INFLUENCE OF SODIUM ACETATE SUPPLEMENT IN THE RATION ON PRODUCTIVE PERFORMANCE OF LACTATING GOATS.

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SUMMARY

Effects of including sodium acetate in diet of goats on dry matter intake, milk yield, milk composition and some ruminal and blood parameters were studied. Nine lactating baladi goats in their 1st week of lactation were used in 3x3 Latin square design of 30 days per each period.

Goats were fed diets of berseem hay and concentrates (30:70% on DM basis), supplemented with sodium acetate at levels of 7 and 14 grams/h/day for treatments 1 and 2, respectively (T_1, T_2). The control group (C) received the same basic ration without the sodium acetate supplement. Dry matter intake differed significantly ($P<0.05$) among treatments, where intake was reduced ($P<0.01$) by adding the supplement. Milk yield, 4% FCM and yields of milk contents were significantly ($P<0.05$) higher in T_1 than T_2 and the control groups. Fat, TS, SNF contents were improved with T_2 treatment than control while TP, lactose and ash contents were superior in T_1. No significancy ($P>0.05$) was detected among treatments in milk acidity. No significancy ($P>0.05$) was detected between control and T_2 except in the yield of ash. Feed efficiency (g/g) calculated as milk yield/DMI and FCM/DMI were better in T1 than control and T2. Ruminal pH, TVFA'S, TN, true-protein-nitrogen, NPN and NH_3-N values were slightly increased with increasing sodium acetate in the diet. There were significant ($P<0.05$) effects due to sampling time among different values of rumen parameters investigated. Molar percentage of rumen acetate increased ($P<0.05$) while propionate and butyrate decreased when goats were fed rations containing sodium acetate. Diets containing sodium acetate slightly increased ($P>0.05$) TP, albumin, urea, alkaline-phosphatase, cholestrol and decreased GOT and GPT in blood serum, while glucose was significantly ($P<0.05$) affected. Data showed that supplementing rations of goats with the proposed levels of sodium acetate improved milk production and milk composition with no deleterious effect on the experimental animal health as compared to those fed the control ration.

Keywords: *goats, milk production, rumen parameters, blood metabolites, sodium acetate.*

INTRODUCTION

Many benefits can be gained from adding buffers to the rations of lactating animals. Some buffers reduce the molar percent of propionate which in turn might lead to an increase in milk fat percent and might influence milk production positively due to the improvement expected in feed efficiency (Davis, 1978). Another role is altering the rumen fermentation which appear to adjust rumen pH upward and increase the dilution rate of the rumen fluid, while some buffers may increase the digestibility of starch in the lower gut (Davis, 1978) or increase the digestibility of feeds including fibrous materials that have been observed when buffers are consumed by ruminants and result in a higher and more stable rumen pH (Mertens, 1978).

This study was carried out to investigate the effect of sodium acetate as a buffer supplement in the ration of lactating goats on feed intake and efficiency, milk yield and composition and some rumen fluid and blood serum parameters.

MATERIALS AND METHODS

This study was carried out in the experimental farm station of milk replacer research center, Fac. of Agric., Ain Shams Univ.

Nine lactating baladi goats, being 4 years old and weighing on average of 28 kg, at the first week of lactation were used in 3 x 3 latin square design. Each experimental period consisted of 30 days. Goats were fed diets of berseem hay and concentrates (30:70% DM basis), supplemented with sodium acetate at levels of 7 or 14 gram/head/day for groups T1 and T2 respectively. The control group (C) received the same ration without the sodium acetate supplement. The chemical composition of concentrate feed mixture (CFM) and berseem hay are presented in Table (1).

Diets were formulated and offered to cover the rate of 4 % of body weight/head/day. The CFM for each animal was offered individually once daily at 8.00 am., while berseem hay was offered at 10.00 am. Dry matter intake was measured during the last 5 days of each period by determining the refusals of the previous day. Water was available *ad lib* for animals all the time. At the last 3 days of each period, the animals were hand milked (twice/day) to record total milk yield. Acidity of milk was determined immediately (Ling, 1963). Daily composited milk samples, according to milk production, were analyzed for fat, total solids, Solids-not-fat, total protein and ash contents (Ling, 1963) and lactose content (Barnett and Abd El Tawab, 1957).

