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EFFECT OF FEEDING WHOLE MAIZE SILAGE WITH SOME FEED ADDITIVES ON FATTENING BUFFALO CALVES.

Shakweer, I.M.E.; A.M.M. Zeid; Ebtehag I.M. Abou-Elenin and A.M.A. Mohi-Eldin.
Animal Production Res. Inst., Agric. Res. Center, Dokki, Giza, Egypt.

ABSTRACT

Sixty four buffalo calves averaged 307.4 ± 10.99 kg live body weight were assigned to evaluate the effect of supplementing rations of buffalo calves with yeast culture and enzyme on nutrient digestibility, nutritive values, some blood parameters, daily gain and feed conversion. Buffalo calves were divided into four similar experimental groups and fed the same basal ration but differed in feed additives. Calves in the 1st group were fed a basal ration containing 40% concentrate fed mixture, 40% corn silage and 20% rice straw without additives (control). Calves in the 2nd and 3rd groups were fed the same basal ration supplemented with either 10 g enzyme/ head /day (Fibrozyme containing 100XU/g xylanase) or 10 g yeast culture/ head /day (Yea-Sacc containing 10^8 cells of *Saccharomyces cerevesiae*/g), respectively. While those of the 4^{th} group, were fed the same basal ration supplemented with (5g yeast + 5g Enzyme)/ head /day. Feeding period lasted for 116 days. At the end of the feeding trials, four digestibility trials using 12 buffalo calves, three in each trial, were conducted to determine nutrients digestibility coefficients and feeding values of the four experimental rations. Blood parameters, feed utilization and economic efficiency were also studied. Results showed that calves fed rations supplemented with both 10g yeast , 10g Enzyme and 5g yeast plus 5g Enzyme improved ($P<0.05$) most nutrients digestibilities and feeding values as TDN compared with control ration, as well as blood parameters. Daily gain , feed conversion and economic efficiency were the highest ($P<0.05$) for calves fed ration supplemented with 5g yeast plus 5g Enzyme (R4) being 1.19,10.30 and 1.87, respectively .It could be concluded that animals fed ration supplemented with feed additives attained to have higher daily gain, reduced feed cost and improved of feed and economical efficiency . Moreover, animals fed ration supplemented with enzyme plus yeast culture recorded the highest performance followed by those fed yeast culture or enzyme supplemented rations alone.

Keywords: Buffalo calves, yeast culture, enzyme, digestibility, blood.

INTRODUCTION

In Egypt, animals are suffering from shortage of feeds especially during summer season. Most of animals feeding during this period depend on grains, concentrate mixture and agricultural residues. The rising costs of feed (grains and protein supplements, in particular) have led to significant increase in animals feed cost during recent years. Forages are usually the cheapest ingredients in animals ration. Expansion in cultivation of marginal soils is considered one of the most effective solutions to overcome feed shortages. Many attempts were carried out to improve the quality of local species of green forages and to introduce new green forage species in marginal soils especially in summer season (Mousa *et al.,* 1995; Geweifel,1997 and Khinizy *et al.,* 1997) and Etman *et al.,* (1998).

The shortage in animal feeds in Egypt is considered the main problem in animal production. So, the partial solving of this problem is to add certain

supplements, i.e. growth promoters to rations of animals to enhance growth and decrease feed/gain ratio. On the other hand, researches have shown that live-cell *Saccharomyces cerevisiae* can increase cellulose degradation in in-vitro ruminal culture (Dawson and Hopkins, 1991) and can utilize rapidly fermentable carbohydrates reducing the production of lactate and thereby increasing rumen pH on high concentrate diets (Walli,1994).Yeast may also provide growth factors, such as malate, to bacteria that utilize lactate that in turn may moderate changes in ruminal pH (Nisbet, and Martin. 1991). Yeast cultures also have been shown to stimulate utilization of hydrogen by ruminal acetogenic bacteria (Chaucheyras, *et al.,* 1995). However, supplemental yeast has not always altered ruminal metabolism (Kim, *et al.,* (1993) or improved animal performance (Swartz *et al.,* (1994).Yeast cultures prepared from active cultures of *Saccharomyces cerevisiae* have been used in animal feeds for over six decades. Williams *et al.* (1991) found that yeast cultures had the greatest effect when diets contained 60% concentrate and 40% forage. On the other hand, Drennan and Moloney (1993) and El-Basiony *et al* (1998) found that yeast culture supplementation increased average daily gain, digestibility of CF and CP, while carcass parameters were improved only during the second stage of fattening (more than 400 kg live body weight.

