J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

EFFECT OF DIFFERENT LEVELS OF DICALCIUM PHOSPHATE ON GROWING MALE LAMBS

Safaa A. Saleh

Biological Application Department ,Nuclear Research Center , Abo Zabaal, Cairo Egypt.

ABSTRACT

This experiment was carried out to investigate the effects of different level of dicalcium phosphate on growth, digestibility, rumen fermentation and some blood parameters. Eighteen growing local breed male lambs (about 3 months old) with an average weight of 23.61 ±0.58 Kg were divided randomly into three feeding groups for 150 days, fed on:

Ration one (R1) : CFM contained1% dicalcium phosphate+ rice straw .

Ration two (R2) : CFM contained 2% dicalcium phosphate + rice straw .

Ration three (R3): CFM contained 3% dicalcium phosphate + rice straw .

Three metabolism trails were conducted to evaluate the nutritive value of the experimental rations with sheep at 90% of ad libitum intake.

Rumen liquor samples were taken using stomach tubes at 0,3 and 6 hours post feeding to determine pH values, ammonia – N (NH3-N) and total volatile fatty acids (TVFA' s) concentration.

The main results showed that the digestibility of dry matter (DM), crude protein (CP) and crude fiber (CF) for R 3 were significantly ($P<0.05$) higher than R 1. While ether extract (EE), organic matter (OM) and nitrogen free extract (NFE) digestibility for the rations had no significantly differences.

The best value of total digestible nutrients (TDN) observed with R3 followed by R2 and the lowest value was reported for R1. The same trend was noticed with digestible

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

crude protein (DCP)% which recorded 9.72, 10.21 and 10.77% for R1, R2 and R3, respectively.

The highest ruminal fermentation values obtained with R3 in comparison with other rations. Whereas, NH3-N concentration and TVFA' s significantly (P<0.05) increased at 3 hours after feeding with R3 but ruminal pH values were unaffected.

Blood total protein, albumin, asparate amino- transferase (AST), and triiodothyronine (T3) were significantly (P<0.05) higher for groups 2 and 3 which fed 2% and 3% of dicalcium phosphate (R2 and R3) compared with the group fed on 1% dicalcium phosphate (R1) .

Blood serum globulin alanine amino – transferase (ALT), calcium, phosphorus and tetraiodothyronine(T4) levels were not affected by dicalcium phosphate levels .

The average daily gain (ADG) , daily intake and feed conversion (Kg DM/Kg gain) were improved with R2 and R3 which were nearly equal ,while feed conversion in terms of Kg TDN /Kg gain or Kg DCP/Kg gain was not different among groups .

It could be concluded that 3% dicalcium phosphate can be used for growing lambs, which are given the best growth performance.

INTRODUCTION

Most grains have deficient level of calcium while legumenus contain high level of calcium in excess of ruminant requirements .

Adequate calcium and phosphorus nutrition depends not only on sufficient total dietary supplies, but also on the chemical forms in which they occur in the diets.

The main sources of inorganic calcium added to rations are limestone, dicalcium phosphate and bone meal (McDowell *et al* ., 1983) .

The dietary calcium: phosphorus ratio also can be important. Most animals require fairly narrow calcium to phosphorus ratio usually no wider than 2:1; however, ruminants can tolerate wider ratios than monogestric animals providing the phosphorus level

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

adequate. Vitamin D was important in absorption of calcium from the intestine. An inadequate intake of Ca may cause weakened bones slow growth, and tetany . While, signs of phosphorus deficiencies are not easily recognized

These two elements (calcium and phosphorus) are discussed together because they are closely associated with each other in metabolism. Also, they occur in the body combined with each other for the most part and an inadequate supply of either in the diet limits the nutritive value of both (Hegsted , 1973).

Objectives of this study were to evaluate the effect of dicalcium phosphate on growth performance of male lambs, rumen fermentation and biochemical blood serum parameters.

MATERIALS AND METHODS

Eighteen growing male lambs (impure local breed) about three months old were randomly selected from the experimental farm project in Nuclear Research Center, Atomic Energy Authority at Inshas , Egypt . Animals were then, divided into three groups on body weight basis (23.89, 24.44 and 22.50 Kg for 1st, 2nd and 3rd groups, respectively).

