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SOME NUTRITIONAL AND PHYSIOLOGICAL EFFECTS OF DIAZEPAM ADMINISTRATION ON GROWING RABBITS

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ABSTRACT

Total of sixty New Zealand White rabbits (NZW) of 5 weeks of age were used to study the effect of diazepam administration on some nutritional and physiological parameters in growing rabbits. Rabbits were divided into five treatment groups, each of 12 rabbits. The first group was the control, and the other four groups were administered (orally) with graded doses of diazepam (2.5; 5.0; 7.5 and 10.0 mg, respectively).

Results obtained could be summarized as follows:

1- Diazepam administration caused significant ($P<0.05$) increases in live body weight, weight gain, feed conversion ratio but decreased feed consumption
2- Digestibility coefficients of (DM, OM, CP, EE, CF and NFE), nutritive values of (TND and DCP%); nitrogen balance and nitrogen retained as a percent of nitrogen intake increased significantly by diazepam administration.
3- There were insignificant increases in both dressing percentage and hot carcass weight (%) in the drug treatment groups.
4- Diazepam administration had no significant effect on plasma protein fractions, lipid fractions, however, slight increase in the plasma total lipids of treated animals were observed.
5- There was no side effect of diazepam on liver function as observed from the GOT and GPT levels in the blood of treated animals. The same was also for kidney function where plasma urea and creatinine were insignificantly different.
6- Diazepam administration inhibited thyroid function as indicated by the decreased rate of T4 conversion to T3.
7- Plasma glucose level was significantly higher in the control group than treated groups.
8- A significant increase in plasma phosphorus level was obtained but no changes in calcium level were observed.
9- Blood packed cell volume and N/L ratio were not significantly different
10- Diazepam increased the economic efficiency (%), and the performance index of the growing rabbits.

It is suggested that diazepam administration may enhance the nutritive value and digestibility of diets and enhance the rabbits performance and can maintain a normal homeostasis for rabbits without any undesirable effects.

Keywords: Diazepam, digestibility, blood picture, growth performance, carcass, rabbits.

INTRODUCTION

Recent studies have been directed towards identifying specific brain sites and various neurotransmitters that are involved in food intake regulation (Denbow, 1989) for example, epinephrine and nor-epinephrine showed a control stimulatory effect on food intake in broilers (Denbow *et al.,* 1981). On the contrary, serotonin has

an inhibitory effect (Denbow *et al.,* 1983). Furthermore, there is evidence that Gamma-Amino butyric acid (GABA), a neurotransmitter, can modulate food intake by opposing the inhibitory effect of serotonin (Morley *et al.,* 1985), and may also play a role with angiotinsin II in modulation of drinking behavior (Swanson and Mogenson, 1981).

Pharmacological methods have been used to control appetite and body weight gain in broiler breeder birds (Oyawoya and Krueger, 1990). Advances in understanding the physiological control of feed intake have led to the identification of the potential chemical or natural products for regulating feed intake in chickens (El-Halawani *et al.,* 1982), rats (Kulkarni *et al.,* 1998), mice (Kuribara *et al.,* 1998), guinea-pig (Hara *et al.,* 1998), and rabbits (Gonzalez *et al.,* 1998).

Tranquilizers have been suggested for use in the animal feeding because of their stress ameliorating properties with possible beneficial effects on growth and feed efficiency in poultry (Kicka and Kamar, 1977; El-Habbak and Radwan, 1990) and in mammals (Feldman and Quenzer, 1984; Morley *et al.,* 1985). Diazepam, a mild tranquilizer, was used to stimulate eating behavior and body weight of humans (Hoebel *et al.,* 1975); pigs (Dantzer, 1976), rats (Stapleton *et al.,* 1979) and rabbits (Swanson and Mogenson, 1981). This drug is classified by Silverstone and Kyriakides (1982) as an anxiolytic agent which potentiates the inhibitory effect of GABA on the serotonergic neurons and stimulates the thyroid hormone activity. Moreover, diazepam receptors are present in both mammals and birds, its binding capacity to peripheral tissues are very low compared to brain tissues, and finally it has a prolonged half life (Feldman and Quenzer, 1984).