The use of enzymes as supplements to rations of ruminants has been viewed with considerable skepticism, but in recent years a considerable number of studies on this topic have been conducted. The majority of theses experiments were designed with the expectation that a fibrolytic enzyme should increase the degradability of feed in the rumen and this response has been observed in many of these studies (McAllister *et al.,* 2001 and Phipps *et al.,* 2002). Recent researches indicate that a blend of cellulose and xylanase is more effective than cellulose alone (Carro *et al.,* 2003 and Wang *et al.*, 2004) .Adding the enzyme mixture just prior to feeding is as effective as treating the forage 2 week before feeding (Yang *et al.,* 1999). Enzymes promote the breakdown of complex feed molecules into smaller chemical fractions such as glucose or amino acids that are digestible by the ruminant animals. The enzyme cellulase initiates the breakdown of cellulose (fiber) into sugars. Common enzyme additives contain cellulases, hemicellulases, xylanases, amylases, and pectinases. Cellulases, hemicellulases, and pectinases are enzymes that degrade the fiber portion of forages. Amylase breaks down starch (amylose) therefore its use would be directed towards starch containing silages such as corn silage (Lewis *et al.,* 1996).They also found that hemicellulases and pectinases are more effective than cellulases at reducing fiber content. While, hemicellulases and pectinases break down fiber fractions (hemicellulose, pectin) that are more easily digested by ruminants. Consequently, these enzymes reduce the concentration of digestible NDF fractions rather than the indigestible NDF fraction cellulose. Interestingly, current trends in enzyme technology involve incorporating enzymes directly into total mixed rations (TMR's) or silages prior to feeding.

The objective of this experiment was to determine the effect of adding enzyme, yeast or a mixture of them as feed additives to diets containing corn silage on productive performance of buffalo calves, along with assessing the economy of their use.

MATERIALS AND METHODS

The present study was conducted in Dina Farm which is located at Cairo-Alexandria desert road. Sixty four male buffalo calves of 307.4±10.99 kg live body weight and age within 14 to 16 months were randomly chosen and divided into four similar groups (16 calves for each) according to their body weight. The aim of the trial was to evaluate the effect of feeding concentrate feed mixture, rice straw and corn silage with or without either enzyme (Fibrozyme containing 100XU/g *xylanase*) or , yeast (*Yea-Sacc* containing 10^8 cells of *Saccharomyces cerevesiae*/g) and a mixture from enzyme plus yeast on nutrient digestibility and animal performance .

Animals in all groups were fed according to El-Ashry (1980) allowances in group feeding. The 1st group was fed a basal ration containing 40% concentrate feed mixture , 40% corn silage and 20% rice straw without additives (control). Calves in the 2nd, 3rd and 4th groups were fed the same basal ration along with enzyme, yeast or a mixture of enzyme plus yeast, respectively. Amounts of additives were 10 gm enzyme, 10gm yeast and 5gm enzyme plus 5gm yeast for animals /head /day in 2nd, 3rd and 4th groups, respectively. Additives for all groups were offered as a top-dress on the mash concentrate feed mixture and mixed gently with the upper part of the concentrate. Rations were offered twice daily at 8 a.m. and 4 p.m. while water was offered freely. Live body weight changes and feed intake were recorded biweekly. Before beginning the feeding experiment which lasted 116 days, three calves were randomly chosen from each group to evaluate and determine nutrients digestibility and feeding values of the experimental rations. During the digestibility trials, the chosen animals were individually fed. The first two weeks were considered as a preliminary period followed by one 3 days collection period. Grab sample method and silica as internal marker were applied according to Van Keulen and Young, (1977). Feces samples were collected twice daily at 12.00 hrs. intervals for three successive days from each calf . Solution of 10% H_2So_4 was added to the representative samples before drying in oven at 60 ºC for 24.00 hrs. Dried samples were ground and kept for chemical analysis according to A.O.A.C. (2000).