Animals of each group were kept in separate shaded pen, where they were groups fed on one of the three tested rations.

Ration one (R1) : CFM contained 1% dicalcium phosphate + rice straw .

Ration two (R2) : CFM contained 2% dicalcium phosphate + rice straw .

Ration three (R3) : CFM contained 3% dicalcium phosphate + rice straw .

Rice straw and concentrate feed mixture (CFM) at the ratio of 25:75, respectively, the tested rations were given according to NRC (1985) allowances for growing lambs.

The chemical analysis, dry matter (DM), organic matter (OM), crude protein (CP), crude fiber (CF), and ash for concentrate feed mixtures and rice straw were conducted according to A.O.A.C. (1990), which present in table 1.

The required amounts of rations were offered in two equal meals twice daily at 8 a.m. and 3 p .m, feed consumption was recorded and feed conversion was calculated.

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

Lambs were weighed at the beginning of the experimental and thereafter at three weeks intervals till the end of the experiment, which lasted for 150days.

At the end of experimental period, four animals from each group were used to evaluate the digestibility and nutritive value of the three experimental rations.

Three digestibility trails were contacted on rams kept individually in metabolic cages; animals were fed ad libitum from the tested rations, which were offered two times daily.

The intake was measured first during the preliminary period and was restricted to 90% of voluntary intake during the collection period to avoid any feed refusals.

During this period animals were offered concentrate feed mixtures in the morning followed by rice straw in the noon. Residual concentrate feed mixtures and rice straw, if any, was collected next morning before offering fresh concentrate feed mixtures. Water was available for animals ad libitum.

Feces and urine voided by animals were collected manually and suitable aliquot of 24 hourly collections was taken for chemical analysis. Wet feces samples were preserved with dilute sulphuric acid for crude protein estimation by micro – Kjeldahl method. The daily feces was firstly dried at $60c^{o}$ over night then finally dried at $105c^{o}$ for 3 hours.

Feed residue, feces and urine were analyzed according to the procedures of A.O.A.C. (1990).

Rumen liquor samples were taken from the three animals of each group at two consequence days following the collection periods of metabolism trails. The samples were taken by a rubber stomach tube at 0,3,6 hrs post feeding.

The pH values for collected rumen liquor samples were measured immediately by using pH meter model 211digital, then filtered through two layers of cheese for determination of total volatile fatty acids (TVFA ‘s) as described by Warner (1964) and ammonia–N(NH3-N) concentration according to A.O.A.C. (1990).

Blood samples were taken from the jugular vein of growing lambs once monthly during the experimental period. Blood serum was tested for total protein according to Weichselbaum TE.,(1946) Stanbio laboratory and albumin according to Doumas,*et al.* (1971) Stanbio

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

laboratory . 2930 East Houston street . San Antonio, Texas 78202. Globulin was calculated by the different between total protein and albumin.

Serum levels of asparate amino –transferase(AST) and alanine amino – transferase (ALT) were determined according to Reitman and Frankel (1957) Quimica Clinica Aplicada S.A. E43870 Amposta / Spain.

Calcium was determined by using atomic absorption (Buck scientific 210 VGP) . Phosphorus was determined by using spectrophotometer (carry – 3E- UV–visible) .Triiodothyronine (T3) and iodothyronine (T4) levels were estimated by RIA technique using solid phase coated tubes and the tracer was labeled with ^{125}I (Diagnostic Products Corporation , 5700 West 96th street, Los Angeles, CA 90045-5597, USA).

Statistical analysis of obtained data was carried out according to one way analysis of variance, using the general linear model procedure, while the differences among means were tested using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Digestibility Trails:

The daily dry matter intake expressed as gram DM / head / day, digestibility%, nutritive value and balance studies with sheep were presented in table2. Dry matter intake for R1, R2 and R3 ranged between 964.7 and 1000.8 gram/day .