These observations suggest that diazepam may be functioning as an appetite-stimulating drug in growing rabbits. The present study was undertaken to provide further information about some nutritional and physiological responses of growing rabbits to diazepam administration.

MATERIALS AND METHODS

This work was carried out at the Center of Agriculture Studies and Consultations (CASC), Rabbit production Unit, Faculty of Agriculture, Ain Shams University, Cairo, Egypt.

Total of sixty, unsexed, New Zealand White (NZW) weaning rabbits, (5 weeks old) were divided randomly into five experimental groups (12 rabbits/group). Each group was subdivided into three replicates with 4 rabbits. Initial body weights of all groups were almost equal. The first group was given a commercial pelleted diet (control group), while the other four groups were given the same basal diet and were administrated orally (once a week) with graded doses of diazepam. (Ratiopharm GmbH Arneimittle, 7902 Blaubeuren, Germany). The doses were 2.5, 5.0, 7.5 and 10.0 mg. The basal experimental diet was formulated and pelleted at Atmida Company to cover the nutrient requirements of rabbits recommended by NRC (1977) and Cheeke (1987).

The rabbits were housed in galvanized metal wire cages provided with feeders and automatic watery system and were kept under the same managerial and hygienic conditions.

The feeding period was extended for 9 weeks. Ingredients and chemical composition of the basal diet is presented in Table (1). Individual

live body weight, feed consumption and feed conversion ratio were recorded at weekly intervals during the experimental period (5-14 weeks of age).

Table (1): Composition and chemical analysis of the basal diet.

Ingredients	%
Clover hay	35.00
Yellow corn	21.15
Wheat bran	31.00
Soy bean meal (44% CP)	11.00
Limestone	1.20
Premix*	0.30
Common salt	0.30
DL-Methionine	0.15
Total	100.00
Chemical analysis (as fed basis)	
A- Determined analysis	
Dry matter (DM%)	91.90
Organic matter (OM%)	84.90
Crude protein (CP%)	16.19
Crude fiber (CF%)	13.60
Ether extract (EE%)	2.75
Crude ash (%)	7.00
Nitrogen free extract (N.F.E.) (%)	51.65
B- Calculated analysis	
DE (Kcal/kg)	2625
Methionine + cystine (%)	0.66
Lysine (%)	0.80
Calcium (%)	0.95
Total phosphorous (%)	0.60

*** One Kilogram of premix provides: 2000.000 IU vit. A, 150.000 IU vit. D, 8.33g vit. E, 0.33g vit k, 0.33g vit. B1, 1.0g vit. B2, 0.33g vit. B6, 8.33g vit. B5, 1.7 mg vit. B12, 3.33g pantothenic acid, 33mg Biotine, 0.83g folic acid, 200g choline chloride, 11.7g Zn, 12.5g I, 16.6 mg SE, 16.6 mg Co, 66.7g Mg and 5g Mn.**

At the 14th week of age, a digestibility trial, the animals were housed individually in metabolic cages for 7 days as a collection period. Amounts of feed were offered and faeces and urine of each animal were taken daily during the collection period. The experimental diet, faeces and urine were carried out according to A.O.A.C (1990).

Blood samples were collected from animals the diffeent treatment at the end of the experiment. Hematocrit was determined using heparinized capillary tubes and microhematocrit centrifuge. Blood smears were stained using Wright's stain and were differentially counted. One hundred leucocytes were counted and differentiated into neutrophils (N) and lymphocytes (L). The N/L ratio was calculated. The blood samples were centrifuged at a speed of 3000 rpm for 15 minutes and blood plasma was stored frozen till biochemical analysis. Total protein, albumin, glucose, total lipids, total

cholesterol, urea, creatinine, transaminase enzyme activities (GOT and GPT), minerals (Calcium and phosphorous), thyroxine (T4) and tri-idothyronine (T3) levels were determined in the blood plasma colorimetrically using available commercial kits. The globulin values were obtained by subtracting the values of albumin for corresponding values of total protein.