During the digestibility trials, ,blood samples were taken before feeding from the jugular vein from each animal and allowed to flow into acid washed heparinzied tubes and were centrifuged at 3000 r.p.m. for 15 min to separate plasma and stored at -20 ºC until analysis . Blood total protein and albumin were determined according to Weichselboum (1946) and Drupt (1974) respectively, while urea concentration was determined according to Fawcett and Scott (1960).

The economical efficiency for gain production expressed as the ratio between the price of gain produced and the cost of feeds consumed was estimated on the basis of the following prices in Egyptian pounds / ton rice straw was 100 LE. ; concentrate feed mixture was 1620 LE.; corn silage was 150 LE.; yeast 35000 LE.; Enzyme 60000 LE., while the price of one kg body weight on selling was 14.5 LE.

Data obtained were statistically analyzed by general linear, model using ANOVA procedures of SAS (1996). The significance among treatments means were tested using Duncan's multiple range test (Duncan,1955).

The chemical compositions of the feed ingredients and calculated experimental ration are illustrated in Table (1).

Table (1): Chemical composition of feed **ingredients and the basal ration.**

Items	DM	Composition on DM% bases					
		OM	CP	EE	CF	NFE	Ash
*Concentrate feed mixture	91.61	92.59	16.80	3.10	12.40	60.29	7.41
Corn silage	34.90	92.37	9.40	2.50	24.88	55.59	7.63
Rice straw	93.33	84.6	3.00	1.87	34.91	44.82	15.40
Calculated experimental ration							
Basal ration	69.27	90.90	11.08	2.61	21.89	55.32	9.10

***Concentrate feed mixture(CFM) consists of : 25% yellow maize, 27% undecorticated cotton seed meal, 20% rice bran, 15% wheat bran, 5%soybean meal, 5% molasses, 2% limestone, 1% common salt.**

RESULTS AND DISCUSSION

Nutrients digestibility and Nutritive values:

Results in table (2) showed that the digestibility of dry matter was significantly (P<0.05) increased with enzyme or enzyme plus yeast supplements (R2 and R4), respectively, compared to R3 and R1. Also, organic matter digestibility significantly (P<0.05) increased with all additives supplementation compared to the control ration (R1), while EE digestibility was the highest (P<0.05) with R2. The CF digestibility significantly (P<0.05) increased with enzyme plus yeast supplemented to R4. However, NFE digestibility significantly (P<0.05) increased with yeast addition to R3 compared to other rations. CP digestibility of tested rations appeared to have higher value with additive supplementation, but the differences were not significant. Generally, data presented in table (2) revealed that ration supplemented with enzyme (R2) tended to have higher in all nutrients digestibility except for NFE digestibility than the control ration (R1), while ration supplemented with yeast (R3) showed higher digestibility for all nutrient except for EE digestibility.

Table (2): Digestion coefficients and nutritive value of experimental rations (on DM basis)

Items	Experimental rations				SE
	R1	R2	R3	R4	±
Digestibility coefficients %					
DM	66.96^{b}	69.54^{a}	67.54^{b}	68.03^{a}	0.546
OM	70.64^{b}	72.22^{a}	72.21^{a}	72.63^{a}	0.302
CP	66.02^{a}	66.39^{a}	66.78^{a}	67.67^{a}	0.432
EE	69.78^{b}	71.04^{a}	67.84^{c}	67.94^{c}	0.319
CF	60.21^{d}	70.35^{b}	67.07^{c}	75.10^{a}	0.589
NFE	71.13^{b}	69.26^{c}	72.35^{a}	69.77^{c}	0.328
Nutritive values %					
TDN	63.47^{b}	64.71^{ab}	65.44^{a}	66.09^{a}	0.457
DCP	7.32	7.36	7.40	7.50	0.036

a, b , c and d : Means followed by different letters in the same row are significantly different (P<0.05)

Moreover, addition both enzyme and yeast to ration (R4) appeared to have higher digestibility for all nutrient except EE and NFE digestibility. From these results, it could be noticed that supplemented ration with either enzyme or yeast appeared to have higher of nutrient digestibility especially CF digestibility.

