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INFLUENCES OF SOME GROWTH PROMOTER SUPPLEMENTATION ON PERFORMANCE, RUMEN ACTIVITY, DIGESTIBILITY AND SOME BLOOD CONSTITUENTS IN BUFFALO CALVES

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ABSTRACT

The objective of this study was to evaluate the influence of dietary supplementation of dried yeast culture and monensin sodium on digestion coefficients, some rumen fermentation, and some blood constituents' parameter in buffalo male calves. Eighteen (18) apparently healthy male buffalo calves (Bubalus bubalis) at 10-11 months of age with an average body live weight (LBW) of 164.6±8.08 kg were selected randomly and divided into three similar groups according to their body weight (6 calves in each) with a completely randomized design. The control group fed the basal ration without any supplementation, the2nd group (YG) fed the basal ration supplemented with 15g/head/day dried yeast *Saccharomy cescervisiae* ("XP" Yeast Culture, Diamond V) while, the 3rd group (MG) fed basal ration supplemented with 1mg of monensin sodium /kg.b.wt/day for six months. Results revealed that, the DM intake kg/d and feeding values as (TDN and DCP) increase significantly (P<0.05) in buffalo calves fed (YG) and (MG) supplemented groups, MG group was the highest significantly (P<0.05) in average daily gain while, there was decreased insignificant differences in feed conversion of MG and YG groups respectively. Ruminal pH values showed limited change without any significantly affect while ruminal ammonia-N concentration, ruminal VFA's proportion in propionate in MG group. Total VFA at 3hr post-feeding for yeast culture group (YG) recorded the highest significant (P<0.05) values. On the other hand, the values of ruminal butyrate decreased in MG group and ruminal propionate proportion in yeast group. The digestibility values of DM, CP and CF were higher (P<0.05) in MG and YG supplemented groups. It was observed that fed MG group showed improved nutritive values as total digestible nutrients (TDN) and digestible crude protein (DCP) than control group (P<0.05). Glucose, globulin and urea concentrations of blood plasma were significantly differ

(P<0.05), but the cholesterol, creatinine concentration and activity of ALT had little effects due to yeast and monensin treatment effects.

In conclusion, supplementation 1mg/kg.b.wt/day of monensin sodium and 15g/head/day yeast culture (*Saccharomy cescervisiae*) to diets of buffalo male calves had positive and beneficial effects on enhance digestion, nutritive values, rumen fermentation, blood constituents and enhancing daily weight gain consequently.

Keywords:

Yeast culture, monensin, buffalo calves, digestibility, rumen fermentation, blood constituents and growth performance,

INTRODUCTION

Probiotics are beneficial living microorganism used to assist intestinal bacterial population establishment and antagonistic to harmful microbes **(Puniya *et al.,* 2015).** Live dried yeast supplementation in ruminant nutrition have been demonstrated an increase nutrient digestibility and ruminal microorganism population, alteration of the proportion of volatile fatty acids produced, reduction in ruminal ammonia **(Chaucheyras-Durand *et al.,* 2008)**, stimulate cellulolytic activity of fibrolytic bacteria in the rumen and enhance growth rate with improve feed: gain ratio **(Jurkovich *et al.,* 2014).** Furthermore, yeast can act as a modulator of immune responses and improve feed intake and average daily gain **(Vosooghi-Poostindoz *et al.,* 2014)**. Ionophores were originally marketed as antibiotics have been shown to induce positive responses in growth and feed efficiency by increase production of propionate on ruminal fermentation, the control of acidosis through decreased ruminal L-lactate, decrease ruminal proteolysis and ruminal methane production **(Duffield *et al.,* 2012).** Monensin sodium is a polyether ionosphere antibiotic. Also it is used as common feed additive produced by a strain of *Streptomyces cinnamonensis.* It is also used to feed beef cattle in various countries to improve energetic efficiency of ruminal fermentation by inhibition of lactate and ammonia-producing ruminal bacteria that improve average daily gains (ADG) also, alters absorption and retention of minerals in growing ruminants and increase production of propionic acid in the rumen **(Chen and Russell, 1999).** It has positive energetic effect due to increased propionate production in the rumen.That is considered because of a general resistance of gram-negative bacteria that reduce succinate to propionate, whereas a reduction in population size and activity occurs in gram-positive bacteria groups, protozoa and fungi tend to be inhibited and prevention of coccidiosis, bloat control and control of acidosis

(Nagaraja *et al.,* 2007).This study aimed to investigate the effect of dietary supplementation of monensin or Yeast culture on quantify changes in production performance involves feed intake, live body weight, daily gain, feed conversion, nutrients digestibility, some ruminal activity parameters and blood parameters of growing male buffalo calves.