After complete bleeding of rabbits, pelt, viscera and tail were removed, then carcass, giblets, (heart, kidney, caul, mesenteric fat) were weighed. Values of pH for blood, stomach and caecum contents were measured immediately using a digital pH meter.

Data were statistically analyzed using complete randomized design according to Snedecor and Cochran (1982). Duncan's Multiple Range test (1955) was also used for the comparison among means of the experimental groups. Economical efficiency (EE) and performance index (PI) were calculated as follows:

$$EE = (A-B)/Bx100$$

where A = price of kg gain (LE)

B = feed cost/kg gain (LE)

The performance index was calculated according to North (1981) as follows:

$$PI = \frac{\text{Live body weight (kg)}}{\text{Feed conversion ratio}} \times 100$$

RESULTS AND DISCUSSION

Growth performance:

Results presented in Table (2) showed that the average live body weight of NZW rabbits at 8, 11 and 14 weeks of age significantly ($P<0.05$) improved in groups administrated different levels of diazepam compared with control group (no administration of diazepam).

The daily weight gain increased significantly ($P<0.05$) during the experimental periods from 5-8 weeks and 11-14 weeks of age and increased insignificantly from 8-11 and 5-14 weeks of age with administrating NZW rabbits levels of diazepam compared with control group.

Daily feed consumption of rabbits decreased significantly ($P<0.05$ or 0.01), while feed conversion ratio was significantly improved ($P<0.05$) during the whole experimental periods with diazepam groups compared to control one.

The present results are in agreement with those of Kicka (1973); Kicka and Kamar (1977); Kicka *et al.,* (1981); Singh and Sud (1993) and Ali *et al.,* (1998) who reported that diazepam increased body weight gains and improved feed conversion ratio in the broiler chickens.

Nutrients digestibility and nitrogen utilization:

Results obtained in Table (3) show that administrating growing rabbits from 5-14 weeks of age with diazepam levels increased significantly ($P<0.05$ or 0.01) digestibility coefficients of DM, OM, CP, EE and CF, while

digestibility of NFE was increased insignificantly (P<0.05) by Diazepam groups compared with control group.

It could be observed from nutritive values of the experimental treatments expressed as TDN and DCP% (Table 3) that administration with diazepam levels significantly (P<0.05 or 0.01) improved the nutritive value and rabbits administrated with 10 mg diazepam utilized the diet more efficiently than other treatments.

Clear improvements in the nitrogen balance values and their percentages were found with increasing diazepam administration up to 10.0 mg. Moreover, the control group recorded lower values for nutrients digestibility, nutritive values and nitrogen utilization than the graded levels of diazepam.

Generally, the results showed clearly that, digestibility coefficients of nutrients, nutritive values and nitrogen utilization increased with administrating levels of Diazepam up to 10 mg. These results may explain the improvement in rabbit growth performance (body weight, daily weight gain and feed conversion ratio).

Carcass traits:

Data of carcass traits are presented in Table (4). There were insignificant differences in all studied carcass traits between diazepam groups and control group except for skin weight percentage. The dressing and hot carcass weight percentages were improved insignificantly by administrating diazepam levels. These results are in agreement with these of Singh and Sud (1993) and Ali *et al.* (1998) who reported that diazepam increased dressing and giblets percentages of broiler chickens. The empty digestive tract parts percentages insignificantly decreased by diazepam administration. Decreasing weight of digestive tract parts was associated with decrease in the thickness of digestive tract of growing rabbits. This result may have a great effect on improving nutrient digestion and absorption through the digestive tract of growing rabbits.

Blood parameters:

Changes in the blood constituents as influenced by diazepam administration are shown in Table 5. Total plasma protein and globulin were not significantly affected by diazepam administration. However, a slight increase in the plasma protein of the higher dose groups were observed. On the other hand, plasma albumin concentrations showed significant (P<0.05) variations with the higher values obtained for groups D3 and D2, respectively. It is clear from the results that there is no obvious trend for the effect of diazepam on plasma protein fractions. This may reflect an enhanced physiological homeostasis due to diazepam administration and consequently an improved dietary protein utilization. This holds true with the findings of Swanson and Mogenson (1981) and Gonzalez *et al.* (1998) in rabbits, and Hara *et al.* (1998) in guinea pigs. Of particular interest is the higher albumin to globulin ratio (A/G) that was observed in the diazepam - treated rabbits. Although these higher values were not

significant, they may indicate an enhanced immunity of these groups and hence, may support the

observed protective effect of diazepam that reported by Kulkarni *et al.* (1998).