Table 1. Chemical composition of dietary ingredients (% DM basis)

Item	Ingredients	
	Concentrate feed mix (CFM)[1]	Berseem hay (BH)
Dry matter (DM)	92.02	91.31
Organic matter (OM)	92.01	88.50
Ash	7.99	11.50
Crude protein (CP)	15.58	12.40
Ether extract (EE)	4.11	3.12
Crude fiber (CF)	13.50	28.36
Nitrogen free extract (NFE)	58.82	44.62

1- Composed of 25% undecorticated cotton seed meal, 35% wheat bran, 30% yellow corn, 4% rice bran, 3% molasses, 2% limestone and 1% salt.

At the last day of each period, rumen liquor samples were collected from each animal at Zero, 3 and 6 hr. post-morning feeding by a stomach tube. The samples were strained through two layers of cheese cloth and were immediately used for determination of ruminal pH and ammonia nitrogen (NH_3-N). Rumen liquor samples were stored in glass bottles (10 ml) with 3 drops of toluene and a thin layer of paraffin oil just to cover the surface to stop microbial activity and to prevent volatilization and stored at -18^0C till they were analyzed. Ruminal pH was determined using a digital pH-meter, total nitrogen (TN), non-protein-nitrogen (NPN) and NH_3-N were determined according to A.O.A.C. (1995). True protein nitrogen (True-PN) was calculated by difference (TN-NPN). Total volatile fatty acids (TVFA's) were determined by steam distillation as described by Warner (1964), while individual VFA (from the samples collected at 3 hr. post-morning feeding) were determined according to Erwin et al., (1961) with minor modifications, using Konik HIRGC 3000 (Konik Instruments Inc, Miami-Flordia (33015-USA).

Blood samples were collected from the jugular vein of each animal at the last day of each period (4 hr. post morning feeding). The collected blood samples were left at room temperature over night then centrifuged at 4000 r.p.m./ 20 min. to separate the serum. The obtained serum was stored at -18^0 C till it was analyzed. Serum total protein was determined as described by Armstrong and Carr (1964), while albumin (Doumas et al., 1971), urea (Patton and Crouch, 1977), transaminases, GOT and GPT, activities (Reitman and Frankel, 1957), glucose (Siest et al., 1981) and total lipids (Postman and Stroes, 1968) were determined as was described between brackets per each parameter mentioned. Globulin and albumin/ globulin ratio were calculated.

Data obtained from this study were statistically analyzed according to procedures outlined by Snedecor and Cochran, (1982). These procedures were:

1- Latin square design for yield and composition of milk and blood parameters using the general linear model procedure

$$Y_{ijkL} = U + R_i + C_j + T_k + E_{ijk} + E_{ijkL}$$

Where Y_{ijkL} is the parameter under analysis of the ijkL goat, U is the overall mean, R_i is the effect due to the lactation period on the parameter under analysis, C_j is the effect due to the animals on the parameter underanalysis, T_k is the effect due to treatment on the parameter under analysis, E_{ijk} is the experimental error for ijk th observation, E_{ijkL} is the effect due to sampling error associated with the Y_{ijkL} observation.

2- Splite plot design for rumen liquid parameters:

$$Y_{ijk} = U + R_i + T_j + (RT)_{ij} + B_k + (TB)_{jk} + E_{ijk}$$

Where R_i : replicate, T_j : treatment, RT_{ij} : interaction B_k : sampling time, $(TB)_{jk}$: interaction (TB), and E_{ijk} : sampling error.

RESULTS AND DISCUSSION

Dry matter intake:

Effect of supplementing rations with sodium acetate on dry matter intake (DM) are presented in Table (2). Dry matter intake differed among treatments, being 990.03, 959.31 and 934.72 gram in control, T_1 and T_2 respectively. The animals of sodium acetate treated groups consumed significantly lower (P<0.05) amount of DM than in control group particularly when comparing T2 with the control (5.6% reduction in DM intake). Values of grams consumed/kg metabolic body size supported the previous results. It also seemed that the reduction in intake was concentrated on the amount consumed from roughage source (BH). The above observations are in agreement with Forbes et al., (1992) and Azahan and Forbes, (1992) who attributed that to the better absorption of nutrients in body tissues or to the osmotic load and acid effect which may influence intake.