The present results are in agreement with those reported by many authors, who found that yea-sacc (YC) could increase digestibility of CF (Abdel-Khalek, *et al.,* 2002; Ragheb *et al.,* 2003; Gaafar *et al.,* 2005 and El-Mekass and Abdel-Azeem, 2007). Some outers reported that yeast culture supplemented to diet enhanced initial rate of ruminal digestion of diet. The beneficial effects of YS supplementation on nutrient digestion were mainly attributed to the observed greater microbial efficiency via stimulation of rumen proteolytic bacteria and increasing the number of rumen cellulytic bacteria by dietary addition of yeast culture (Williams, 1988 and 1989 and Dawson *et al.,* 1990).Wohlt *et al* (1991) showed that the increase in digestibility due to yeast cultures supplementation may be attributed to providing stimulatory factors to rumen cellulolytic and proteolytic bacteria especially when high concentrate (>50%) diets are fed. They stated that feeding yeast culture had increased numbers of cellulolytic rumen bacteria and resulted in improved fiber digestibility. Nsereko *et al.,* 2000 and Wallace *et al.,* 2001 suggested that exogenous enzymes could increase fiber degradation through a hydrolyic action prior to feeding or in vitro incubation with ruminal microorganisms.In this respect, increased ciliate protozoa number in *Kluyveromyces marximanus* , *Saccharomyces cerevisiae* and *Saccharomyces uvarum* culture supplementation supports the hypothesis of increased fiber utilization in yeast culture fed ruminants (Newbold *et al.,* 1995 and Kamel *et al.*, 2004). Rumen protozoa are known to represent more than 90% of rumen fibrolysis activity. Increased cellular activities of proteases, α-amylase, β-glucosidase and xyalanse supported the fact that yeast culture supplementation stimulated establishment and increase bacterial cells numbers in rumen (Newbold *et al*., 1995). Thus, the overall success in improving the fiber digestion and ruminant performance may be limited. This could mainly be due to the presence of hydrophobic cuticle, lignin and its close association with cell wall polysaccharides and the nature of lignocellulose, which prevents the efficient utilization of fiber in the rumen. Hence, considerable basic and applied research effort, together with improved enzymes, will be needed to enhance fibre digestion by ruminants and thus, their performance (Wiedmeier *et al,* 1987; Hall *et al.,* 1993 and Ali *et al.,* 1995). Omer *et al.,* (2009) showed that inclusion of exogenous enzymes in the diet significantly ($P<0.05$) improved digestibilities for all nutrients relative to control ration for crossbred steers. Harrison, *et al.,* (1988) and Wohlt *et al.,* (1998) found that CP digestibility tended to be improved by cows fed a diet supplemented with yeast culture. Contrary, Mohi-Eldin *et al*., (2008) indicated that the supplementation of different yeast cultures in calf's ration did not have any effect on DM, OM, EE and CP digestibility coefficients. Also, El-Mahdy, *et al.,* (2009) showed no significant affect for Pro_Bio_Fair product (yeast culture) on DM, OM digestibilities by Friesian calves.

The nutritive values as TDN% and DCP% in table (2) showed that TDN% ranged between 63.47 and 66.09%.The lowest value was recorded for R1 (control ration) , while the highest values were recorded for R3 and R4 (yeast and enzyme plus yeast) . The DCP values in table (2) increased with additives supplementation but with no significant differences. These results are in agreement with Omer, *et al.,* (2009) who showed that TDN values were increased with addition of exogenous enzyme in the diet for crossbred steers. El-Shaer (2003) reported beneficial effects of feeding lambs on diet supplemented with yeast culture. Many investigators have attributed the beneficial effects of YS directly to change in the ruminal fermentation and in microbial population in the digestive tract. Enzyme preparations containing high levels of cellulase, hemicellulase and pectinase have been used to improve the nutritive quality of forages (Graham and Balnave, 1995; Lewis *et al.,* 1996 and Kung *et al*., 1997). But, Ibrahim *et al.,* (2006) found that the yeast culture additive into lamb ration had no significant effect on the nutritive values estimated as TDN and DCP.

