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EFFECT OF DIETARY NIACIN AND/OR THIAMIN SUPPLEMENTATIONS ON GROWTH AND FATTENING PERFORMANCE OF BUFFALO CALVES.

Ebtehag, I. M. Abou-Elenin; A. A. Abdou; W. A. Riad and M. R. M. Mostafa

Animal Production Research Institute, ARC, Giza, Egypt.

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SUMMARY

This study was conducted to evaluate the effect of feeding supplemented diets by ether niacin, thiamin or its mixture on the growth and fattening performance of buffalo calves. A feeding trial was carried out using twenty growing buffalo calves with average initial weight 275±2.6 Kg and aged 14 months. They were divided into four similar groups (5 calves each) in 120- day feeding trial periods using the randomized complete block design. All animals' groups were fed individually along the experimental period on a basal ration (BR) that consisted of 69.5% concentrate feed mixture (CFM), 17.4% rice straw (RS) and 13.1% corn silage (CS) on DM basis. A certain amounts of dietary niacin and/or thiamin were mixed thoroughly with CFM as in the following treatments. Animals were given BR without supplements (T_1) as control, BR supplemented with 0.5 g niacin/head/day (T_2), BR plus 0.5 g thiamin/h/d (T_3) and BR supplemented with 0.25 g niacin and 0.25 g thiamin/h/d (T_4). Animals were fed according to allowances of kearl (1982) for buffalo calves. Four digestibility trials were conducted to determine the digestibility and feeding values of the experimental rations. Results indicated that digestibility of DM and OM were insignificantly increased with T_2 and T_3 rations, but significantly ($p<0.05$) increased with T_4 one, compared with control (T_1). Digestibility of CF, EE and NFE followed the same trend of DM among treatments. Otherwise, CP digestibility was slightly improved with all tested rations. The values of TDN, DCP and DE were followed similar trends to that of nutrients digestibility among treatments. Daily feed intake wasn't affected significantly by the two supplements. Total weight gain and daily gain were significantly ($p<0.05$) higher in all tested rations in comparison of control one, while the highest value had occurred with T_4. Regarding feed conversion measurement, significant improvement due to both supplements and its mixture were found respecting DM,TDN or DCP: gain, compared with unsupplemented diet (control). Concerning economic evaluation, net revenue and economical efficiency were markedly increased with supplemented rations compared with control one. No significant differences were found among treatments in blood total protein and creatinine. It could be concluded that either niacin or thiamin and its mixture had an effectiveness role for improving the performance of fattening buffalo calves when the concentrate feed mixture was high percentage in their rations.