Milk yield and composition:

Milk yield and 4% FCM were significantly (P<0.05) higher in T_1 representing an increase of about 16.46%, 13.25% and 15.71, 10.33% compared to goats receiving Zero and 14 gram sodium acetate, respectively. The relative improvement in milk production of T_1 might be due to the increase in rumen microflora activity, which led to improve feed efficiency, resulting in an increase in milk yield for these animals. Also, increasing milk production as described by the obtained results might be due to increasing propionate production in the rumen of T_1 (see table 5) than the other two groups and the probable increase in digestion of feeds which enhance the overall productive efficiency of ruminants and is reflected on the feed efficiency as shown in table 2. Similar results were reported by Preston and Leng (1987), Vojtisek et al. (1989) and Chen et al. (1989).

As an impact of the increased milk yield, daily fat, TS, SNF, TP, lactose and ash yields were significantly higher (P< 0.05) in T_1 than control and T_2.

Data of milk composition of the experimental goats are also summarized in Table (2). Milk fat, TS, SNF, ash contents and acidity were higher in T_2 (14 gram sodium acetate) than control and T_1. However, milk TP and lactose contents did not differ significantly among groups. It is of importance to note that milk fat content was significantly higher ($P< 0.05$) in T_2 particularly than T_1. The higher fat content in milk of goats in this group was associated with substantial reduction in milk yield which might have been a major factor encouraging maintenance of fat percent (Saliva et al., 1976). Increased fat percentage in T_2 group might also be due to the increased rumen acetate to propionate ratio (see Table 5) or to the increase in intake of plasma fatty acids by the mammary gland as suggested by Tomlinson et al., (1994).

Generally, efficiency calculated as milk yield/ DMI and 4% FCM/DMI were improved by T_1 followed by T_2 (Table 2).

Rumen liquor parameters:

Effects of added sodium acetate to diets on characteristics of ruminal fermentation are shown in table (3). Ruminal pH values were slightly higher ($P>0.05$) in treated groups than control group. All values were above pH 6.0 which indicated a better digestion of cellulolytic materials (Mertens. 1978). Values of VFA'S, TN, true protein – nitrogen, NPN and NH_3-N were insignificantly increased with increasing sodium acetate in the diet. Similar results were reported by Schneider et al. (1988) and Yijun et al. (1995).

Table 2. Effect of supplementing lactating goats rations with sodium acetate on intake, milk yield and composition and feed efficiency

Item	Treatments			±SE	Contrast[1]		
	Control (c)	T1 C+7gm ac.	T2 C+14gm ac.		P<	A	B
No. of animals	3	3	3	—	—	—	—
Live body weight	28.00	28.00	28.00	—	—	—	—
Dry matter intake (gram/h/d):							
Total	990.03	959.31	934.72	5.15	Ns	*	Ns
From CFM	689.33	680.00	673.72	3.27	Ns	Ns	Ns
From BH	300.70	279.31	261.00	2.53	Ns	*	Ns
g/kg $W^{0.75}$	81.35	78.83	76.81	0.29	Ns	*	Ns
Yield, gram/d:							
Milk	926.22	1078.67	932.22	59.20	*	Ns	*
4% FCM[2]	908.16	1028.51	932.22	43.80	*	Ns	*
Fat	35.85	39.80	37.29	3.62	*	Ns	*
Total solids (TS)	109.39	122.75	111.49	6.39	*	Ns	*
Solids not fat (SNF)	73.54	82.95	74.20	3.83	*	Ns	*
Protein (TP)	28.90	32.90	28.53	1.70	*	Ns	*
Lactose	35.94	41.10	35.70	3.48	*	Ns	*
Ash	6.48	8.52	7.55	0.68	*	*	*
Milk composition%							
Fat	3.87	3.69	4.00	0.15	Ns	Ns	*
TS	11.81	10.98	12.11	0.41	*	Ns	*
SNF	7.94	7.69	7.96	0.26	*	Ns	*
TP	3.12	3.05	3.06	0.15	Ns	Ns	Ns
Lactose	3.88	3.81	3.83	0.13	Ns	Ns	Ns
Ash	0.70	0.79	0.81	0.03	*	*	Ns
Acidity	0.181	0.189	0.193	0.002	Ns	Ns	Ns
Feed efficiency (g/g)							
Milk/DMI	0.94	1.12	0.99	0.07	*	Ns	*
FCM/DMI	0.92	1.07	0.99	0.04	*	Ns	*

1- Orthogonal contrast P<, A: control versus T_1 and T_2, B: T_1 versus T_2. Ns ($P>0.05$), * ($P<0.05$). Each value is a mean of 27 value from 9 animals.

