B	6.67^B	0.14	7.10	6.95	0.17
PCV %	42.7	42.80	42.50	42.00	0.54	41.60	43.40	0.39
Biochemical parameters:								
Total protein (g/dl)	8.18	8.29	7.94	7.97	0.12	7.80	8.40*	0.15
Albumin (g/dl)	4.62	4.76	4.57	4.60	0.12	4.47	4.82	0.12
Globulin (g/dl)	3.56	3.53	3.37	3.37	0.09	3.34	3.58	0.07
Alb./Glob. ratio	1.30	1.35	1.36	1.36	0.03	1.33	1.35	0.02
GOT activity (U/l)	23.38^C	29.56^B	30.76^B	36.13^A	0.57	29.74	30.18	0.52
GPT activity (U/l)	15.14^a	13.73^b	12.10^c	12.52^{bc}	0.41	13.15	13.59	0.36
GOT/GPT ratio	1.54^D	2.15^C	2.54^B	2.89^A	0.08	2.26	2.22	0.08
Urea-N (m mol/l)	3.38	3.18	3.67	3.01	0.24	3.24	3.38	0.18
Creatinine (mg/dl)	0.95	0.90	0.88	0.97	0.03	0.91	0.94	0.02
Glucose (m mol/l)	5.42	5.33	5.18	6.28	0.46	5.51	5.34	0.23

A, B, C Means and a, b, c, values in the same row bearing different letters differ significantly at $P<0.01$ and $P<0.05$, respectively.

* Significant sex differences at $P<0.05$.

in blood of rabbits may cause or induce kidney dysfunction. The present levels of urea-N and creatinine may indicate a normal function of kidneys in all experimental rabbits.

No significant differences were observed in glucose level among dietary treatments (Table 3), which is in accordance with Ayyat (1991), who found that concentration of glucose was not affected by level of dietary CP. There was a tendency, however, of higher glucose level in T4, which may be attributed to the higher TDN% in MS diet as compared to the other diets (El-Ayouty *et al.*, 2000).

Sex effect

Data in Table 3 show that only RBCs count and concentration of total protein were significantly ($P<0.05$) higher in female rabbits than males. The observed significantly ($P<0.05$) higher RBCs count was reflected in higher PCV% in females than males, although the differences were not significant. The significantly ($P<0.05$) higher TP level in females (Table 3), inspite of the insignificant differences in DM intake (CP intake) may indicate higher efficiency of protein metabolism in females than males. The present finding comes in line with El-Husseiny *et al.* (1997), who found that females had higher ($P<0.05$) TP (7.2 g/dl) than that in males (6.7 g/dl) in blood serum of growing NZW rabbits.

The present results concerning the haematological and biochemical parameters in blood of growing rabbits suggest that the use of different kinds of silage in diets of rabbits had no health hazards on the physiological performance of animals. In addition, the present findings indicate the superiority of females than males when fed different kinds of silage.

Characteristics of gastrointestinal tract (GIT)

Weight of total GIT tissue and its contents

Full weight of GIT (FW) was affected ($P<0.05$) by treatments, being the highest in T2 followed by T1 and the lowest in T4 (Table 4). The insignificant differences in empty weight of GIT (EW) led to higher ($P<0.05$) weight of total contents in GIT (CW) of T1 and T2 than in T3 and T4. The lowest ($P<0.05$) FW and CW were associated with the lowest ($P<0.01$) MS intake in T4 (Table 4).

Since dietary treatments insignificantly affected the dressed weight, FW as a percentage of the dressed weight showed the highest ($P<0.05$) values in T2 and the lowest ($P<0.05$) in T3, but the differences were not significant between each of T2 and T3, and the other treatments. Such differences were not significant in terms of EW as a percentage of the dressed weight and significantly ($P<0.05$) higher CW% in T1 and T2 than T3 and T4 (Table 4).