No significant differences were detected in the plasma total lipids cholesterol and their ratio (Table-5). However, slight increases were observed in the plasma total lipids of diazepam treated groups. A similar trend was recorded for lipids /cholesterol ratio. A marked, although insignificant, decrease in plasma cholesterol was observed in the diazepam-treated groups. It appears that diazepam administration may affect lipid metabolic pathways in rabbits. The lowered plasma cholesterol concentration in the diazepam-treated rabbits may be related to the protective effect of this drug as mentioned before (Kulkarni *et al*., 1988). Therfore, higher plasma cholesterol is the main reason for atherosclerosis in mammals.

Concerning liver function, as indicated by GOT and GPT levels in blood, it appears that diazepam administration had no harmful effect on the treated rabbits liver. Although, higher, but insignificant, values of GOT and GPT, and a lower GOT/GPT ratio were obtained for the D2 treated group, the other values showed comparable results. Furthermore, plasma urea and creatinine concentration as indicators for kidney function, showed insignificant changes. It appears from these results that diazepam administration may improve protein metabolism and promote the growth of the treated animals. This confirms the previous findings of Hoebel, *et al.* (1975) and Silverstone and Kyriakides (1982).

The changes in T4, T3 concentrations and T4/T3 ratio as influenced by diazepam administration are shown in Table-5. There were significant ($P<0.05$) differences among diazepam-treated and the control groups. Thyroxine (T4) concentration was lower in the diazepam-treated groups, except for the D3 group which showed a higher T4 value than the control group. This result is difficult to be discussed and may be due to laboratory errors in blood sampling during T4 determination. Plasma T3 concentrations were slightly lower in the D4 and the control groups, however the differences between all groups were insignificant. This may suggest that the rate of conversion from T4 to T3 was lower in these groups. It is suggested that the tranquilizing drugs may inhibit thyroid gland activity and then decreased the rate of T4 converted to T3 in the peripheral circulation. This concept was supported by many workers who used tranquilizers as anti-stress drugs to function, mainly, as thyroid depressing agent (Denbow *et al.,* 1983; Kicka and Kamar, 1977; Feldman and Quenzer, 1984).

Plasma glucose level was significantly higher in the control group than in the diazepam treated groups. This confirms the previous results of T4 values in the present study. Diazepam administration suppressed thyroid activity which in turn lowered plasma glucose level. Plasma calcium levels were not affected by diazepam administration, however, plasma phosphorus levels were significantly increased. Furthermore, packed cell volume and N/L ratio were insignificantly different between all groups. These results show that all rabbits were in an eustress condition due to diazepam administration effects on the thyroid activity.

Economic traits:

Data of the economic evaluation as affected by diazepam administration are shown in Table (6). Total costs (PT) increased by diazepam administration, while the increases of live body weight gain with diazepam groups were more than those with control group. These results show that, economical efficiency (%) and performance index for all treated groups with diazepam were markedly higher than those of control group. Also, these results indicate that, the administration of diazepam by levels reach up to 10.0 mg per rabbit per week resulted in relative economical efficiency about 14.6 to 30.6% more than control group.

Generally, it could be concluded that, increasing diazepam level up to 10.0 mg/rabbit/week improved live body weight gain, feed conversion ratio, digestibility coefficients of nutrients, nutritive values, nitrogen utilization, dressing percentage, economic efficiency and performance index. Diazepam administration did not have any adverse effects on physiological parameters of growing rabbits.

Table (6): Economical traits of NZW rabbits as affected by administration of diazepam.