Blood parameters:

Results obtained in Table (3) indicated that animal groups fed rations with supplemented enzyme(R2), yeast(R3) and enzyme plus yeast (R4) had significantly ($p<0.05$) higher concentration of plasma protein such as total protein compared to the control ration (R1) .The previous significant trend was observed with globulin concentration being 3.26,3.41and 3.07 gm/100ml for R2,R3 and R4 , respectively. Also, significant increases in concentration albumin in blood of animals fed R2 and R4 were observed, but it was not significant with R3. On the contrary, values of plasma urea-N concentration were significantly ($P<0.05$) lower with enzyme, yeast and enzyme plus yeast addition to rations (R2, R3 and R4) compared to the control ration (R1) These results were agreement with those reported by (Ibrahim *et al*, 1997, Fayed (1995), Abdel-Khalek *et al*., 2000 and El-Ashry *et al.,* 2002) They found that supplementation of yeast culture decreased ($P<0.05$) blood urea of Friesian calves and Egyptian buffalo calves. Such trend may reflect the normal physiological status and normal liver function of lambs fed all supplements (Streov and Makarova, 1989).

Table (3): some blood parameters of buffalo calves fed on experimental rations.

Items	Experimental rations				SE ±
	R1	R2	R3	R4	
Total protein g/100ml	6.77^{b}	7.37^{a}	7.26^{a}	7.36^{a}	0.119
Albumen g/100ml	3.76^{b}	4.15^{a}	3.58^{b}	4.25^{a}	0.109
Globulin g/100ml	2.97^{d}	3.26^{b}	3.41^{a}	3.07^{c}	0.029
Urea-N mg/100ml	26.32^{a}	24.99^{b}	24.65^{b}	24.73^{b}	0.370

A, b,c and d : Means followed by different letters in the same row are significantly different (P<0.05)

Generally, values of serum total protein and its fractions were in the normal range recorded by Wlliam (1997) who reported that the normal blood of sheep has a range of 6 to 8 gm/100ml for protein values. El-Mahdy, *et al*.,

(2009) showed no significant effect of Pro_Bio_Fair product (yeast culture)on plasma albumin and globulin of Friesian calves. Abdel-Khalek, *et al* (2000) reported that lacto–Sacc addition to ration significantly improved plasma total protein. Also, plasma albumin concentration was significantly higher with rate of 6.5% in calves fed ration supplemented with yeast.

Growth performance

Results in table (4) showed that the DM intake (kg/head/day) was higher for calves feed rations R2, R3 and R4 compared to those fed the control ration (R1), showing that supplementation with yeast , enzyme or yeast plus enzyme resulted in higher feed intake. The TDN and DCP intakes appeared to have the same previous trend. The highest TDN and DCP intake were recorded with animal fed ration containing enzyme plus yeast culture (R4). The results in table (4) revealed that the addition of different supplements of enzyme, yeast and enzyme plus yeast significantly ($P<0.05$) increased daily gain of buffalo calves compared to the control (R1). The increasing rates of gain were 11.1, 13.1 and 20.2 % for animal fed rations (R2, R3 and R4) with enzyme, yeast and enzyme plus yeast, respectively. Data presented in table (4) revealed that adding enzyme plus yeast culture to the basal ration improved both total and daily gains, by about of 20.2% . Also, adding either enzyme or yeast culture led to more weight compared to the control group. However, difference between enzyme and yeast was not significant, but enzyme plus yeast together had significantly increased total and daily gain. Data of feed conversion indicated that there were no significant differences among all supplemented rations in converting DM to gain. While, R4 had the best converting value of kg TDN and DCP /kg gain. Generally, animals fed R4 with enzyme plus yeast recorded the best value of feed conversion for DM, TDN and DCP to give one gain than others rations. Also, results obtained in table (4) showed that feeding R4 (containing enzyme plus yeast) was better with respect to feed conversion of DM, TDN and DCP to get one kg gain. At the same time, animal fed R2 or R3 (containing enzyme or yeast) had higher feed efficiency, with no significant differences between them. Generally, supplementation with enzyme, yeast culture or mixture from them tended to improve feed conversion. Many authors indicated pronounced increase of feed intake of ruminants fed diets supplemented with YS (Wohlt *et al.,* 1998; Robinson and Garrett, 1999; Dann, *et al.,* 2000; Abdel-Khalek *et al*., 2002; El-Saadany *et al.,* 2002 and El-Mekass and Abd El-Azeem, 2007). El-Sharkawy(2006) reported that more yeast addition insignificantly increased DMI , while DCPI significantly increased by more yeast. The same authors showed that the conversion of DM, TDN and DCP improved with yest. El-Mahdy, *et al.,* (2009) showed that Pro_Bio_Fair product (yeast culture) did not significantly affect daily gain and feed conversion of Friesian calves. Beauchemin *et al.(*1995) reported that the addition of commercial enzyme preparations containing cellulose and xylanase to hay diet increased the live weight gain of cattle by as much as 35%. Similarly, a 5–25% increase in milk yield had been reported in the case of dairy cows fed with forage treated with commercial fibrolytic enzymes (Lewis *et al*., 1996 and Stokes and Zheng, 1995). The active yeast supplementation has positive effects in young ruminant's performance