Keywords: *Niacin, thiamin, ruminants feeding, supplement, fattening calves.*

INTRODUCTION

During the last decade and due to the pressure of high population worldly, an intensive livestock production systems are becoming urgently use to secure the huge food demands for such highly growing world's population. Such great intensification system needs significant changes in feeding systems and formulation the rations for cattle than the traditional ones. For instance, increasing the concentrate portion in the rations on the expense of roughage one that causing a negative effect on rumen functions and in turn the productive performance of animals. So, under these intensive farming systems, potentially must be using the technology of supplementing the feed additives to correct and monitoring any deviation than nature and in turn outputted the full potential of genetically productive performance. A massive efforts are currently on the race to evaluate a huge types of additives in order to guarantee its potential benefits when incorporated in animals' rations and consequently increasing the production of farm animals. There are an accession of varieties of feed additive and accurately must be choose the most suitable and effective one for a certain ration formulation. Specifically, changes in the roughage to concentrate ratio of the diet are known to alter the microbial activities in the rumen (Girard *et al.,* 1994). In consistent, Santschi *et al.* (2005) revealed that ruminal B-vitamin concentrations can be altered by dietary manipulation, changes in forage to concentrate ratio, composition of the diet and the dynamic environment of the rumen due to the continuous flow of the digesta into the lower gut. Earlier research findings demonstrated that microbial production of niacin in the rumen does not meet the requirements of growing calves (Girard, 1998) and oral administration of niacin has resulted to increase microbial protein synthesis (Shields *et al.*, 1983 and Flachowsky, 1993) and VFA's (Doreau and Ottou, 1996 and Ottou and Doreau, 1996). Feasibly, Kumar and Dass (2005) concluded that supplementation of niacin into the diet of buffaloes had improved the rumen functions by decreasing the ammonia–N concentration and therefore increasing protein synthesis. In addition, Flachowsky (1993) indicated that beef cattle appeared to be in modulator effect as niacin supplemented at 1g/h/d or approximately 100 mg/kg DMI, when body weight of bulls is lower than 300 kg and the diet are poor in protein content (10 to 12%) CP of DM and also during dietary adaptation period. Regarding ruminal thiamin concentration, it is a result of thiamin synthesis and degradation by ruminal microorganisms (Harmeyer and KallenKirchen, 1985). Both rumen conditions and the activity of rumen microorganisms are largely affected by feeding conditions particularly intake level, concentrate feed level, roughage quality, nutrients balance…etc. A sudden drop in ruminal pH can induce increased thiaminase activity which can destroy the thiamin and attained thiamin deficiency (Zinn *et al.,* 1987). In Egypt, Kholif *et al.* (2009) observed that supplementation of 340 mg thiamin/cow/day to their rations increased milk yield by 13% and milk protein by 16% in comparison with control ration that free from the supplement. Comparable results in which 40 mg/h/d thiamin supplemented into the diet of ewes, were recognized by Solouma *et al.* (2013). It was improved blood metabolites and in turn significantly increased milk yield and milk composition as well as reduced somatic cell count in ewe's milk. Moreover, positive significant effect on growth performance was found by El-Shanti *et al.* (2012) due to including 20 or 40 mg/h/d thiamin in diets of Assaf lambs. Finally, Mostafa *et al.* (2015) concluded that using either thiamin or niacin supplementations into rations of growing and fattening Friesian calves tended to improve productive performance and economical efficiency for fattening calves, with the best results are associated with niacin supplement. So far, the literature presents somewhat conflicting results about the effects of ration's formulation and composition on ruminal B-vitamin fractions concentrations.

The present study was carried out to evaluate the effect of either niacin and/or thiamin on growth-fattening performance of buffaloes calves.

MATERIALS AND METHODS

This research work was conducted in animal production research institute, ARC, Ministry of agriculture, in cooperation with Messier buffalos production farm that belonging to the production sector, ARC, Ministry of agriculture, Kafr El-Shiekh governorate, Egypt. Twenty buffalo calves with average age were 14 months and 275±2.6 kg live body weight were divided into four similar groups (5 calves each) in feeding trial using a complete randomized block design. All animals' groups were fed individually for about 120-days experimental period on a basal ration (BR) that consisted of 69.5% concentrate feed mixture (CFM), 17.4% rice straw (RS) and 13.1% corn silage (CS) on dry matter basis. Supplementation of niacin and/or thiamin were mixed thoroughly with CFM and offered to animals as in the following dietary treatments: T_1 fed the basal ration (BR) without supplementation (as control), T_2 fed BR with 0.5 g niacin/h/d, T_3 fed BR with 0.5 g/h/d thiamin and T_4 fed BR plus 0.25g/h/d niacin and 0.25 g/h/d thiamin. The CFM used in this experiment was consisted of corn grain 36%, barley grain 20%, wheat bran 25.6%, soybean meal 15%, limestone 2%, common salt 1%, mineral 0.4%. Animals were fed according to allowances of Kearl (1982) for buffalo calves twice daily at 8 am and 4 pm. Fresh water was free along the day round. All animals were vaccinated and treated in accordance of the established routine of the feedlot and they injected with vitamins AD_3E to cover their requirements. Post overnight withdrawal period of feed and water, shrunk weights for experimental animals were recorded for two successive days at the beginning and the end of the trial and every two weeks in between as well. Four digestibility trials were conducted simultaneously on the animals of the feeding trial (three animals from each group) to determine the nutrients digestibility and feeding values of the experimental rations. Acid Insoluble Ash (AIA) method was applied as an internal marker as described by Van Keulen and Young (1977). Fecal grab samples of nearly 200 gm were taken from the rectum of each animal for 7- d collection period. Representative samples of feed and feces were taken for proximate analysis according to (A.O.A.C, 1995). Blood samples were taken from jugular vein into centrifuging tubes containing anticoagulant (EDTA) from three calves of each group at 3 hrs after feeding. Blood samples were immediately centrifuged at 4000 pm for 20 minutes to get blood plasma. The plasma total protein (TP) and albumin were determined according to Peters (1968) and Doumas (1971), respectively. Globulin was estimated by difference. Liver functions were assessed by measuring the activity of transaminases (AST and ALT) according to Reitman and Frankel (1957) and creatinine was measured according to Bartel (1971). Economical efficiency was expressed as the ratio between the price of output (weight gain) and the input cost (feed consumed) and also as feed cost/gain, was estimated based on the current price (LE/ton) being 2800, 400 and 300 for CFM, CS and RS, respectively. Thiamin was priced as 180 LE/kg and niacin 80 LE/kg. The price of live body weight was 35 LE/kg.