Items	Control	D1	D2	D3	D4
Average of feed consumed (Kg/rabbit)	5.859	5.513	4.851	5.450	5.040
Price/Kg feed (PT)	62.00	62.00	62.00	62.00	62.00
Feed cost (PT)	363.26	341.81	300.76	337.90	312.48
Price of diazepam doses	--	22.50	45.00	67.50	90.00
Total feed cost (PT)	363.26	385.76	345.76	405.40	402.48
Average weight gain (Kg/rabbit)	1.248	1.603	1.382	1.570	1.521
Price/Kg live body weight (PT)	925	925	925	925	925
Total return (PT)	1154.40	1482.78	1278.35	1452.25	1406.93
Net return (PT)	791.14	1097.02	932.59	1046.85	1004.45
Economical efficiency (%)	217.79	284.38	269.72	258.23	249.56
Relative economical efficiency	100.00	130.58	123.84	118.57	114.59
Performance index	38.60	62.18	55.11	60.97	62.59

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بعض التأثيرات الغذائية والفسيولوجية من معاملة الأرانب النامية بمادة الديازيبام

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إستخدم فى هذه الدراسة 60 أرنب نيوزيلاندى ابيض عمرها خمسة اسابيع وذلك لمعرفه التأثيرات الغذائية والفسيولوجية الناتجة عن إعطاء احد المواد المهدئه (الديازيبام) والتى لها تأثير منشط للشهية على الاداء الإنتاجى للأرانب. قسمت الأرانب الى خمسة مجموعات بكل مجموعة 12 أرنب حيث كانت إحدى المجموعات للمقارنة والباقى تم إعطاؤه إحدى الجرعات التالية 2.5 - 5-7.5 ثم 10 ملليجرام من الديازيبام، ويمكن تلخيص النتائج التى تم التحصل عليها فى:-

1- كان لإعطاء الديازيبام تأثير معنوى على زيادة وزن الجسم، الزيادة فى الوزن ومعدل تحويل الغذاء كما كان له تأثير معنوى جيد على تقليل استهلاك الغذاء.
2- كانت المعاملات الهضمية لكل من المادة الجافة والعضوية والبروتين ومستخلص الإثيير والإلياف الخام والمستخلص الخالى من الازوت والقيمة الغذائية (البروتين المهضوم ومجموع المركبات الغذائية المهضومة) وميزان الازوت والازوت المحتجز كنسبة مئوية من الازوت المأكول زادت معنوية مع إعطاء الديازيبام.
3- تزداد نسبة التصافى والنسبة المئوية لوزن الذبيحة باضافة الديازيبام.
4- لم يكن للديازيبام تأثير معنوى على بروتينات الدم وكذلك الليبيدات ولكن إتضح وجود زيادة غير معنوية فى الليبيدات الكلية بالدم.
5- لم يكن للديازيبام تأثير ضار على وظائف الكبد او الكلى وهذا يتضح من عدم وجود زيادة معنوية فى الانزيمات GPT, GOT وكذلك فى مستوى اليوريا والكرياتينين.
6- إنخفض نشاط الدرقية بزيادة الديازيبام وبالتالى انخفض معدل تحويل هرمون T4 الى T3 فى الدم.
7- هناك إرتفاع ملحوظ فى سكر الجلوكوز فى دم أرانب المجموعة المقارنة عن المجموعات الاخرى.
8- إزدادت نسبة الفوسفور غير العضوى فى الدم معنويا ولكن لم يتأثر مستوى الكالسيوم.
9- لم تتأثر نسبة المكونات الخلوية بالدم وكذلك النسبة كرات الدم البيضاء المتعادلة الى الكرات الليمفاوية فى الدم
10- من الناحية الإقتصادية لوحظ ان اضافة الديازيبام يؤدى الى زيادة الكفاءة الإقتصادية للأرانب الناميه

ومن النتائج السابقة توصى هذه الدراسة باضافة الديازيبام للأرانب النامية لتحسين القيمة الغذائية للعلف وزيادة الكفاءة الإنتاجية كما انه يعمل على تحسين الحالة الفسيولوجية للأرانب دون اى أعراض جانبية أخرى.