2- Calculated as the equation of Gains. (1928) Cited from Ling. 1963 where 4% FCM = 0.4 (milk yield) + 15 (fat yield).

who concluded that adding sodium acetate to the diet caused insignificant increase in rumen fluid pH, TVFA'S, NH_3-N in the rumen of cows. However, although no significancy (P>0.05) were detected among different treatments in NH_3-N concentrations, values of NH_3-N seemed to be sufficient to cover the microbial demands for microbial protein synthesis as obtained from the reports of previous investigators (Mehrez et al, 1977; wallace, 1979 and Erdmann et al, 1986).

Table 3. Rumen liquor parameters of the experimental lactating goats (pooled over sampling time).

Item	Treatments			+SE	Contrast[1]		
	Control	T_1	T_2		P<	A	B
PH	6.46	6.63	6.82	0.10	Ns	Ns	Ns
TVFA'S meq/dL	6.40	6.77	6.81	0.20	Ns	Ns	Ns
Ammonia nitrogen (mg/dL)	20.53	21.20	22.36	1.11	Ns	Ns	Ns
Total nitrogen (mg/dL)	209	219	221	9.44	Ns	Ns	Ns
True protein-nitrogen (mg/dL)	112	118	119	7.53	Ns	Ns	Ns
Non-protein-nitrogen (mg/dL)	97	101	102	2.95	Ns	Ns	Ns
NPN/TN	46.41	46.12	46.15	1.20	Ns	Ns	Ns
NH_3-N/NPN	21.16	21.00	21.92	0.54	Ns	Ns	Ns

Each value is a mean of 27 samples for 9 animals

1- orthogonal contrast: P<, A: control versus T1 and T2, B:T1 versus T2, Ns (P> 0.05).

Concerning the effect of time of sampling (table 4), it was found that the ruminal pH was significantly (P<0.05) higher for pre-feeding samples while the lowest pH value was obtained after 3 hours post-feeding, then it began to re-increase. This trend was similar to the findings of El-Ashry et al., (1988) and Schneider et al, (1988). In contrary, ruminal TVFA'S were significantly (P<0.05) increased with time of sampling from Zero to 3 hr. post-feeding, and reached to the lowest value 6 hr post-feeding. Parashad et al, (1972) reported that rumen pH is one of the most important factors affecting the fermentation in the rumen and influences its function and it varies in a regular manner depending on the nature of the diet and on the time that it is measured after feeding and reflects changes of organic acids quantities in the ingesta. In line, these results are related to fermentation process of both non structural and structural carbohydrates and production of volatile fatty acids which increased with proceeding time affecting the pH to decrease to some extent until they were proportionally and relatively absorbed from the rumen wall resulting in an increase in pH value. This assumption is in an agreement with the conclusion of Roddy and Roddy (1985) who stated that, the pH values were inversely related to VFA's concentrations in the rumen. The TN,NPN, true protein nitrogen reached their highest (P<0.05) values at 6 hr. post-feeding while the highest absolute value of NH_3-N was at 3 hrs post-feeding. No significancy (P>0.05) was observed between NPN/TN ratios among different time indicating constant ratios between NPN and true protein nitrogen content in the rumen along the experimental period. Similar results were reported by Schneider et al., (1988) and Yijun et al. (1995). The significancy (P<0.05) among sampling times in the ratio of NH_3/NPN reflected the pattern of metabolism and production of ammonia in the rumen along the sampling time (Table 4).