MATERIAL AND METHODS

This study was carried out at Buffalo Experimental Station Mahallet Mousa, Kafer El-Sheikh Governorate, Animal Production Research Institute (APRI). Agricultural Research Centre, Ministry of Agriculture, Giza, Egypt.

Animals and experimental diets:

Eighteen (18) healthy male buffalo calves (Bubalus bubalis) at 10-11 months old with an average live body weight (LBW) of 164.6±8.08 kg and housed in semi-open shads yards pens individually. The animals were divided randomly assigned to one of three similar experimental diets (six animals per treatment) in a completely randomized design according to initial LBW and age. The feeding trial lasted for 6 months and animals were fed individually, the basal ration consisted of berseem hay, rice straw *ad lib* and concentrate feed mixture (CFM) fed according to **(NRC, 2005)** recommendations based on LBW and offered twice daily in two equal portions at 8.00 a.m. and 4.00 p.m.. The calves received exactly the same diet, as shown in (Table 1). The control group fed the basal ration without supplementation, 2nd group (YG) fed basal ration with 15g/head/day dried yeast *Saccharomces cervisiae* ("XP" Yeast Culture, Diamond V. Mills, Cedar Rapids, IA, USA), and 3rd group (MG) fed the basal ration with 1mg of monensin sodium /kg.b.wt/day**.** Calves were adapted to the experimental diets for two weeks before the start of the feeding trial, and daily requirements of CFM biweekly changed qualitatively and watered freely.

Table (1): Feeding regimes.

Treatments	Experimental diets
Control diet (CD)	**CFM* + berseem hay (BH) +rice straw (RS), ad libitum**
YG	**CD + 15g/head/day dried yeast culture (Saccharomy cescervisiae)**
MG	**CD + 1 mg of monensin sodium /kg BW/day**

***Concentrate feed mixture (CFM) fed according to (NRC, 2005) recommendations based on LBW, and concentrate feed mixture consisted wheat bran 35.5%, decorticated cotton seed cake31.5%, yellow corn15%, sun flower seed cake10%, vinas3.5%, limestone 3% and 1.5% salt (Nacl), YG (yeast), MG (Monessen sodium).**

Dried yeast culture and monensin sodium was hand-mixed daily for individual animal before feeding. Yeast culture contain 10^8/g cells of *S. cervisiae* pure strains with feed grade emulsifier and potato starch solutions under the most stringently controlled chemical, bacteriological and sanitary conditions.The microorganisms were maintained on agar medium composed of (g/l) yeast extract, 3.0 malt extract, 30.0 peptone, 5.0 sucrose 20 and agar 20.

Growth performance:

Body weight was recorded at beginning of the experimental and then biweekly in the morning before drinking and feeding (Fasting weight), total daily feed intake, total gain, average daily gain, feed conversion ratio and feed efficiency were calculated, samples of the feed mixture collected monthly throughout the experimental period for chemical composition analysis (Table 2) according to **(AOAC, 1996)**.

Table (2): Chemical analysis of the experimental animals diets (as DM basis %)

Ingredients	Items						
	%DM	%OM	% CP	% CF	% EE	NFE%	Ash%
CFM	91.26	85.02	11.91	12.20	3.53	57.38	6.24
Berseem hay	90.90	77.54	13.09	25.62	1.47	37.36	13.36
Rice straw	92.75	81.16	2.44	35.83	1.21	41.68	11.59

DM: dry matter, OM: organic matter, CP: crude protein, CF: crude fiber, EE: ether extract, NFE: Nitrogen-free, extract.