Table (2): Effect of diazepam on growth performance of growing rabbits (X±SE).

Items	Control	D1	D2	D3	D4	Sign.
No. of rabbits	12	12	12	12	12	
Initial body weight (g)	566.50±23.50	561.00±19.00	558.50±21.50	558.00±19.00	557.50±24.50	NS
Live body weight:-						
8 weeks	909.50^{b}±52.50	1199.00^{a}±29.00	997.50^{ab}±47.50	957.50^{ab}±57.50	1041.50^{ab}±79.00	*
11 weeks	1615.00^{b}±50.00	1811.50^{a}±49.50	1555.00^{b}±45.00	1602.50^{b}±82.50	1567.50^{b}±17.50	*
14 weeks	1814.00^{b}±66.00	2164.00^{a}±81.01	1940.00^{ab}±95.00	2127.50^{a}±37.50	2078.00^{ab}±75.00	*
Daily live weight gain (g/day)						
5-8 weeks	16.34^{b}±4.24	30.38^{a}±0.48	20.90^{b}±1.24	19.03^{b}±1.84	23.03^{ab}±2.60	*
8-11 weeks	33.60±2.98	29.17±3.79	26.55±0.12	30.71±1.19	25.07±2.93	NS
11-14 weeks	9.48^{b}±2.67	16.79^{ab}±4.65	18.33^{ab}±2.38	25.00^{a}±5.71	24.31^{a}±2.74	*
5-14 weeks	19.80±0.47	25.45±2.67	21.93±1.71	24.92±0.90	24.14±0.81	NS
Daily feed consumption (g)						
5-8 weeks	68.00^{ab}±2.00	71.00^{a}±1.00	54.00^{d}±1.00	57.00^{cd}±3.00	62.50^{bc}±1.50	**
8-11 weeks	103.50^{a}±2.50	93.00^{ab}±4.00	86.00^{b}±6.00	98.50^{ab}±5.50	85.50^{b}±3.50	*
11-14 weeks	107.50±2.50	98.00^{ab}±3.00	90.50^{c}±5.50	104.50^{ab}±2.50	91.50^{bc}±3.50	*
5-14 weeks	93.00^{a}±2.00	87.50^{ab}±2.50	77.00^{b}±4.00	86.50^{ab}±3.50	80.00^{b}±3.00	*
Feed conversion ratio						
5-8 weeks	4.43^{a}±1.03	2.34^{b}±0.01	2.59^{b}±0.11	3.01^{ab}±0.13	2.75^{ab}±0.25	*
8-11 weeks	3.11±0.35	3.23±0.29	3.24±0.24	3.21±0.06	3.48±0.55	NS
11-14 weeks	12.40^{a}±3.75	6.27^{ab}±1.56	4.98^{b}±0.35	4.44^{b}±1.12	3.80^{b}±0.29	*
5-14 weeks	4.70^{a}±0.21	3.48^{b}±0.31	3.52^{b}±0.01	3.49^{b}±0.27	3.32^{b}±0.01	*

a, b, c, d: Means in the same row with the same letters are not significantly different.

NS: Non Significant *** : (P<0.05)** **** : (P<0.01)**

Table (3): Digestibility coefficients, nutritive values and nitrogen utilization as affected by administration of Diazepam levels (X±SE).