In general, the rabbit's digestive tract usually reaches its adult proportions in the 4^{th} month of life (Lebas and Laplace, 1982), which indicate complete development of GIT in the experimental rabbits used. It is worthy noting that T2 showed the highest FW, CW, FW% and CW%, while EW or EW% were not affected by treatments. This may be attributed to the highest silage intake form (SBT+B)S in T2 than the others (Table 4). The present FW are nearly similar to those obtained by El-Hariary *et al.* (1995) and higher than those reported by Taie and Zanaty (1993) for EW of GIT. The insignificant trend of changes in EW and EW% (Table 4) among groups were almost associated with level of fiber in different forages used in rabbit feeding (Table 1). In this respect, Kuan *et al.* (1983) found an increase in weight of digestive tract tissue as dietary proportion of fibers was increased in rabbit diets. Also, Garcia *et al.* (1994) reported a linear increase (P<0.01) in EW of GIT as a percentage of body weight by increasing NDF% in rabbit diets.

Table 4. Feed intake (g) and characteristics of gastrointestinal tract in male NZW rabbits at 18 wk of age

Item	T1 (B)	T2 (SBT+B) S	T3 (BS)	T4 (MS)	
Pre-slaughter weight (g)	2420	2363	2590	2423	91.1
Dressed weight (g)	1343	1291	1395	1273	60.1
Daily feed intake (g DM):					
Forage	19.7^{c}	27.7^{a}	25.7^{b}	12.0^{d}	0.36
Concentrate	82.7^{a}	79.2^{c}	83.7^{a}	81.2^{a}	1.40
Total	102.4^{b}	106.9^{ab}	109.4^{a}	93.2^{c}	1.5
Gastrointestinal tract weight (g):					
Full weight (FW)	510.9^{ab}	518.4^{a}	506.1^{b}	496.6^{c}	2.80
Empty weight (EW)	150.1	155.9	159.7	160.8	12.1
Contents weight (CW)	360.8^{a}	362.4^{a}	346.4^{b}	335.8^{b}	3.90
Relative gastrointestinal tract	**weight (%):**				
FW (As % of dressed weight)	38.0^{ab}	40.2^{a}	36.3^{b}	39.0^{ab}	1.10
EW (As % of dressed weight)	11.1	12.1	11.5	12.6	0.98
CW (As % of pre-slaughter weight)	14.9^{a}	15.3^{a}	13.4^{b}	13.9^{b}	0.18

^{abc} Means denoted by the same superscripts within the same row did not differ significantly otherwise they differ significantly at level of 0.05.

Tissue weight of gastrointestinal tract segments

The values obtained of different gastrointestinal tract segments (Table 5) revealed that tissue weight of small intestine (SI) was heavier (P<0.01) in rabbits fed silage treatments than the control one, being lighter (P<0.01) in T2 than T3 and T4, while the opposite was found for caecal tissue. However, stomach and colon+rectum tissue did not differ significantly.

Despite, the higher level of CF in all silage treatments, marked reduction in tissue weight of caecum and increase in SI were observed. In contrast to the present results, marked decreases in tissue weight of stomach from 24.5 to 20.0g, SI from 63.7 to 55.8 and colon from 25.0 to 23.9% were observed by increasing dietary fiber level from 13.9 to 23.9% (Abou-Ashour and Ahmed, 1983). Also, a linear increase in caecum weight was found with increasing dietary NDF (Garcia *et al.*, 1994).

Similar trend of differences were observed (P<0.05) when tissue weight of different segments of GIT was expressed as a percentage of their total tissue weights. Rabbits in T3 and T4 showed the highest (P<0.05) relative weight for SI and the lowest (P<0.05) for caecum, followed by T2, while T1 showed reversible situation for T3 and T4.