Data were statistically analyzed according to Snedecor and Cochran (1980) using general linear model program of SAS (1999). Duncan's multiple range test was employed to test for significant differences (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition

The concentrate feed mixture used in this experiment was consisted of 36% corn grain, 20% barley grain, 25.6% wheat bran, 15% soybean meal, 2% limestone, 1% common salt and 0.4 mineral salts and this formula being have 15% CP and 71% as TDN, on DM basis. The chemical composition of experimental basal ration and its component are presented in Table (1).

Table (1): Chemical composition of feed ingredients and calculated chemical composition of basal ration (% on DM basis).

Item	Chemical analysis (%)			
	Concentrate	Corn* Silage	Rice Straw	Basal Ration
Dry matter (DM)	91.30	27.10	94.12	85.01
Organic matter (OM)	91.64	92.66	87.94	91.07
Crude protein (CP)	14.81	8.6	4.31	12.23
Crude Fiber (CF)	11.99	27.51	31.07	17.13
Ether extract (EE)	2.6	2.01	1.56	2.35
Ash	8.36	7.34	12.06	8.93
NFE	62.24	54.54	51.00	59.36

**Fermentation properties were pH (4.01), lactic acid (4.22% of DM), TVFA's (2.12% of DM) and ammonia-N 5.11% of total N.*

The proximate analysis of either CS or RS used in this study were extremely comparable to those recorded in the literature. The values of CP (14.81%), CF (11.99%) and EE (2.6%) of CFM were also within the normal range of the currently manufactured concentrates in Egypt, that usually used for beef production. These values are close to those decided by RCFF (2001), being 14% CP, 15% CF and 65% TDN values for finishing phase of beef cattle. The visual and chemical characteristics of corn silage are indicating to be obtained very good silage in its fermentative process being pH 4.01, lactic acid 4.22% of DM, TVFA's 2.12% of DM) and ammonia-N 5.11% of total N.