Rumen liquor:

In the middle of the trial three calves individually from each treatment were used to obtain rumen liquor. The samples were taken after 3hours of feeding for two consecutive days throughout the feeding using a stomach rubber tube connected to an electric suction vacuum pump (**Nagah, 2002**). Then strained through four layers of cheese cloth and cooled in a special bag containing ice and transported to the laboratory. The filtered sample was analyzed to estimate, pH value using pH meter (Microcomputer pH-vision Model 6007 (JENCO). Ammonia nitrogen concentration as (NH3-N mg/100ml) according to **(Con-Way methods, 1962)**, total VFA's concentrations as ml eq/100ml rumen liquor were determined immediately by the steam distillation method described by (**Abou-Akkada and El-Shazly, 1964)** the individual VFA's acetic, propionic and butyric as percentage of TVFA's were determined (by means of gas chromatographic method).

Blood samples:

Blood samples were taken monthly before morning feeding from jugular vein by vein puncture in heparinized test tubes and immediately centrifuged at 3500 rpm for 15 min to separate plasma, then immediately frozen at-20°C and stored until analysis. Commercial kits (Diamond Diagnostics Co.,Egypt) were used to determine total protein (TP), albumin (Al), urea (U), cholesterol (Ch), creatinine and plasma transaminases; glutamic-oxaloacetic-transaminase (ALT) and glutamic-pyruvic-transaminase (AST), according to **Armstrong and Carr (1964), Doumas *et al.,* (1971), Patton and Crouch (1977), Allain *et al.,* (1974), Henry (1965) and Reitman and Frankel (1957),** respectively. While, globulin (G) was calculated by subtracting, the Al concentration from the TP value and Al: G ratio was measured by dividing albumin value by its corresponding globulin value.

Digestibility trial:

At the end of treatments three calves from each group were assigned randomly, maintained individual digestibility cages and weighed at the start and end of each trial to determine nutrient digestibility and nutritive values of the experimental rations, by using grap sample method, acid insoluble ash method (AIA) was used as an internal marker to determine the nutrients digestibility according to **(Van Keulen and Young, 1977)**. Feces grab samples were collected from the rectum twice daily at 9a.m. and 9p.m. for seven successive day's collection period. Feed intake was recorded daily once at 8.00 a.m. Samples of 10 % of daily faces and feeds was taken and dried at 60°C for 24-72h and ground to chemical analysis.

Statistical analysis:

The data were statistically analyzed according to **(SAS, 1999**) the differences among groups were tested by Duncan's multiple rang test **(Duncan, 1955).** The statistical model used in this study was as follows: $Yij= \mu + Ti + eij$.

Where: Yij = observed response, μ= overall mean, Ti= effect of treatment (I=1-3) one= control (no addition), two = yeast addition and three=Monessen addition and Eij= the experimental error.

RESULTS AND DISCUSSION

Growth performance:

Dates in (Table 3), illustrated that yeast culture supplementation group (YG) increased significantly (P<0.05) in daily dry matter intake kg/day (DMI) and feeding values as TDN and DCP while, there was insignificant decreased in feed conversion of MG and YG respectively, as compared to the control group during the feeding trial. Average daily gain achieved to the highest significantly (P<0.05) of (MG) buffalo calves group, also average total body weight gain (based on control group) increased by 1.53% and 4.78% while; feeding efficiency improvement by 16.1% and 21.57% for YG and MG, respectively.

Table (3): Effect of yeast culture and monensin supplementation on growth performance and feed conversion of buffalo calves (during 6 months).

Variable	Treatments			Overall mean	±SE
	control	YG	MG		
Average Initial Body weight, kg	166.5	159.6	164.4	163.5	4.7
Average Final Body weight, kg	261.5	265. 5	274	268	12.4
Average Daily gain, kg	0.571^{b}	0.663^{ab}	0.681^{a}	0.639	0.06
DM intake kg/day	4. 60^{ab}	4. 84^{a}	4. 45^{b}	4.63	0.05
Average Feeding values % *					
TDN	64.44^{b}	66.15^{a}	65.83^{ab}	65.47	0.45
DCP	9.58^{b}	10.53^{a}	10.54^{a}	10.22	0.15
SV	58.38	59.28	58.12	58.59	0.36
nutritive ratio 0:1	6.73	6.28	6.25	6.42	0.07
Feed conversion (kg gain/ ….)					
kg DM intake	8.06	7.29	6.50	7.28	0.42
kg TDN intake	5.19	4.83	3.28	4.76	0.39
kg DCP intake	0.772	0.768	0.685	0.742	0.41
kg SV intake	4.71	4.32	3.78	4.27	0.04