Items	Control	D_1	D_2	D_3	D_4	Sign.
Digestibility coefficients (%)						
DM	55.37^{b}±4.49	68.72^{a}±1.91	64.35^{ab}±2.68	59.30^{ab}±1.74	69.52^{a}±6.20	*
OM	56.01^{b}±3.41	69.35^{a}±1.83	64.71^{ab}±2.72	59.86^{ab}±1.50	69.98^{a}±5.79	*
CP	58.34^{c}±3.73	73.70^{ab}±2.76	72.40^{ab}±0.39	67.58^{b}±2.83	77.54^{a}±3.64	**
EE	79.98^{b}±4.00	87.02^{ab}±1.04	91.96^{a}±2.21	87.16^{ab}±1.17	92.26^{a}±1.14	*
CF	17.95^{d}±0.42	28.67^{ab}±3.37	23.57^{bc}±1.18	22.67^{cd}±0.83	29.25^{a}±0.40	**
NFE	70.32±2.82	79.35±2.56	75.68±1.80	71.48±1.69	78.65±4.71	NS
Nutritive values						
TDN%	52.49^{c}±1.76	61.75^{a}±1.45	59.29^{ab}±1.15	56.10^{bc}±0.66	62.21^{a}±2.70	*
DCP%	9.04^{c}±0.33	11.74^{ab}±0.39	11.58^{ab}±0.06	10.81^{b}±0.45	12.15^{a}±0.33	**
Nitrogen utilization						
N-intake (g/day)	1.80±0.19	3.27±0.28	2.82±0.35	3.12±0.24	2.90±0.77	NS
Fecal N (g/day)	0.78±0.03	0.88±0.12	0.78±0.09	0.95±0.08	0.68±0.24	NS
Urinary N (g/day)	0.27±0.04	0.43±0.03	0.52±0.06	0.61±0.10	0.48±0.11	NS
N-balance (g/day)	0.76^{b}±0.18	1.97^{a}±0.17	1.52^{ab}±0.23	1.55^{ab}±0.10	1.74^{a}±0.43	*
N-balance % of intake	40.81^{b}±6.64	60.12^{a}±2.23	53.63^{a}±2.19	49.85^{ab}±1.09	61.03^{a}±1.98	**

a, b, c: Means with the same letters are not significantly different.
NS: Non Significant * : (P<0.05) ** : (P<0.01)

Table (4): Effect of diazepam administration on carcass characteristics of growing rabbit

Items	Control	D_1	D_2	D_3	D_4	Sign.
Dressing percentage	57.27±0.40	60.79±1.09	60.55±0.90	60.07±0.73	58.00±1.8	NS
Hot carcass weight %	46.79±0.27	50.00±1.09	48.76±1.03	49.42±0.38	46.93±2.20	NS
Head weight %	6.59±0.15	7.20±0.37	7.27±0.24	6.65±0.19	6.93±0.36	NS
Liver weight %	2.81±0.10	2.58±0.15	3.43±0.29	3.02±0.21	3.10±0.21	NS
Heart weight %	0.35±0.03	0.29±0.02	0.37±0.04	0.32±0.03	0.42±0.05	NS
Kidneys weight %	0.65±0.02	0.62±0.03	0.66±0.06	0.60±0.03	0.67±0.06	NS
Spleen weight %	0.08±0.02	0.08±0.02	0.07±0.01	0.05±0.01	0.09±0.01	NS
Blood weight %	2.78±0.41	2.52±0.64	2.51±0.05	2.75±0.09	2.25±0.35	NS
Legs weight %	3.97±0.09	3.44±0.09	3.35±0.08	3.55±0.14	3.79±0.19	NS
Skin weight %	10.18^{b}±0.42	12.16^{a}±0.25	11.34^{ab}±0.64	9.20^{b}±1.53	10.01^{b}±0.08	*
Lungs	0.71±0.09	0.60±0.05	0.63±0.09	0.80±0.29	0.69±0.03	NS
Heart fat weight %	0.16±0.02	0.15±0.01	0.20±0.02	0.14±0.04	0.20±0.02	NS
Kidneys fat weight %	0.61±0.27	0.47±0.09	0.44±0.13	0.44±0.12	0.47±0.08	NS
Mesenteric fat weight %	0.58±0.15	0.48±0.02	0.49±0.04	0.52±0.21	0.49±0.13	NS
Caul fat weight %	0.15±0.04	0.27±0.07	0.31±0.08	0.25±0.06	0.23±0.04	NS
Total non carcass fat wt %	1.50±0.43	1.38±0.14	1.43±0.23	1.38±0.31	1.44±0.22	NS
Empty stomach weight (%)	1.77±0.67	1.10±0.07	1.32±0.11	1.16±0.07	1.17±0.05	NS
Empty small intestine weight (%)	3.18±0.31	2.33±0.17	2.94±0.09	2.86±0.27	3.09±0.25	NS
Empty large intestine weight (%)	3.62±0.63	2.76±0.65	2.92±0.14	3.09±0.42	3.50±0.50	NS
Empty caecum weight (%)	1.89±0.17	1.54±0.01	1.48±0.10	1.34±0.33	1.55±0.15	NS
Blood pH	7.30±0.10	7.73±0.09	7.50±0.01	7.73±0.26	7.50±0.06	NS
Stomach pH	1.77±0.09	1.87±0.12	2.20±0.21	2.20±0.31	2.23±0.18	NS
Caecum pH	6.50±015	6.40±0.12	6.43±0.22	6.67±0.27	6.83±0.23	NS