Nutrients digestibility and feeding values:

Results of digestion coefficients and feeding values of the experimental rations are presented in Table (2). Based on control, digestibility of DM, OM, CF, EE and NFE were insignificantly increased with rations T2 and T3, but significantly ($p<0.05$) increased with T4 (together supplements). While digestibility of CP was not significantly affected by dietary supplementation of niacin, thiamin and its mixture however, somewhat an improvement on digestibility of CP was happened with all tested rations compared with control one. Such improvement in digestibility might be attributes to the mutual positive effect of both supplements (thiamin & niacin) on the vitality of rumen microorganisms and its proliferation which consequently arising the feed degradation efficiency. In ruminants, niacin is synthesized by rumen microorganisms and its synthesis has been considered to be adequate for their optimum performance (Hungate, 1966). Also, Schwab *et al.* (2006) concluded that B-vitamin intake, duodenal flow and ruminal synthesis are influenced by dietary forage and NFC contents. The feeding values which expressed as TDN, DCP and DE were followed the same trends of DM digestibility among treatments, with the highest values occurred with T4. In perspective, the modulatory effect of supplementation of niacin and/or thiamin into the diets of cattle greatly dependent on dietary factors and consequently the rumen condition that continuously seem to be in highly dynamic state. In relation to this point, Shaver and Bal (2000) suggested that a possible role for thiamin supplementation when dietary contents of NDF and ADF are lower and non-fiber carbohydrate is higher than recommended. In the meantime, Kumar and Dass (2005) reported that niacin supplementation in diet of buffaloes improved the rumen fermentation by decreasing ammonia-N concentration and increasing protein synthesis. The present results are in harmony with the findings obtained by Gabr *et al.* (2004) who found a markedly improvement in TDN and DCP values when supplemented sheep's diet with yeast culture (good source of vit. B complex). Definitely, Dawson (1994) found that yeast or yeast culture are rich source of vitamins, enzymes and others important and vital nutrients and act as co-factor which make them attractive as digestive enhancers of basic source of nutrients. Recently, Mostafa *et al.* (2015) proved that each of thiamin or niacin supplements tended to increased digestibility coefficients when they were incorporated in the diets of Friesian calves.

Table (2): Nutrients digestibility and feeding values of fattening buffalo calves fed experimental rations.

Item	Experimental rations				±SE
	T1	T2	T3	T4	
Digestibility coefficients, (%):					
DM	65.40^{b}	67.39^{ab}	66.37^{ab}	71.11^{a}	1.62
OM	68.28^{b}	70.41^{ab}	69.57^{ab}	73.91^{a}	1.69
CP	71.43	74.31	73.42	74.64	1.79
CF	59.08^{b}	61.28^{ab}	59.51^{ab}	65.77^{a}	1.93
EE	80.49^{b}	83.93^{ab}	80.61^{b}	87.03^{a}	1.22
NFE	69.80^{b}	71.71^{ab}	71.24^{ab}	75.59^{a}	1.73
Feeding values (%):					
TDN%	64.54^{b}	66.59^{ab}	65.72^{ab}	69.86^{a}	1.56
DCP%	8.74	9.09	8.98	9.13	0.22
DE (Mcal/Kg DMI)^{A}	2.85^{b}	2.94^{ab}	2.90^{ab}	3.08^{a}	0.07

*$^{A:}$ DE (Mcal / Kg DMI) = 0.04409 x TDN% . (NRC, 1988) SE= standard error *N.S= non significant*
a, b and c: Means in the same rows with differ rent superscripts are significantly different at (P< 0.05).
T1= control , T2=0.5g Niacin, T3 = 0.5 g Thiamin T4= 0.25 g Niacin+ 0.25g Thiamin

Growth performance:

Data of daily feed intake, total live body gain, daily gain and feed conversion ratio of calves fed the experimental rations are presented in Table (3).

Daily feed intake:

Daily feed intake that expressed as DM, TDN, DCP and DE were not significant affected by the dietary treatments. The lack of the effect of dietary treatments on feed intake might be due to so far the quality of the palatability of the experimented rations in which the addition of the two supplements have nothing effect on it. Likewise, mostly the digestibility of most nutrients particularly CP did not affected by the tested treatments that considered also as an another reason for the scanty differences among treatments in respect of feed intake. In consistent with this point, Miller (2002) indicated that sufficient nitrogen and rumen degradable protein must be supplied to maximize bacterial fermentation, energy digestibility and feed intake. In pertinence, digestion of fibrous feeds, which in turn increasing DMI, also increased by the provision of performed dietary protein (Carro and Miller, 1999). Conclusively, Nocek and Russell (1988) suggested that stimulating effect involves a cycle of improved efficiency of microbial protein synthesis, increased DM digestibility and thereby increased feed intake. Results here are in harmony with those reported by Kamalamma *et al.* (1996) and El-Shanti *et al.* (2012) who did not observed any effect of yeast culture or thiamin supplementation on DM, with cows and sheep, respectively. While, Erasmus *et al.* (1992) and Wang *et al.* (2001) found that an increase in DMI with yeast culture supplementations with diary cows' rations. Additionally, Mostafa *et al.* (2015) demonstrate that DM was significant increased due to supplement the rations of fattening Friesian calves by two levels of thiamin or niacin in comparison of control, however the feed intake as TDN, DCP and DE did not significantly affected by the supplements.

Body weight gain:

Results of growth performance as final body weight, total weight gain and daily gain are presented in Table (3). The values of total weight gain and daily gain were significant ($p<0.05$) higher in all tested rations in comparison with control that free from the experimental supplements. The differences among the tested rations was not significant, nevertheless the highest values were occurred with T_4 that have the mix of the two supplements. This positive response of both supplements on growth performance could be attributed to the potentiality of medulatory effect of niacin and/or thiamin whose enhancing the most metabolic processes in the body. Pointedly and in support to these results, McDowell (2000) demonstrated that thiamin is adding to ruminants' rations containing high level of concentrate on the basis that may have an important role as a coenzyme for the certain enzymes in Krebs cycle and pentose pathway, so, thiamin is necessary for carbohydrates metabolism. Earlier, Dawson (1994) reported that yeast culture are rich source of vitamins, enzymes and others important nutrients and act as cofactor which make them attractive as digestive enhancers of basic source of nutrients. Results of growth-fattening performance in the present study are closely similar to those reported by Flachowsky (1993) who indicated that beef cattle appeared to be beneficial as niacin supplemented at 1g/h/d or about 100mg/kg DMI, when body weight of bulls is lower than 300kg and diets are poor in protein content (10 to 12%) of DM and during dietary adaptation period.

On other work, influence of added niacin (0.0, 0.5 or 1.00 g/h/d) and CP content (9.2 to 12.0%) of DM or supply of different N-source (urea, rapeseed meal, soya bean or fish meal) were investigated respecting rumen fermentation, feed intake and weight gain with growing bull weighing 175-300 kg. Niacin increased weight gain with urea (43 g/h/d) and with rapeseed or soy-rations (60gm/h/d), but did not influence with fish meal-ration. Increasing weight gain resulted from ruminal and metabolic effects (about 2/3) as well as enhanced feed intake of bulls (1/3) as revealed by Flachowsky *et al.* (1993). Regarding thiamin supplementation, El-Shanti *et al.* (2012) found similar effect in which 20 or 40 mg/h/d incorporated in diets of lambs, being both levels enhanced growth performance, however, the highest value was found with low level. Also, Kholif *et al.* (2013) found similar results with ewes, where 40 mg/h/d thiamin supplementation into their ration led to an increase in their milk yield. Earlier study proved that when diet of feedlot steer was supplemented by 0.190 mg thiamin/kg diet, the daily gain was significantly ($p<0.05$) higher (104 kg/d) compared with control (0.92 kg/d) (Grigat and Mathison, 1982).

Regarding feed conversion that expressed as kg DM, TDN and DCP per kg gain, it could be observed that significant ($p<0.05$) improvement due to both supplements and its mixture were found respecting DM, TDN or DCP : gain (Table 3). Results here are in agreement with those obtained by El-Shanti *et al.* (2012) who recorded that feed conversion being 5.87, 4.99 and 5.16 kg feed per kg gain for zero, 20 or 40 mg thiamin/h/d with Assaf lambs. In conclusion, results reviewed in literature suggested a possible role of thiamin and niacin supplementations when dietary contents of NDF and ADF are lower and NFC is higher than recommended (Shaver and Bal, 2000). Considerable further studies are needed to quantify to what extent thiamin/niacin supplementation to the high energy diet of beef cattle would be effect on fermentation pattern in rumen, metabolic processes and feed conversion.