Table 4. Rumen liquor parameters of lactating goats fed rations supplemented with sodium acetate as affected by time of sampling

Items	Time of sampling (hr) after feeding			±SE	Contrast[1]		
	Zero	3 hr	6 hr		P<	A	B
PH	6.57	5.93	6.46	0.23	*	Ns	*
TVFA'S meq/dL	6.60	7.60	6.10	0.69	*	Ns	*
Ammonia nitrogen (mg/dL)	19.60	27.03	21.46	1.82	*	Ns	*
TN (mg/dL)	201.00	231.00	239.00	12.14	*	*	Ns
True protein-nitrogen (mg/dL)	110.00	126.00	129.00	7.53	*	*	Ns
NPN (mg/dL)	91.00	105.00	110.00	4.65	*	*	Ns
NPN/TN	45.27	45.45	46.03	0.41	Ns	Ns	Ns
NH_3/NPN	21.54	25.74	19.51	1.50	*	Ns	*

Each value is a mean of 27 samples from 9 animals.

1- Orthognal contrast: P<, A: control versus T1 and T2, B:T1 versus T2, Ns (P>0.05), * (P<0.05).

Data in table (5) indicated that adding sodium acetate to the diet significantly ($P<0.05$) increased molar percentage of rumen acetate but decreased propionate and butyrate. Similar results were reported by Yljun et al., (1995) who found that adding sodium acetate or sodium bicarbonate to the diet significantly increased molar percentage of rumen acetate while decreased propionate and butyrate. Rumen dilution and flow of digest were also increased in their study resulting in enhancing the amount of nitrogen leaving the rumen and improving protein utilization (Yijun et al., 1995).

It might be important to add that Davis, (1978) demonstrated that there is a significant correlation between the molar percentage of rumen propionate and milk fat percent and in line a positive correlation between fat percent and C_2:C_3 ratio which might be insured in this study (Tables 2 and 5) where T_3 recorded the highest C_2:C_3 ratio and the lowest C_3 molar percent while its milk fat content was the highest.

Table 5. Effect of supplementing lactating goats rations with sodium acetate on fraction of VFA'S in the rumen liquor of goats.

Acid	Treatments			±SE	Contrast		
	Control	T_1	T_2		P<	A	B
C_2	59.84	61.22	63.70	0.96	Ns	*	*
C_3	20.74	22.49	20.76	0.87	*	Ns	*
C_2:C_3	2.89	2.72	3.07	0.16	Ns	*	*
ISOC_4	2.65	2.02	2.09	0.11	*	*	Ns
C_4	9.68	9.05	8.12	0.48	*	*	*
ISOC_5	2.55	2.12	2.00	0.08	*	*	Ns
C_5	4.54	3.10	3.33	0.31	*	*	*

Each value is a mean of 3 samples for 9 animals

1- Orthognal contrast: P<, A: control versus T1 and T2, B:T1 versus T2, Ns (P>0.05), * (P<0.05).

Blood plasma metabolites

Data in Table (6) showed no significant differences (P>0.05) were observed among different treatments on some blood serum parameters, except glucose values (P<0.05). Diets containing sodium acetate tented to increase TP (P>0.05), albumin (P>0.05), urea (P>0.05), alkaline-phosphates (P>0.05), cholesterol (P>0.05) and glucose (P<0.05), however, they slightly decreased GOT and GPT (P>0.05). Serum glucose had the same trend of milk yield (Table 2) which was in accordance with the results of Clark et al. (1977) who claimed a positive correlation between blood glucose and milk yield.

Table 6. Effect of supplementing lactating goats rations with sodium acetate on some blood serum parameters.

Item	Treatments			±SE	Contrast		
	Control	T_1	T_2		P<	A	B
Total protein g/dL	6.13	6.30	6.54	0.11	Ns	Ns	Ns
Albumin g/dL	3.11	3.21	3.27	0.06	Ns	Ns	Ns
Globulin g/dL	3.02	3.09	3.27	0.17	Ns	Ns	Ns
A/G ratio	1.03	1.04	1.00	0.08	Ns	Ns	Ns
Urea nitrogen mg/dL	43.25	45.10	45.71	0.35	Ns	Ns	Ns
GOT u/L	37.97	36.29	36.23	0.19	Ns	Ns	Ns
GPT u/L	18.19	17.38	16.62	0.37	Ns	Ns	Ns
ALK-P-ase u/L	37.12	37.81	38.23	0.31	Ns	Ns	Ns
Cholestrol mg/dL	127.50	131.50	134.30	4.36	Ns	Ns	Ns
Glucose mg/dL	65.67	69.84	65.69	0.99	*	Ns	*

Each value is a mean of 9 samples for 9 animals
1- Orthognal contrast: P<. A: control versus T1 and T2. B:T1 versus T2. Ns (P>0.05). * (P<0.05).