through increased DM intake and daily gain, change in hip weight and width (Lesmeister *et al.,* 2004).

Table (4): Total and daily gain, feed intake, and feed utilization efficiency of buffalo calves fed experimental rations.

Items	Experimental rations				SE
	R1	R2	R3	R4	±
No. of Animals	16	16	16	16	
Duration, days	116	116	116	116	
Initial weight , kg	308.86	306.51	305.50	308.81	10.99
Final weight , kg	424.06c	433.69b	434.94b	447.11a	12.93
Total gain, kg	115.2^{c}	127.18^{b}	129.44^{b}	138.30^{a}	2.263
Av. Daily gain, kg /head/day	0.99^{c}	1.10^{b}	1.12^{b}	1.19^{a}	0.196
Concentrate Kg DM/head/day	3.30	3.38	3.38	3.46	-
Corn silage Kg DM/head/day	5.14	5.17	5.17	5.28	-
Rice straw Kg DM /head/day	3.43	3.45	3.45	3.53	-
Total DM intake, kg/head/day	11.87	12.00	12.00	12.27	-
Total TDN, kg /head/day	7.53	7.77	7.85	8.11	-
Total DCP, kg/head/day	0.87	0.88	0.89	0.92	-
Feed conversion					
Kg DM/kg, gain	11.99^{a}	10.91^{b}	10.71^{b}	10.30^{b}	0.21
Kg TDN/kg, gain	7.61^{a}	7.06^{b}	7.01^{c}	6.82^{b}	0.15
Kg DCP/kg, gain	0.88^{a}	0.80^{b}	0.79^{b}	077^{c}	0.02

a, b and c : Means followed by different letters in the same row are significantly different (P<0.05

The *Saccharomyces cerevisiae* and *Saccharomyces uvarum* (SC, SU and mixed yeast culture) supplementation improved growth, possibly as the result of stimulated microbial growth and activity in rumen and increased proportion of available carbon toward microbial protein synthesis. All together, improved efficiency of fermentation, which diverted balanced supply of nutrient toward animal cell growth, improved growth has also been reported on yeast supplementation in ruminants, while performance was not improved on live yeast culture feeding (Lesmeister *et al.,* 2004; Abdelrahman and Hunaiti, 2008 and Tripathi *et al*. 2008).