Dry matter intake tended to increase by increasing level of dicalcium phosphate. These results are inagreement with Erdman *et al* .,(1980) reported that , addition of calcium from 0.50 to 1.03 % for lactating cows significantly ($P< 0.05$) increased feed intake by 1.3 Kg /day.

Also, it could be observed that the R3 had the best values in digestibility of most nutrients. Digestion coefficients of dry matter, crude protein and crude fiber for R 3 were significantly ($P<0.05$) higher than R 1, being 70.75, 68.6 0and 57.50% respectively.

Ether extract, organic matter and nitrogen free extract digestibility for the rations had no significantly differences. These results agree with those obtained by Zinn and Shen (1996) indicated

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

that supplemental calcium did not influence (P<0.05) digestibility of organic matter, nitrogen free extract and fatty acids.

The nutritive value of the experimental rations in terms of total digestible nutrients (TDN) values were 66.83, 69.06 and 70.11% for R 1, R 2 and R 3, respectively.

The same trend was noticed with digestible crude protein (DCP)% which recorded 9.72, 10.21 and 10.77% for R1, R2 and R3, respectively.

Results of the dietary N retention shown in table 2 , indicated that positive N balance for all rations . The best value of N balance was recorded for rams fed R3 .It may be due to higher digestibility of crude protein for this ration containing 3% of dicalcium phosphate.

Significantly higher positive balances of calcium and phosphorus (P<0.05) were noticed with R2 and R3 than with R1. This may be due to high dicalcium phosphate intake on these rations.

Rumen activity

The effect of different level of dicalcium phosphate on ruminal pH values were presented in Table 3 indicated that ruminal pH was decreased after feeding until 3 hours and then lightly increased at 6 hours after feeding for all rations. That is agree with Emmanuel *et al.* (1969) and Soliman (1981) indicated that rumen pH values were high before feeding and decreased after feeding then increased.

No significant difference among treatments was detected in ruminal pH values. All pH values were above 6.0 which indicated to the best digestion of cellulytic materials in the rumen as reported by Mertens, (1977). If pH falls below 6.0 a substantial reduction of the proteolytic activity was noted as well as very low counts of proteolytic bacteria, whereas, the deamination of amino acids appears to have an optimum at pH 6.0 to 7.0 and decrease when pH fell below 6.0 (Erfle *et al* . 1982) .

Total Volatile fatty acids (TVFA' s) were obtained in the present study are shown in table 3. Where the highest values of TVFA' s were at 3 hours after feeding, this may reflect the effect of the voluntary feed intake as reported by Fenner *et al* (1967). Then lowed at 6 hours post feeding, whereas, ruminants are totally dependent on the end products of carbohydrate fermentation in the

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

rumen like TVFA' s which are the principal energy source for the host animal (Chesson and Orskov , 1984) .Also, might be the rumen bacteria to consumed TVFA' s as a sources of energy for its growth . Whereas, Jayasuriya *et al* , (1987) reported that the microbial out put was significantly correlated (r=0.87) to TVFA' s production. The highest (P<0.05) TVFA's concentrated were observed with lambs fed R3 compared with R1 and R2.

Data of ruminal NH3-N concentration increased after feeding at 3 hours, then decreased at 6 hours post feeding. Similar trend was observed with all rations. Tancurov (1969), Abd EL- Aziz *et al*, (1993) and Zied (1998) found similar results.

At 3 hours after feeding, ruminal NH3-N concentration to be highest (P<0.05) with lambs fed R3 compared with R1 and R2, While NH3N concentration for R3 was the highest disappearance at 6 hours compared with other rations .It may be due to high transportation of ammonia into microbial protein .

The results are on line with Wiliams and Newbold (1990) indicated that the reducation of ammonia in the rumen liquor appear to be the result of increased incorporation of ammonia into microbial protein due to increase stimulated microbial activity .

Generally, The highest ruminal fermentation values obtained with R3 in comparison with other rations. These data may be attributed to the ability of R3 to improve digestibility of nutrient within the rumen.