Table 5. Tissue and contents weight (g) of different gastrointestinal tract segments in male NZW rabbits at 18 wk of age

Treatment	Stomach	Small intestine	Caecum	Colon + rectum
(1) Tissue weight (g)				
T1(B)	21.5	44.8^{C}	59.2^{A}	24.6
T2(SBT+B)S	21.4	51.6^{B}	53.7^{B}	29.1
T3(BS)	23.4	61.9^{A}	46.0^{C}	28.3
T4(MS)	25.6	59.0^{A}	48.5^{C}	27.6
	1.93	1.92	1.59	3.5
(2) Relative tissue weight (%)				
T1(B)	14.3	29.9c	39.4a	16.4
T2(SBT+B)S	13.7	33.1b	34.5b	18.7
T3(BS)	14.7	38.8a	28.8c	17.7
T4(MS)	15.9	36.7a	30.2c	17.2
	1.2	1.00	1.30	1.10
(3) Contents weight (g)				
T1(B)	99.9	30.9	185.6	44.4a
T2(SBT+B)S	119.7	19.8	204.4	18.5b
T3(BS)	111.9	25.1	186.0	23.4b
T4(MS)	105.9	18.5	194.8	16.6b
	16.9	5.10	19.30	6.40
(4) Relative contents weight (%)				
T1(B)	27.7b	8.6a	51.4b	12.3a
T2(SBT+B)S	32.8a	5.5b	65.4a	5.3b
T3(BS)	32.3a	7.3ab	53.6ab	6.8b
T4(MS)	31.5a	5.5b	58.1a	4.9b
	1.10	0.76	1.40	1.7

(2) as a percentage of total weight of empty gastrointestinal tract.
(4) as a percentage of total weight of contents in gastrointestinal tract.
^{ABC} and ^{abc} Means denoted by different superscripts within the same column are significantly different at P<0.01 and P<0.05, respectively.

Content weight of GIT segments

Weight of contents for different segments did not differ among treatments, except for colon + rectum, which was lower (P<0.05) in silage groups than the control (Table 5). This may be related to the higher DM content in all types of silage than in berseem (Table 2) and may reflect slower rate of passage of silage diets along the gastrointestinal tract than the control (B). On the other hand, there was tendency of insignificant increase in weight of stomach content and decrease in SI content in all silage treatments as compared to the control. These findings are in good agreement with Abou-Ashour and Ahmed (1983) who reported similar results when dietary CF level was increased from 13.9 to 23.9% in diets of Baladi rabbits.

When weight of contents was expressed as a percentage of total weight of contents of the gastrointestinal tract, caecum contents represented above 50% of total weight of contents. However, SI and colon + rectum had the lowest values in all treatments (Table 5). Generally, all silage treatments had almost higher (P<0.05) relative contents weight for stomach and caecum and lower (P<0.05) values for SI and colon + rectum than the control (Table 5). This may indicate that transit is very fast in small intestine and very slow in stomach and caecum of all silage treatments than berseem.

With canulated rabbits the mean retention times for contents of stomach, oro-ileal and ileo-rectal segments have been calculated as 1-3, 4-9 and 7-24 h, respectively (Gidenne and Ruckebush, 1989; Gidenne *et al.*, 1991 and Gidenne and Perez, 1993). The increase in retention time of different types of silage than berseem may be related to the dietary CF content. Although, Mangold and Behum (1956) reported that proportion of large fibrous particles in the diet of rabbits appears to have little effect on retention time within the gastrointestinal tract.

The present results indicate wide variation in tissue and contents weight of different gastrointestinal tract segments and consequently in mean retention time of digesta (rate of passage or transit time) as affected by dietary treatments, which are directly reflected on digestion of different nutrients.

Caecum activity

Data of caecum parameters in Table 6 revealed that dry matter (DM) content of caecal material ranged between 24.0 and 29.9% in all treatments. The normal range was 20-25% as reported by Vernay and Raynaud (1975) in rabbits fed commercial diets. These differences may be related to the type of feeding.

Acidic or nearly neutral pH values were obtained (5.90 - 6.87). Rabbits in T3 showed significantly ($P<0.05$) the lowest pH value which may be associated with the higher content of lactic acid in BS than in other silages (Mohiel-Din, 1999) and reflected in significantly ($P<0.05$) the highest VFAs production in T3 than the other treatments (Table 6).

Table 6. Caecum activity of male NZW rabbits at 18 wk of age

Parameter	T1(B)	T2 (SBT+B)S	T3 (BS)	T4(MS)	
Dry matter %	26.5	24.0	28.1	29.9	2.60
pH value	6.27^{ab}	6.70^{a}	5.91^{b}	6.87^{a}	0.24
VFAs (meq/100ml)	3.90^{b}	4.13^{b}	5.83^{a}	3.63^{b}	0.40

[ab] Values having different superscripts within the same row are significantly different at $P<0.05$.