Tripathi and Karim (2011) found that Yeast culture supplementation to lambs improved intake by 8.0 to 18.8% and gain from 19 to 26% but carcass attributes did not change. The *Saccharomyces uvarum* (SU) and mixed yeast culture declined the pH and TVFA concentration. Yeast culture has mixed response on rumen ciliates population. Proteases activity was improved by 499, 407, 284 and 144 units respectively, in mixed, *Kluyveromyces marximanus , Saccharomyces cerevisiae* and *Saccharomyces uvarum* culture inoculation. Yeast culture increased cellular activity of α-amylase, β-glucosidase and xylanase but carboxymethyle cellulose activity was unaffected. Declined TVFA and increased cellular activity of α-amylase, β- glucosidase and xylanase in rumen medium showed that yeast culture favored the growth and activity of simple and short chain polysaccharides degrading micro-organism. Among three yeast cultures, SC has the most pronounced effect on animal response observations. Thus yeast culture supplementation in growing lamb has potential to improve intake and growth and can substitute antibiotics as growth promoting feed

additive. Omer,*et al.,* (2009) showed that addition of exogenous enzymes in the diets improved the ADG by 1.23% ,4.04 and 7.03% for rations contained enzyme at 0.2, 0.4 and 0.6% respectively, compared to the control ration of crossbred steers.

Economic efficiency:

Data in table (5) showed that the total feed cost of rations tended to be higher with adding feed supplements, but average feed cost per kg gain showed adverse values, owing to higher daily gain of animals fed rations containing feed supplementation .So, feed cost /kg gain was lower with tested group, being 8.35, 7.98 and 7.77 LE. for animals fed ration R2,R3 and R4, respectively . Also, the economical efficiency recorded the same previous trend, showing higher economical efficiency with animals fed rations containing the respective additive, giving 1.74, 1.82 and 1.87, respectively. Generally using enzyme plus yeast culture as feed supplements to the basal ration containing concentrate feed mixture, corn silage and rice straw was better than using either enzyme or yeast alone. Also, using enzyme plus yeast culture as feed additive tended to have higher daily gain, improved feed utilization efficiency and lend to lower cost of feeding to get one kg gain as well as more economical efficiency.

Table (5):Economic efficiency of buffalo calves fed ration supplemented with enzyme or/and yeast.

Items	Experimental rations			
	R1	R2	R3	R4
Daily feed intake , as fed /kg				
Concentrate feed mixture	3.6	3.7	3.7	3.78
Corn silage	14.73	14.8	14.81	15.12
Rice straw	3.68	3.70	3.70	3.78
Amount of feed additives (gm)				
Enzyme	-	10	-	5
Yeast	-	-	10	5
Total daily feed cost L.E.	8.41	9.18	8.94	9.25
Average daily gain , kg	0.99	1.1	1.12	1.19
Feed cost /kg gain L.E.	8.49	8.35	7.98	7.77
Price of daily gain L.E.	14.36	15.95	16.24	17.26
Economical return L.E.	5.95	6.77	7.31	8.01
Economical efficiency	1.71	1.74	1.82	1.87

Calculation was based on the following price in Egyptian pound (L.E.) per ton at 2008, rice straw was 100 LE. ; concentratedfeed mixture was 1620 LE. ; corn silage was 150 LE.; yeast 35000 LE.; Enzyme 60000 LE., while the price of one kg body weight on selling was 14.5 LE.

Moreover, feed supplementation tended to induce higher daily gain, decreased feed cost and improved feed efficiency. However, the control group (R1) had the highest feed cost to give one kilogram body gain. It is of interest to notice that rations R2, R3 and R4 (enzyme, yeast and enzyme plus yeast addition) reduced daily feed cost by about 1.65%, 6.00% and 8.48%, respectively compared to the control ration (R1) .So, the highest economical efficiency was related to the lowest feed cost and highest daily gain which appeared with calves fed ration R4 (enzyme plus yeast addition).

Conclusion:

From these results, it can be concluded that supplementation of enzyme or/and yeast culture tended to increase in nutrients digestibility, nutritive value, with no adverse effects on blood plasma parameters. Moreover, these supplementations showed increases in daily gain and economical efficiency. Also, addition enzyme plus yeast was the best as feed additive in ration formulation of growing buffaloes calves to get more weight gain with decreasing in feed cost.

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تـأثير التغذيـة بسـيلاج الـذرة بـالكيزان مـع بعـض الاضـافات الغذائيـة علـى تسـمين العجول الجاموسى.