^{a,b,c} ***means in the same row with different*** **superscripts are significantly different(P<0.05).**

***Average Feeding values as (TDN, DCP and SV) calculated according to (Nagah, 2002).**

*** YG (yeast), MG (monensin), SV = starch values.**

Yeast culture additive has positive effects on growth performance by improving DM intake and daily gain in young ruminant's early establishment, this was correlated to enhance rumen development parameters such as rumen papillae length, width and rumen thickness with stabilization of rumen microbial communities and increased the activity of nutrient digestibility in rumen **(El-Ashry *et al.,* 2003; Ali, 2005; Helal and Abdel-Rahman, 2010**).

Kumer *et al.*, (2010), found that the same results when fed Graded Murrah buffalo bull calves for 120days with 25g/h/day *S. cerevisiae* as supplementation**.** On contrast, 0.25g yeast culture/10 kg LBW yeast culture supplementation had no significant effect on body gain and feed conversion values **(Nagah, 2002 and Ragheb *et al.*, 2003**). **El-Shaer, (2003**) found that 200 mg/d of Monessen improved feed consumption, ADG, feed efficiency and controls of acidosis by maintain higher ruminal pH of ruminal fermentation, resulted to increase propionate production, decreased ruminal L-lactate, ruminal proteolysis and ruminal methane production.However, the change in fermentation profile may not be sufficient to improve performance of animals receiving low-quality forages with limited supplementation **Vendramini *et al.*, (2015).** On the other hand, add monensin did not influence ADG, DM intake, feed conversion, or NE value and ruminal pH reduction to be closely associated with decreased voluntary feed intake with monensin supplementation **(Zinn *et al.*, 1994)**.

Ruminal liquor parameters:

Results in (Table 4), showed that (MG) group was the highest significantly ($P<0.05$) values of buffalo calves ruminal NH3-N concentration while, (YG) group was the lowest values during the experimental treatment in accordance with, **(Nagah, 2002; El-Shaer, 2003 and Ghorab, 2007). (Komonna, 2007)** who reported that, the ruminal NH3-N concentration for yeast culture supplementations was lower than the control group but the differences were not significant. On the other hand, some studies found higher values of ruminal ammonia-N due to yeast culture supplementation (**Abdel-Latif, 2005; Shahin *et al.*, 2005 and Al-Dabeeb and Ahmed, 2002**). A reduction in ruminal NH3-N concentration as response to yeast culture in treated animals may be attributed to the inhibitory effect on proteolysis amino acid deamination, ruminal urease activity, enhance microbial growth and decrease N loss by incorporating more digestible carbohydrates into microbial mass **(Sniffen *et al.*, 2004)** or as results to increased incorporation of ammonia into microbial protein stimulated microbial activity **(Chaucheyras-Durand *et al.*, 2008).**

Also, date in (Table 4) showed that limited changed without any significant effect in ruminal pH values due to treatments. These results are in agreement with those reported by **(Al-Dabeeb and Ahmed, 2002 and Ali, 2005). (Komonna, 2007)** mentioned that yeast stimulates rumen bacteria and enhance lactate and ammonia utilization resulting in moderate ruminal pH and increases in microbial population which lead to increased rumen fiber

digestion and protein synthesis. On the other hand, pH values were higher in yeast diet with any significant effects on concentrations of volatile fatty acids, ammonia, lactate or soluble carbohydrate in ruminal fluid for dairy goats **(Kholif and Khorshed, 2006 and Giger-Reverdin *et al.*, 2004).** Also a reduction in ruminal pH with Monessen supplementation to be closely associated with decreased voluntary feed intake and reducing ruminal lactate concentrations **(Nagaraja *et al.*, 2007**). On the other hand, there was no effect in heifers calves fed 200 mg/d monensin levels on ruminal pH and ammonia ruminal concentrations reported with **(Vendramini *et al.*, 2015)** Also, **(Ellis *et al.*, 2012)** found higher ruminal pH values resulted to reduced volatile fatty acid concentrations when monensin supplementation.