Table (3): Average feed intake, body weight gain (kg) and feed conversion for fattening buffalo calves fed the experimental rations.

Item	Experimental rations				±SE
	T1	T2	T3	T4	
Number of animals	5	5	5	5	
Experimental period (days)	120	120	120	120	
Feed intake (kg/head/day) as fed:					
Concentrate feed mixture (CFM)	7.25	7.31	7.31	7.39	
Corn Silage (CS)	3.62	3.66	3.66	3.69	
Rice Straw (RS)	1.81	1.83	1.83	1.85	
Feed additives (gm)	----	0.5	0.5	0.25+0.25	
Feed intake (kg/head/day) on DM basis:					
CFM	6.61	6.68	6.68	6.74	
CS	0.98	0.99	0.99	1.00	
RS	1.70	1.72	1.72	1.74	
Total intake (kg) as:					
DM intake (kg/day)	9.29	9.39	9.39	9.48	
TDN intake (kg/day)	6.00	6.25	6.17	6.62	
DCP intake (kg/day)	0.81	0.85	0.84	0.87	
DE (Mcal/kgDMI)	0.26	0.28	0.27	0.29	
Live body weight, kg:					
Initial weight	277.6	275.0	275.8	276.6	9.20*
Final weight	367.2 ^{b}	394.0 ^{ab}	391.4 ^{ab}	398.2 ^{a}	9.09
Total live weight gain	89.6 ^{b}	119.0 ^{a}	115.6 ^{a}	121.6 ^{a}	6.42
Daily gain (gm)	747 ^{b}	992 ^{a}	963 ^{a}	1013 ^{a}	0.05
Feed Conversion :					
kg DM intake / kg gain	12.46 ^{a}	9.47 ^{b}	9.74 ^{b}	9.36 ^{b}	0.23
kg TDN intake / kg gain	8.04 ^{a}	6.30 ^{b}	6.40 ^{b}	6.54 ^{b}	0.35
kg DCP intake / kg gain	1.09 ^{a}	0.86 ^{b}	0.87 ^{b}	0.85 ^{b}	0.02

a, b and c: Means in the same rows with differ rent superscripts are significantly different at (P< 0.05).
**N.S= non significant T1= control , T2=0.5g Niacin, T3 = 0.5 g Thiamin T4= 0.25 g Niacin+ 0.25g Thiamin*

Blood parameters:

Data of some blood parameters for experimental dietary treatments are presented in Table (4). Concentration of total protein did not significant affected by all tested treatments in comparison with control one. Results here are supported by the findings of Kholif *et al*. (2009) who found non significant differences due to added different levels of thiamin into dairy cows' rations respecting blood total protein concentration. Also, blood creatinine concentration was comparable with all dietary treatments. Otherwise, urea concentration was significant (p<0.05) decrease by either niacin or its mixture with thiamin compared with control, and vice versa with thiamin supplement. Concerning liver enzymes, most of AST value were non significant affect by treatments, except that of T_3 (thiamin supplement) having the highest one (p<0.05). However, ALT activity was significant (p<0.05) decreased with all supplements compared with control that have the highest value.

In contrary, Mostafa *et al.* (2015) indicated that total protein content in blood was significant increased with supplementation of different levels of either niacin or thiamin with fattening Friesian calves. While the values of each creatinine, AST and ALT were not significantly affected by these supplements. Earlier, Mehrez *et al.* (2004) concluded that yeast culture (as a good source of vit B complex) supplementation to growing sheep diets has a positive effects on their productive performance without any adverse effect on blood constituents and in more specific had higher impact when supplemented with high concentrate diet than roughage one.