ابراهيم محمد السيد شقوير، عبد المنعم محمد مصطفى زيد، ابتهاج ابراهيم محمد أبو العنين و عبد الحليم محمد عبد السلام محى الدين.
معهد بحوث الانتاج الحيوانى – مركز البحوث الزراعية – وزارة الزراعة – جمهورية مصر العربية

أجريت هذة الدراسة بإستخدام 64 عجل جاموسى متوسط أوزانها الحى 307.5 كجم وذلك لدراسة تـأثير اضـافة بعـض الاضـافات الطبيعيـة مثـل الانـزيم (*Fibrozyme* containing 100XU/g *xylanase*) و الخميرة (*Yea-Sacc* containing 10^8 g cells of *Saccharomyces cerevesiae*), على معاملات الهضم والقيمة الغذائية وبعض مقاييس الدم ومعدل النمو والكفاءة الغذائية الاقتصادية . وقسمت الحيوانات الى أربعة مجاميع متماثلة فى كل مجموعة 16عجل ، وغذيت المجاميع على النحو التالى:المجموعة الأولى (الكنترول) غذيت على عليقة مكونة من (40 %علف مركز، 40% سيلاج اذرة ، 20% قش ارز) بدون إضافات . والمجموعة الثانية غذيت على نفس العليقة الاساسية مضاف اليها 10 جم انزيم والمجموعة الثالثة غذيت على نفس العليقة الاساسية مضافا اليها 10 جم خميرة والمجموعة الرابعة غذيت على نفس العليقة الاساسية مضافا اليها 5جم انزيم + 5 جم خميرة لكل حيوان فى اليوم.

واجريت اربعة تجارب هضم بإستخدام 12 عجل (3 حيوانات فى كل مجموعة) لتقدير القيمة الغذائية ومعاملات الهضم للعلائق المختبرة.

ومن النتائج التى تم الحصول عليها من هذه الدراسة أن العجول التى غذيت على عليقة مكونة من (40% علف مركز ، 40% سيلاج اذرة ، 20% قش ارز) مضاف اليها كلا" من الانزيم والخميرة ومخلوط من الانزيم والخميرة أدى الى تحسين فى المعاملات هضم المركبات الغذائية وكذلك القيمة الغذائية للمركبات الكلية المهضومة والبروتين المهضوم مقارنة بعليقة الكنترول واظهرت المجموعة التى غذيت على عليقة مضاف اليها مخلوط من الانزيم والخميرة اعلى قيم لهضم البروتين(67.17%) والالياف الخام (75.1%) والقيمة الغذائية معبرا عنها بمجموع المركبات الكلية المهضومة (66.9%) واعلى قيمة للبروتين المهضوم(7.5%) وكذلك أدت استخدام الاضافات الى زيادة معنوية فى معدلات النمو اليومى والكفاءة الاقتصادية. وكانت العليقة المضاف اليها مخلوط الانزيم والخميرة بمعدل 5 جرام انزيم +5جرام خميرة اعطت افضل النتائج من حيث معدل النمو اليومى (1.19/كجم /يوم) والكفاءة الغذائية (6.82 كجم TDN / كجم نمو) وكذلك افضل كفاءة اقتصادية (1.87) واقل تكلفة غذائية لكل كجم نمو (7.77 جنيها) مقارنة بالعلائق المختبرة وعليقة الكنترول .

ونستخلص من هذه ال=دراسة:

استخدام الخميرة بمعدل 10 جرام والانزيم بمعدل 10 جرام/ للرأس يوميا أو مخلوط منهما (بنسبة 5 جم لكل منها) مع علائق محتوية على سيلاج الذرة بنسبة 40% للعجول الجاموسى اعطت نتائج جيدة لكل الاضافات من حيث تحسين معاملات الهضم والقيمة الغذائية ومعدلات النمو والكفاءة الاقتصادية مقارنة بعليقة لكنترول واعطت العليقة المضاف اليها مخلوط الانزيم والخميرة اعطت افضل النتائج وكانت افضل العلائق اقتصاديا مقارنة بالعلائق الاخرى المختبرة .0

قام بتحكيم البحث

أ.د / أحمد زكي محرز	**كلية الزراعة – جامعة المنصورة**
أ.د / كامل عتمان إبراهيم	**مركز البحوث الزراعية**