Blood serum parameters

The effect of experimental rations on blood serum parameters is presented in table 6. Total protein, albumin and AST were significantly (P<0.05) higher for groups 2 and 3 which fed 2% and 3% of dicalcium phosphate (R2 and R3) compared with the group fed on 1% dicalcium phosphate (R1) . Such trend may be attributed to higher crude protein intake (increase feed intake) from R2 and R3 than from R1 as indicated in table 1 , and improvement in protein digestibility in the gut with these rations (R2 and R) .

Dicalcium phosphate levels did not affect blood serum globulin and ALT transamineses levels. Similar trends were observed for blood serum levels of calcium and phosphorus.

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

The range of calcium was 9.9 to 10.6 mg / dl and for phosphorus was 5.15 to 5.49 mg /dl, which are within the normal range.

These results were compatible with those given by Horst et al, (1997) have shown that plasma calcium is controlled by the coordinated efforts of the calcitropic hormones , parathyroid hormone (PTH) and vitamin D3 [1,25 $(OH)_2$ D3], which are responses to any increase or decrease in plasma calcium pool.

Lambs fed R2 and R3 had higher ($P<0.05$) concentrate of triiodothyronine (T3) than R1 . This result may be attributed to higher dry matter intake, which leads to highly metabolic rate and increment of body weight, while the increase of tetraiodothyronine (T4) level was not significant between experimental rations

Growth performance

Average daily gain , daily intake and feed conversion are given in table 5. Lambs daily gain was improved by 27% and 39% for R2 and R3 than R1, this may be due to reduce daily intake companion to low level of dicalcium phosphate. Whereas, the highest value mean daily intake was recorded with lambs fed R3 containing 3%dicalcium phosphate.

These results were agreement with Burroughs *et al* ., (1975) and Stock *et al.*, (1986) reported that increased feed intake would have caused an increase in energy consumed and an increase in both microbial protein and escape protein reaching the small intestine thus , increasing lamb gains.

Feed conversion ratio (Kg DM /Kg gain) was improved (P0.05) with R3 followed by R2 than with R1. Growth performance studies of Bock *et al*.(1991) observed that increasing calcium from 0.6 to 0.9% improved feed conversion ratio (dry matter intake /gain) by 6.6% .However , feed conversion in terms of TDN or DCP Kg /Kg gain was not statistically different among rations .

Data revealed that the average daily gain (ADG), daily intake and feed conversion of R2 and R3 were nearly equal, while lambs fed R1 appeared to have lower values. Thereby, calcium supplementation resulted in a significant improvement in the performance of fattening lambs (Goodchild, 1993).

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

Optimum animal performance is linked very closely with calcium and phosphorus levels in diet (Beeson et al.,1975;Harms et al., 1976 and Peo,1976) .

It could be concluded that supplementing male lambs rations with 3% dicalcium phosphate improved feed conversion.

Table (1): Chemical analysis for the experimental rations on DM basis %

	CFM *	Rice straw	Dicalcium phosphate
DM	92.13	94.01	-
OM	92.49	81.37	-
CP	16..28	3.31	-
CF	15.11	40.52	-
EE	4.69	2.65	-
NFE	56.41	34.89	-
Ash	7.51	18.63	-
Ca	0.55	0.72	22.5
P	0.51	.09	16.8

- CFM: concentrate feed mixture containing 1% dicalcium phosphate and vitamin AD3E.

Table(2) : Dry matter intake, digestibility coefficients, nutritive values and balance studies for the experimental rations.

Item	R1	R2	R3
DM intake g/day	964.7	989.5	1000.8
Digestibility coefficients %			
DM	58.5^{c}	68.71^{b}	70.75^{a}
OM	68.61	70.11	71.26
CP	63.50^{c}	65.90^{b}	68.60^{a}
EE	69.80	68.60	69.70
CF	50.20^{b}	58.10^{a}	57.50^{a}
NFE	64.30	65.50	66.40
Nutritive value (DM basis),%			
TDN	66.83^{b}	69.06^{a}	70.11^{a}
DCP	9.72^{b}	10.21^{ab}	10.77^{a}
Balance studies (g/day)			
Nitrogen retention	6.19^{c}	7.57^{b}	8.90^{a}
Calcium retention	4.48^{b}	5.56^{a}	5.94^{a}
Phosphorus retention	1.83^{b}	2.39^{a}	2.64^{a}

A, b ,c Mean in the same row with different superscripts differ significantly ($P<0.05$).