a, b, : Means with the same letters are not significantly different.

NS: Non Significant *** : (P<0.05)**

Table (5): Effect of diazepam administration on blood constituents of growing rabbits.

Items	Control	D_1	D_2	D_3	D_4	Sign.
Protein fractions:-						
Total protein (g/dL)	6.47±0.23	6.32±0.32	6.74±0.24	6.99±0.68	6.64±0.32	NS
Albumin (g/dL)	3.80^{ab}±0.08	3.61^{b}±0.17	4.52^{ab}±0.20	5.19^{a}±0.84	4.32^{ab}±0.43	*
Globulin (g/dL)	2.67±0.30	2.71±0.16	2.22±0.35	2.80±0.47	2.32±0.13	NS
Al/Gl ratio	1.29±0.16	1.34±0.03	2.17±0.44	1.56±0.25	1.89±0.28	NS
Fat fractions:-						
Total lipids (mg/dL)	997.00±30.57	1002.67±80.07	1006.67±19.64	1043.33±33.83	914.67±100.04	NS
Total cholesterol (mg/dL)	236.67±48.35	175.83±13.72	170.00±33.30	194.17±30.83	133.17±19.46	NS
Lipids/cholesterol ratio	4.21	5.70	5.92	5.32	6.87	
Glucose (g/L)	1.39^{a}±0.27	0.89^{ab}0.12	0.81^{b}±0.06	0.84^{b}±0.04	0.98^{ab}±0.18	*
Liver function:-						
GOT (IU/L)	98.00±5.86	88.67±8.11	101.67±5.78	88.67±2.73	89.00±5.86	NS
GPT (IU/L)	47.00±2.52	42.33±6.39	69.00±15.52	43.33±3.71	40.33±12.96	NS
GOT/GPT ratio	2.09	2.09	1.47	2.05	2.21	
Kidney function:-						
Urea (mg/dL)	41.67±8.28	44.32±3.02	45.11±1.34	35.51±2.32	40.31±1.40	NS
Creatinine (mg/dL)	1.48±0.31	1.22±0.06	0.90±0.03	1.43±0.30	1.59±0.23	NS
Thyroid function:-						
T4 (ng/ml)	23.15^{ab}±0.84	15.16^{b}±4.21	15.70^{b}±2.84	28.40^{a}±3.97	16.18^{b}±4.64	*
T3 (ng/ml)	0.77±0.01	0.90±0.16	0.86±0.07	0.98±0.10	0.74±0.18	NS
T4/T3 ratio	29.95^{a}±1.25	17.86^{c}±4.84	18.43^{bc}±3.81	28.63^{ab}±1.34	22.02^{abc}±2.72	*
Calcium (mg/dL)	10.48±0.37	11.06±0.24	10.72±0.44	10.85±0.22	10.57±0.54	NS
Phosphorus (mg/dL)	5.32^{b}±0.24	5.47^{b}±0.30	5.76^{ab}±0.08	6.48^{a}±0.08	6.15^{ab}±0.42	*
PCV	39.00±0.58	41.33±1.67	40.67±2.33	41.00±1.15	46.00±1.15	NS
NL ratio	0.42±0.08	0.40±0.08	0.48±0.05	0.51±0.06	0.50±0.05	NS

a, b, c: Means with the same letters are not significantly different. NS: Non Significant * : (P<0.05)