Table (4): Some blood parameters of fattening buffalo calves fed experimental rations.

Item	Experimental rations				±SE
	T1	T2	T3	T4	
T. protein (g/dl)	7.67	8.44	7.88	8.81	0.36*
Urea (g/dl)	3.81[a]	2.89[b]	3.97[a]	2.71[b]	0.24
Creatinine (mg/dl)	1.71	1.99	1.71	1.97	0.09*
AST (IU/L)	34.77[b]	34.69[b]	36.19[a]	34.69[b]	0.28
ALT (IU/L)	15.17[a]	13.15[d]	14.40[b]	13.85[c]	0.15

*a, b, c and d: Means in the same rows with different superscripts are significantly different at (P< 0.05). *N.S= non significant*

Economical efficiency:

Economical evaluation data of the dietary experimental treatments are presented in Table (5). Results of the present study demonstrate that feed cost per kg live weight gain was markedly deceased with for

Table (5): Economical evaluation of fattening buffalo calves fed experimental rations.

Item	Experimental rations			
	T1	T2	T3	T4
Feed intake (kg/head/day) as fed:				
Concentrate feed mixture (CFM)	7.25	7.31	7.31	7.39
Corn Silage	3.62	3.66	3.66	3.69
Rice Straw	1.81	1.83	1.83	1.85
Feed additives				
Average daily gain (kg)	0.75	0.99	0.96	1.01
Economic evaluation:				
Gain price (LE /day)	26.13	34.71	33.72	35.47
Feed Cost (LE/head/day):				
Concentrate Intake	20.29	20.48	20.47	20.68
Corn silage intake	1.45	1.46	1.46	1.48
Rice Straw intake	0.54	0.55	0.55	0.55
Price of additive (LE)	0.00	0.04	0.09	0.07
Total feed cost (LE/day)	22.29	22.53	22.57	22.77
Feed cost / kg gain	29.84	22.72	23.43	22.47
Net revenue(LE/head/day)[A]	3.85	12.18	11.14	12.69
Increasing rates of revenue (%)	100	316	289	329
Economic efficiency [B]	1.17	1.54	1.49	1.56
Improvement of economic efficiency (%)	100	131	127	133

Price of feedstuffs and supplementation : 2800 LE/Ton of concentrate feed mixture (CFM) and ***400*** *LE/Ton of corn silage, 300 LE/ton Rice straw, 180 LE/kg of Thiamin, 80 LE/kg of Niacin, and price of live body weight: 35 LE/kg live body weight.*

[A] *Net revenue (LE/head/day) = money output – money input*

[B] *Economic efficiency = money output/money in put*

tested rations compared with control one. Also, the net revenue (LE/h/d) was markedly increased with all supplemented rations compared with control one, with the highest value was associated with the mixture supplement (thiamin and niacin). Similar trend was observed in economic efficiency among dietary treatments. The improvement of economical efficiency values being 100, 131, 127 and 133% for T_1, T_2, T_3 and T_4, respectively. Results obtained by this study are in agreement with those obtained by Kholif *et al.* (2009) who worked with dairy cows and using thiamin supplement, El-Shanti *et al.* (2012) who used lambs with thiamin supplement, Mehrez *et al.* (2013) who tested live yeast supplement (good source of Vit. B complex) on grown lambs performance and lastly Mostafa *et al.* (2015) who worked with Friesian calves with different levels of either niacin or thiamin supplements. Generally, the modern livestock feeding programs are actually using a huge kinds of feed additives for enhancement feed and economic efficiencies especially in very intensive feeding systems. It is potentially have an added value for farm economic efficiency whenever properly used.

CONCLUSION

Conclusively this study could be emphasized on the very important role of each niacin and/or thiamin supplementation into the diets of ruminants particularly at finishing phase of fattening calves, where the concentrate feed mixture represent high percentage in their rations. Results proved that either niacin or thiamin and its mixture had an effectiveness role for improving the performance of fattening buffalo calves.