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

Table (3) :Rumen fermentation parameters for male lambs fed the experimental rations .

Item	Time /hr1	R1	R2	R3
PH values	0	7.12±0.06	7.06±0.04	6.99±0.06
	3	6.47±0.19	6.39±0.02	6.48±0.01
	6	6.48±0.15	6.58±0.06	6.78±0.06
Mean		6.69±0.21	6.61±0.22	6.73±0.16
NH3-N mg/ 100 ml RL	0	20.41±0.61	20.95±1.50	21.28±0.28
	3	24.79±1.30^{b}	24.32±0.50^{b}	26.49±1.56^{a}
	6	23.09±1.80	23.15±0.14	24.41±1.52
Mean		22.76±1.58^{b}	22.80±1.76^{b}	24.10±0.53^{a}
TVFA 's meq/100ml RL	0	7.82±0.73	7.91±0.35	7.62±0.34
	3	9.10±0.81^{b}	9.39±0.51^{b}	10.36±0.11^{a}
	6	8.15±0.78	8.61±0.42	8.81±0.82
Mean		8.36±0.51	8.64±0.43	8.93±0.79

A, b ,c Mean in the same row with different superscripts differ significantly (P<0.05).

RL : rumen liquor .

Table (4): Effect of feeding the experimental rations on some blood serum parameters of male lambs.

Item	R1	R2	R3
Total protein ,g/dl	6.31±0.30^{b}	7.44±0.10^{a}	7.35±0.20^{a}
Albumin ,g/dl	3.18±0.10	3.55±0.10	3.63±0.10
Globulin g/dl	3.13±0.18	3.89±0.20	3.72±0.19
AST, U/L	45.30±1.70^{b}	56.1±2.20^{a}	55.8±2.20^{a}
ALT, U/L	21.50±2.30	23.1±1.30	22.9±2.20
Calcium, mg/dl	9.90±0.20	10.6±0.15	10.5±0.20
Phosphorus, mg/dl	5.15±0.21	5.21±0.13	5.49±0.11
T3 ng/dl	68.7±2.80^{b}	76.8±3.10^{a}	78.1±2.30^{a}
T4 µg/dl	4.61±0.23	4.87±0.33	5.16±0.31

A, b ,c Mean in the same row with different superscripts differ significantly (P<0.05).

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

Table (5) :Average daily gain and feed conversion of male lambs fed the experimental rations .

Item	R1	R2	R3
No. of animals	6	6	6
Period , days	150	150	150
Initial body weight, Kg	23.89	24.44	22.5
Final body weight, Kg	47.32	54.14	55.06
Total gain , Kg	23.43	29.7	32.56
Average daily gain (ADG)	156.2^{b}	198^{a}	217^{a}
Mean daily intake			
DM ,Kg			
TDN ,g	1.025	1.241	1.325
DCP ,g	685	857	928
Fed conversion	99.63	126.7	142.7
DM Kg/Kg gain			
TDN Kg/ Kg gain	6.562^{a}	6.267^{ab}	6.105^{b}
DCP Kg/Kg gain	4.385	4.328	4.276
	0.638	0.639	0.657

A, b ,c Mean in the same row with different superscripts differ significantly ($P<0.05$).

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

REFERENCES

Abd El – Aziz, A.A; Lashin,M. E., El- Oksh,N. and Fouad R. T. (1993). Effect of some mechanical treatment and feed additives on nutritional value of corn stalks . III-Blood and rumen parameters . J. Agric. Sci. Mansoura Univ. 18:46.

A.O.A.C. (1990) . Official methods of analysis 15 rd ed. Association of analysis chemists. Washington D.C., USA.

Beeson , W. M. ,Perry, T. W. ,Jacobson , N. L., Wiggers , R. D. **and** Jacobson , G. N.(1975). Calcium in beef and dairy nutrition . National Feed Ingredients Association , Des Moines, Lowa.