It could be concluded that supplementing goats rations with the proposed levels of sodium acetate reduced intake, improved feed efficiency, improved milk yield and milk composition (specially milk fat content) with no deleterious effect on general health of the treated animals as compared to those fed the control ration.

REFERENCES

Armstrong, W.D. and C.W. Carr. (1964). Physiological Chemistry: Laboratory Directions, 3rd ed. P. 75. Baburges Co. Minneapolis. Minnesota.,U.S.A.

A.O.A.C. (1995) Official Methods of Analysis . International 16th Edition. Vol. 1., " Agricultural Chemicals. Contaminants, Drugs " Washington D.C., USA.

Azahan, E.A.E and J.M.Forbes (1992). Effect of intrauminal infusions of sodium salts on selection of hay and concentrate foods by sheep. Appetite. 18:2, 143.

Barnett, A.J.G. and G. Abd El-Tawab (1957) Determination of lactose in milk and cheese. J. Sci. Food Agric., 8:437.

Chen, J.; Q.M. Ren; J. Meng; Y.D. Qin; C.k. Han; W.Q. Jiang and W.B. Shuai (1989). Effect of sodium acetate on physiological characteristics and lactating performance of dairy cows in summer. Chinese Jornal of Animal-Science, 25, 3.

Clark, J.H.; H.R. Derring, and M.R. Bennink (1977). Milk production, nitrogen utilization and glucose synthesis in lactating cows infused postruminally with sodium caseinate and glucose. J. Nutrition, 107:631.

Davis, C.L. (1978). The use of buffers in the rations of lactating dairy cow. In Regulation of Acid- Base Balance Symposium, Arizona Inn, Tucson, Arizona, Nov., 8:9, 1978. P. 51.

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

El-Ashry, M.A; H.A. El-Alamy; O.A. Salem and A.M. Kholif (1988). Rumen parameters of lactating goats as affected by different concentrate : roughage rations. Annals Agric. Sci., Moshtohor, 26:217.

Erwin, E.S.; G.J. Marco and E.M. Emery (1961). Volatile fatty acids analysis of blood and rumen fluid by gas chromatography. J.Dairy Sci., 44:1768.

Erdmann, R.A.; G.H.S Proctor and J.H. vandersall (1986). rumen ammonia concentration on In situ rate and extent of digestion of feedstuffs. J.Dairy Sci : 69:2312.

Forbes, J.M.; J.N. Mbany and M.H. Anil (1992). Effect of intraruminal infusions of sodium acetate and sodium chloride on silage intake by lactating cows. Appetite, 19, 293.

Ling, E.R. (1963) "Text book of Dairy Chemistry" Vol. 11, Partical Chapman and Hall. L.T.D. London 3rd ed. PP. 140.

Mehrez, A.Z., E.R. Orskov and I. Mc Donald (1977). Rates of rumen fermentation in relation to ammonia concentration. Br.J.Nutr. 38,447.

Mertens, D.R. (1978). Effect of buffers upon fiber digestion. Invited paper at Regulation of Acid-Base Balance Symposium, Arizona Inn, Tucson, Arizona, Nov., 8:9, 1978. P. 65.

Parashad, J.; S.S. Aliluwalia and B.P. Josh (1972). Climinto-biochemical studies in indigestion in cattle and buffaloes. Indian. J. Anim Sci , 42, 911.

Patton. C.J. and S.R. Crouch (1977). Spectrophoto-metric and kinetics investigation of the Berthelot reaction for the determination of ammonia. Anal. Chem., 49:464.

Postman, T. and J.A. Strose (1968). Lipids screening in clinical chemistry. Clinica Chimica Acta, 22:569.

Preston, T.R. and R.A. Leng (1987). Matching ruminant production systems with available resources in the tropics and sub-trobics. Penamblue books, Armidale, New South Wales, 2350, Australia, P.83.

Reitman, S. and S. Frankel (1957). Calorimetric method for the determination of serum glutamic-oxalsacetic and glutamic-pyrovate transminase. An. J. Clin. Path., 28:56.

Roddy, K.J. and M.R. Roddy (1985). Effect of feeding complete feeds on various nitrogen fractions and total volatile fatty acids concentration in the rumen fluid of sheep. Indian J. of Anim. Sci. 55 :819.