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تأثير الإضافات الغذائية لكل من النياسين و/أو الثيامين على أداء النمو والتسمين للعجول الجاموسى

إبتهاج إبراهيم محمد أبو العنين ،على أحمد عبده على ، واصف عبد العزيز رياض و محمد رفاعي محمود مصطفى

معهد بحوث الإنتاج الحيواني – مركز البحوث الزراعية – الدقي – الجيزة – مصر.

أجريت هذه الدراسة لتقييم تأثير إضافة كل من الثيامين والنياسين (من مجموعة فيتامين ب) أو مخلوطهما على أداء النمو والتسمين للعجول الجاموسى. بإستخدام 20 عجل جاموسي نامي بمتوسط وزن 2.6±275 كجم وعمر 14 شهر حيث قسمت إلى أربعة مجموعات متماثلة (5 عجول / مجموعة) واستمرت 120 يوم. وقدمت لكل المجاميع عليقة أساسية مكونة من 69.5% علف المركز , 13.1% سيلاج أذرة , 17.4% قش أرز على أساس المادة الجافة. وتم إضافة كل من النياسين والثيامين الى المجاميع كالتالي بدون إضافة للكنترول (ج 1), 0.5 جم نياسين/للراس/يوم (ج 2), 0.5 جم/ ثيامين/للرأس/يوم (ج3). 0.25 جم نياسين +0.25 جم ثيامين/للرأس/يوم (ج 4). أعطيت الاحتياجات الغذائية طبقا لمقررات Kearl (1982) للعجول الجاموسى. وأجريت أربعة تجارب هضم لتقدير القيم الهضمية والغذائية للعلائق التجريبية (بإستخدام AIA).

وكانت أهم النتائج أن معاملات هضم كل من المادة الجافة والعضوية كانت أعلى (غير معنويا) مع ج 2, ج 3 ولكن كان الإرتفاع معنويا مع ج 4 مقارنة بمجموعة الكنترول ج1. أما معاملات هضم كل من الألياف الخام والدهن والمستخلص الخالي من الأزوت كان لها نفس إتجاه هضم المادة الجافة بين المعاملات التجريبية. بالإضافة لذلك كان هناك تحسن بسيط فى معامل هضم البروتين الخام مع جميع المعاملات المختبرة مقارنة بالكنترول. وأيضا قد أخذت قيم المركبات الغذائية المهضومة الكلية, البروتين الخام المهضوم, الطاقة المهضومة نفس إتجاهات معاملات الهضم بين المعاملات التجريبية. وأيضا أوضحت النتائج إن المأكول اليومى من المادة الجافة والمركبات المهضومة الكلية والطاقة المهضومة لم تتأثر معنويا بتلك الإضافات . أما الوزن المكتسب الكلى ومعدل الزيادة اليومية للنمو كان أعلى معنويا في جميع العلائق المختبرة مقارنة بالكنترول وكانت القيمة الأعلى من نصيب المعاملة الرابعة (ج4) . وفيما يخص التحويل الغذائي كان هناك تحسن معنوي مع الإضافتين ومخلوطهما ككجم مادة جافة مأكولة, مركبات مهضومة كلية مأكولة, البروتين الخام المأكول لكل كجم نمو.

وكان التقييم الإقتصادى من حيث الدخل الصافي والكفاءة الإقتصادية كانت هي الأعلى معنويا مع علائق الإضافات مقارنة بالكنترول. هذا وقد وجد انه لا توجد اختلافات معنوية بين المعاملات فى البروتين الكلى والكرياتينين فى الدم. نستخلص من النتائج إن إضافة النياسين أو الثيامين أو مخلوطهما كان لهم دور هام فى تحسين أداء العجول الجاموسى المسمنة عند ارتفاع نسبة المواد المركزة فى العليقة.