Bock, B. J., Harman, D. L., Brandt, Jr., R. T. and Schneider, J. E. (1991). Fat source and calcium level effects on finishing steer performance, digestion, and metabolism. J . Anim. Sci. 69:2211.

**Brigges , P.K. , Hogen , J. P. and Reid , R. L. (1957) . The effect of volatile fatty acids, lactic acid and ammonia on ruminal pH in sheep . Aust. J. Agric. Res.,8:674.

Burroughs ,W ., Nelson .D. K and Mertens , D. R. (1975) . Protein physiology and its application in the lactating sow: The metabolizable protein-feeding standard. J. Anim. Sci. 41:933.

Cheeson , A. and Oreskov E. K. (1984). Microbial digestion in the digestive tract. Pages 305-339 in Straw and other fibrous by – products as feed (Snndstol, F. and Owen . E, eds). Elsevier Scientific publishing company, Amsterdam/Oxford/New York.

Doumas , B.; W. Wabson and H. Biggs (1971) . Albumin standards and measurement of serum with bromocrfsol green. Clin. Chem. Acta , 31 :87.

Duncan, D. B. (1955). Multiple Range Test and Multiple F test . Biometrics , 11:1.

Emmanuel, B. L. Alwlor M. J. and Aleese,D. M.(1969). The rumen buffering of sheep fed pelleted roughage concentrate rations . Br. J. Nut., 23:805.

Erdman, R. A. , Botts, R. L., Hemken, R. W. and Bull, L. S. (1980). Effect of dietary sodium bicarbonate and magnesium oxide on production and physiology in early lactation ,J. Dairy Sci. 63:923.

Erfle , J. D., Boila, R. M., Mahadevan, S., and Sauer, F. D. (1982). Effect of pH on fermentation characteristics and protein

degradation by rumen microorganisms in vitro J. dairy Sci. 65:1457.

Fenner , H; Dickinson, F. N. And Barnes, H. D. (1967) . Relationship of digestibility and certain rumen fluid components to level of feed intake and time of sampling after feeding . J. Dairy Sci. , 50:334.

Goodchild, A., Ankuz, O., Khalily, M., Bahhady, F. and Termanini A. (1992). Responses of fattening lambs to calcium and trace element supplements. Annual report of the pasture forage and livestock program. ICARDA.

Harms, R. H., Damron, B. L., Roland, D. A. ,and Potter, M. L. (1976). Calcium in Broiler layer and Turky Nutrition. National Feed Igredients Association, Des Moines, Lowa.

Hegsted,D.M.(1973). Modern Nutrition in health and disease. 5th ed. Lea and Febiger Philadelphia.

Horst, R.L. , Goff, J. P., Reinhordt, T. A. and Buxton, D. P. (1997). Strategies preventing milk fever in dairy cattle . J. Dairy Sci. 80:1269.

Jayasuriya, M. C. N., Hamilton, R. and Rogovic, B. (1987). The use of an artificial rumen to assess low quality fibrous feeds. Biological wastes. 20, England.

McDowell, L. R. ; J. H. Conrad; G. L., Ellis and J. K. Loosli , (1983) . Minerals for grazing ruminants in tropical regions. Department of Animal Science center for Tropical Agriculture University of Florida, Gainesville . 11:15 .

Mertens, D. R. (1977). Effect of buffers upper fiber digestion. Invited paper regulation of Acid- Base Balance Symposium. Tucson, Arizona.

NRC.(1985). Nutrient Requirements of Domestic Animals. Nutrient requirements of sheep. Sixth revised edition. National Academy Press. Washington, D.C.

Peo,E.R.(1976).Calcium in swine nutrition. National Feed Ingredients Association, Des Moines, Lowa.

Reitman , S. and S. Frankel (1957).Calorimetric method for the determination of serum glutamic oxaloacetic acid and glutamic pyruvic acid . am. J. Clin. Path., 28 , 56-63.

Soliman, S.A. (1981) . Nutrational studies upper the use of elephant grass in fattening buffalo calves.Ph.D. Thesis ,Fac. of Agric.,Ain-Shams Univ.