Saliva, L.A.; H.H. Van Horn; E.A. Olaloku; C.J. Wilcox and B. Jr. Harris (1976). Complete rations for dairy cattle. Dried poultry wastes for lactating cows. J.Dairy Sci., 59:2071.

Schneider, P.L.; D.K. Beede and C.J. Wilcox (1988). Effect of supplemental potassium and sodium chloride salts on ruminal turnover rates, acid-base and mineral status of lactating dairy cows during heat stress. J.Anim.Sci., 66:126.

Siest, G.; J. Henny and F. Schiele (1981). Interpretation des examens de Laborative, Karger. 206.

Snedecor, G.W. and W.G. Cochran (1982). Statistical Methods. 7th ed. Iowa State Unvi. Press, Ames, Iowa, USA.

Tomlinson, A.P., H.H. Van Horn, C.J. Wilcox and B. Jr. Harris (1994). Effect of undergradable protein and supplemental fat on milk yield and composition and physiological responses of cows. J. Dairy Sci., 77:145.

Vojtisek,B; J. Hamrik, B. Hronova, I. Diblikova and E. Minksova (1989). Use of sodium acetate in feed of cows with ketosis. Vetrinarni-Medicina, 34, 585.

Wallace, R.J. (1979). Effect of ammonia concentration on the composition, hydrolytic activity and nitrogen metabolism of the microbial flora of the rumen. J. Appl. Bacteriol.47:443.

Warner, A.C.J. (1964). Production of volatile fatty acids in the rumen. Methods of measurements. Nutr. Abstr. and Rev., 34:339.

Yijun, W.U; J. Chen, Z. Han and Y.J. WU (1995). Studies on the manipulation of rumen digestion and metabolism in lactating cows with three buffers J. southwest Agric. Univ., 17,160.

تأثير إضافة خلات الصوديوم فى العليقة على الأداء الإنتاجى للماعز الحلاب

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تم دراسة تأثير إضافة خلات الصوديوم فى علائق الماعز الحلاب على المأكول من المادة الجافة ومحصول اللبن وتركيبه وكذا التأثير على بعض دلالات سائل الكرش وسيرم الدم غذيت الحيوانات على علائق تحتوى على دريس برسيم (٣٠%) وعلف مركز (٧٠%) تبعاً لمقررات ARC ١٩٦٥ للماعز الحلاب واعتبر ذلك هو العليقة المقارنة (٣) بينما أضيف على عليقه المعاملة الأولى(١) ٧ جرام من مسحوق خلات الصوديوم بينما أضيف على عليقه المعاملة الثانية (٢) ١٤ جم من نفس المسحوق. انخفض المأكول من المادة الجافة فى العلائق المعاملة كما زاد محصول اللبن وكذا محصول اللبن المعدل ٤% دهن فى العليقة (١) ثم العليقة (٢) وكانت اقل كميه فى العليقة المقارنة (٣) ولوحظ ارتفاع نسبه دهن اللبن فى العليقة (٢) بشكل معنوى بينما لم توجد فروق معنوية بين العليقة (١، ٢) ولم تلاحظ فروق معنوية فى حموضة اللبن. وقد تحسنت الكفاءة الغذائية محسوبة على أساس محصول اللبن الناتج عن كل جم مادة جافه مأكولة فى العلائق المعاملة عن عليقه المقارنة. وقد ارتفعت بيانات سائل الكرش المختبرة بقيم غير معنوية عند إضافة خلات الصوديوم على العلائق كما ارتفعت نسبه الخلات إلى البربيونات بقيم معنوية كلما زادت إضافة خلات الصوديوم فى العليقه كما زاد تركيز الجلوكوز فى سيرم دم الحيوانات المغذاة على العليقة ب مقارنه بالعليقتين(٣ ، ٢) بقيم معنوية وبذلك فقد بينت الدراسة أن إضافة خلات الصوديوم بالمعدلات المستخدمة فى هذه الدراسة تقلل من المأكول من المادة الجافة وتحسن الكفاءة الغذائية للحيوان كما تزيد من محصول اللبن وتحسن من نسبه الدهن فيه دون أن يكون فى ذلك أى تأثير ضار على صحة الحيوان أو إنتاجه.