The fermentation rate in rabbit caecum is greatly affected by availability of substrates, which vary in different diets (Parker, 1976 and Attiya, 1996). However, Garcia *et al.* (1994) reported that level of fiber did not affect VFAs production and pH values in caecal contents of rabbits. So, the significant ($P<0.05$) differences in caecal activity of different treatments may be related to source and level of fiber in the experimental diets (Table 1).

In conclusion, rabbits as herbivorous animals could benefit from diets containing different kinds of silage in particular BS and MS as forage, when fed along with concentrates. Rabbits showed better growth performance and physiological responses without any adverse effect on blood metabolism, gastrointestinal tract and caecal activity.

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بعـض مكونات الدم وخصائص القناة الهضمية لأرانب النيوزيلاندى الأبيض المغذاة على علائق محتوية على سيلاج

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استخدم فى هذه الدراسة ٤٨ أرنب نيوزيلاندى ابيض حديث الفطام عند بداية الأسبوع السادس من العمر وقسمت الى ٤ مجموعات متقاربة فى الوزن بكل مجموعة ١٢ أرنب (٦ ذكور+ ٦ إناث). وكانت المعاملات الغذائية كالأتى:

المجموعة الأولى: عليقة مركزة (٧٠%) + برسيم أخضر (٣٠%)
المجموعة الثانية: عليقة مركزة (٧٠%) + مخلوط سيلاج (١:١) من البرسيم وعروش البنجر
المجموعة الثالثة: عليقة مركزة (٧٠%) + سيلاج برسيم
المجموعة الرابعة: عليقة مركزة (٧٠%) + سيلاج ذرة
واستمرت التغذية حتى الأسبوع الثامن عشر من العمر .
أظهرت النتائج ما يأتى :

١- الكفاءة الغذائية : لم يتأثر وزن الجسم ومعدل الزيادة اليومية فى الوزن معنوياً بالعلائق التجريبية خلال الفترة التجريبية ولكن تفوقت الاناث على الذكور معنويا فى وزن الجسم عند نهاية الفترة التجريبية وأدت تغذية المجموعة الرابعة على سيلاج الذرة الى انخفاض معنوى فى المأكول من السيلاج والمأكول الكلى وإلى احسن كفاءة غذائية .
٢- مكونات الدم : أدى إدخال السيلاج الى علائق الأرانب إلى ارتفاع معنوى فى نشاط إنزيم GOT وانخفاض معنوى فى نشاط إنزيم GPT واتساع النسبة بينهما فى بلازما الدم بينما أظهرت الإناث تفوقاً معنوياً على الذكور فى عدد خلايا الدم الحمراء وتركيز البروتينات الكلية فى البلازما .
٣- خصائص القناة الهضمية للذكور : أثرت المعاملات الغذائية على الوزن الكلى للقناة الهضمية بمحتوياتها وعلى النسبة المئوية لوزنها بالنسبة لوزن الجسم قبل الذبح حيث أن كل أنواع السيلاج أدت إلى زيادة معنوية فى وزن نسيج الأمعاء الدقيقة وانخفاض معنوي فى وزن نسيج الأعور او فى نسبتهما المئوية للوزن الكلى لنسيج القناة الهضمية بينما انخفض وزن محتويات القولون معنويا مقارنة بوزن باقى الأجزاء .
٤- نشاط الأعور: أدت التغذية على سيلاج البرسيم (المجموعة الثالثة) إلى زيادة معنوية للتركيز الكلى للأحماض الدهنية الطيارة المنتجة فى الأعور وانخفاض معنوى فى قيمة pH لمحتويات الأعور .

يستنتج من هذا البحث انه يمكن إدخال السيلاج بأنواعه المختلفة المستخدمة فى هذا البحث فى تغذية الأرانب دون حدوث أى تأثيرات سلبية على الكفاءة الغذائية ومكونات الدم والقناة الهضمية .