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

Stock, R., Klopfenstein, T and Brink D. (1986). Whey as a source of rumen degradable protein . II . For growing ruminants . J . Anim. Sci. 1986. 6.3:1574-1580

Tancurov, G. V. (1969). Changes in the concentration of N compounds in the rumen of sheep fed on roughage and silage. Kormyta godivlja Silskogo sp. Res p. mizvid. Tematnauk - Zb. No. 16, 3-6. (cited in Nutr. Abst., 41:1644,1971)

Warner. A.C,T. (1964). Production of volatile fatty acids in the rumen : Methodes of measurement. Nutr. Abst. Rev., 34:339.

Weichselbaum T. E.(1946) **.** An accurate and rapid method for determination of proteins in small amounts of blood serum and plasma. Am. J. Clin Pathol 7:40.

Williams, P.E.V. and Newbold, C.J. (1990). Rumen proboscis : The effect of novel microorganisms on rumen fermentation and rumenal production. In: W. Hresign and D.J.A. Cole (ed). Recent Advances in Animal Nutrition. PP.211,Butter worth, London.

Zied, M. M. A. (1998). Effect of using medicinal plant on goats performance. Ph. D. Thesis, Fac. Of Agric. Cairo Univ.

Zinn, R. A., and Shen Y. (1996). Interaction of dietary calcium and supplemental fat on digestive function and growth performance in feedlot steers . J. Anim. Sci.74.

J. Agric. & Env. Sci. Alex. Univ., Egypt. Vol. 2 (1) 2003

الملخص العربي

تأثير إضافة مستويات مختلفة من ثنائي فوسفات الكالسيوم على أداء ذكور الحملان النامية

صفاء عبد المنعم عبد المنعم صالح
مركز البحوث النووية - هيئة الطاقة الذرية

استخدمت في هذه الدراسة 18 ذكرا من الحملان المحلية عمر 3 شهور بمتوسط وزن 61 و 23 كجم ، واستمرت الدراسة لمدة 150 يوم . قسمت الحيوانات عشوائيا إلى ثلث مجاميع لدراسة تأثير إضافة مستويات مختلفة من ثنائي فوسفات الكالسيوم على أداء الحملان.غذيت الحيوانات على عليقه أساسية عبارة عن قش الأرز و مخلوط العلف المركز المحتوى على 1% ثنائي فوسفات الكالسيوم (عليقه مقارنة) بينما العليقة الثانية و الثالثة تحتويان على 2% و 3% ثنائي فوسفات الكالسيوم على التوالى.

أجريت تجارب هضم لتقدير القيمة الغذائية لتلك المعاملات على الأغنام وفى نهاية تجارب الهضم تم أخذ عينات سائل الكرش قبل الأكل وبعد 3 و6 ساعات من الأكل. خلال فترة التجربة تم وزن الحيوانات كل ثلاث أسابيع وأخذ عينات دم كل شهر لتقدير بعض قياسات الدم.

أوضحت نتائج الدراسة ما يلي :

1- ارتفعت معاملات الهضم للمادة الجافة و البروتين و الألياف للمعاملة الثالثة المحتوية على 3% ثنائي فوسفات الكالسيوم بالمقارنة بالعليقة المقارنة.

2- زيادة معدل النمو اليومي مع زيادة محتوى العليقة من ثنائي فوسفات الكالسيوم حيث كان متوسط الزيادة اليومية للحملان هي 156 و 198 و217 جرام يوميا للمعاملات الاولى و الثانية و الثالثة على التوالى.

3- زيادة إنتاج الأحماض الدهنية الطيارة و أمونيا الكرش مع المستويات العالية من ثنائي فوسفات الكالسيوم.

4- ارتفاع بر وتينات الدم وAST و T3 في دم الحملان المغذاة على مستويات عالية من ثنائي فوسفات الكالسيوم.

لذلك يمكن التوصية بإضافة ثنائي فوسفات الكالسيوم إلى علائق الحملان بنسب من 2 إلى 3% من العليقة المركزة لتحسين معدلات نمو الحملان.