Table (4): Effect of yeast culture and monensin supplementation on feed intake and ruminal characteristics of buffalo calves (3houres post feeding).

Variable	Treatments			Overall mean	±SE
	control	YG	MG		
Ammonia-N mg/100ml	**24.26^{b}**	**21.20^{c}**	**26.35^{a}**	**23.94**	**3.01**
Ruminal fluid pH	**6.61**	**6.38**	**6.73**	**6.59**	**0.03**
Rumina VFA's (%)					
Acetate	**47.52**	**43.24**	**44.36**	**45.04**	**1.15**
Propionate	**21.95^{b}**	**25.13^{b}**	**27.61^{a}**	**24.89**	**0.75**
Acetate: propionate ratio	**2.16^{a}**	**1.72^{b}**	**1.61^{b}**	**1.83**	**0.130**
Butyrate	**14.48^{a}**	**13.6^{a}**	**9.99^{b}**	**12.69**	**1.10**
Isobutyrate	**1.52**	**2.43**	**1.8**	**1.92**	**0.02**
Valerate	**8.26**	**8.35**	**7.94**	**8.18**	**0.13**
Isovalerate	**6.27**	**7.25**	**7.30**	**6.94**	**0.04**
TVFA, mol /100ml *	**9.31^{b}**	**10.71^{a}**	**8.98^{c}**	**9.67**	**0.23**

^{a,b,c} ***Means in the same row with different*** **superscripts are significantly different(P<0.05).**

*** YG (yeast), MG (monensin), TVFA: Total volatile fatty acid.**

Data in (Table 4) illustrated that, the highest significantly (P<0.05) values of total VFA At 3hr post-feeding for (YG) group while, the lowest of (MG) group also, total VFA had inverse relation with ruminal pH, the similar results was obtained with**Al-Dabeeb and Ahmed (2002) and Komonna, (2007)** in sheep and **(Shahin *et al.*, 2005)** in buffalo calves. On contrast,

(El-Shaer, 2003) and (Ismaiel *et al.,* 2010) showed insignificant differences in total VFA due to yeast culture supplementation. Monessen supplement caused a change in microbial populations and the fermentation profile in the rumen. Moreover, it increased propionate production which results to decrease in available substrate for methanogens, mainly hydrogen and format, and reduces the amount of energy lost as methane **(Ellis *et al.,* 2008),** or affects gram positive bacteria that produce acetic and butyric acid and creates suitable environments for propionate producing bacteria in the rumen **(Chen and Russell, 1999)**.

Ruminal VFA's proportion increased significantly ($P<0.05$) molar of propionate and decreased of ruminal acetate and butyrate in MG group (Table 4), on the other hand the values increased in butyrate and decreased of ruminal propionate and acetate proportion in YG group while, the other percentages of ruminal VFA, were not affected by feeding treatment. The changes in ruminal VFA's proportion with monensin additive are consistent with characteristic changes in fermentation that occur by decreased proportions of branched-chain VFA's and increasing ruminal propionate production and decreased in acetate, butyrate proportions and ruminal proteolysis **(Ellis *et al.,* 2012 and Vendramini *et al.,* 2015).**

The variation between the results may due to concentrate: roughage ratio or the level of YC and monensin supplementation or due to the variation in animal species **(Abdel-Latif, 2005).**

Blood components:

Date in (Table 5), obtained that there were significant differences ($P<0.05$) between supplementation groups (monensin and yeast culture) than the control group on blood plasma globulin (G), urea concentrations (U) and glucose levels in blood plasma of buffalo calves fed the experimental diets (2.62 g/dl, 26.24 and 44.52 mg/dl for YG group, 2.70 g/dl, 22.28 45.33 mg/dl for MG group and 1.69 g/dl, 23.4 and 40.82 mg/dl for control group, respectively) while, the other blood plasma parameters indicated that no significant differences in treatments which had a little effect due to treatments. Also, the values of the most blood plasma parameters (especially AST and ALT) estimated that the animals were generally in a good nutritional status and their liver function safe for physiological and in normal health condition for buffalo calves fed the experimental diets. The obtained results are in accordance with those reported by **(El-Ashry *et al.,* 2003).** YC increased plasma globulin values due to stimulate rumen microbes that altered microbial protein synthesis and increased protein passage as well as protein yield. **(Ragheb *et al.,* 2003)** reported that dietary YS and LS

supplementation increased blood plasma urea concentrations. Furthermore,insignificant increasein serum urea-N response obtained by yeast supplementation may reflect to feed N improved utilization, which agrees with that reported by **(El-Shaer, 2003)** with Friesian calves**.** On the other hand**,** blood plasma urea N decreased in dairy cows and albumin increased in ewes were reported after yeast supplementation **(Bruno *et al.,* 2009 and Helal and Abdel-Rahman, 2010),** However, **(Khattab *et al.,* 2003) and (Shahin *et al.,* 2005)** with buffalo calves recorded a decrease in A/G ratio due to YC supplementation. **(Abdel-Ghani *et al.,* 2004)** found a decreased in blood globulin concentration in buffalo calves. **(Hassan, 2009)** found that YC supplementation had no significant effect on urea concentration, which may be due to differences in levels and duration of yeast supplementation. The increase in plasma concentrations of globulin and urea in heifers receiving monensin may be due to improved utilization of N and associated with decreased proteolysis of dietary protein and altered site of protein digestion, would be expected with greater energy intake and greater efficiency in propionate production in the rumen **(Cappellozza*et al.,*2014)**.

However, **(Vendramini *et al.,* 2015)** reported that there was no effect of 200 mg/d monensin levels on plasma concentrations fed heifers calves.

Table (5): Effect of yeast culture and monensin supplementation on blood parameters values of buffalo calve groups during (6 months feeding trial).

Variable	Treatments			Overall mean	±SE
	control	YG	MG		
Total protein, (g/dl)	6.76	7.45	7.27	7.16	0.12
Albumin, (g/dl)	4.80	4.73	4.57	4.7	0.10
Globulin, (g/dl)	1.96 [b]	2.62 [a]	2.70 [a]	2.42	0.06
A/G ratio	2.67	2.03	1.88	2.19	0.09
Urea, mg/dl	23.04 [b]	26.24 [a]	22.28 [b]	23.85	0.32
Glucose (mg / dl)	40.82 [b]	44.52 [a]	45.33 [a]	43.56	0.52
Creatinine, g/dl	1.64	1.43	1.59	1.55	0.06
Cholesterol, mg/dl	58.46	51.05	57.25	55.59	1.95
AST(IU / dl)	35.16	42.31	40.40	39.29	0.52
ALT (IU / dl)	28.61	26.23	26.39	27.08	0.31

***a,b,c,* Means in a row without a common superscript letter differ (P< .05). YG (yeast), MG (monensin).**

The responses to monensin or yeast culture supplementation were varies documented in published research, may be due to differences such as the yeast type and strain, mode of action and level of application, as well as the animal type, diet, energy level, parity, lactation stage, and level of productivity. These differences make it difficult to compare published results and predict the usefulness of yeast supplementation for Egyptian buffaloes**. (Hanne *et al.,* 2017).**

Yeast culture or monensin supplementation increased (P<0.05) glucose level as compared to the control group. The higher glucose level in blood may be related to the effect of yeast culture through activity of amylase that lead to rapid rate of carbohydrates hydrolysis and absorption in the alimentary tract **(Abdel-Khalek *et al.,* 2000).** The increase activity of cellulolytic bacteria that act on cellulose fibers degradation thus producing more glucose and increased glucogenic precursor propionate in rumen. It also decreased plasma insulin and insulin-glucose ratio thus leads to an increase in gluconeogenesis **(Dawson, 1993)**. Monensin may also inhibits bacteria in the rumen of the gastrointestinal tract and thereby spare glucose from microbial degradation, thus making more glucose available for absorption resulting in decreased gut glucose metabolism or reduced ruminal proteolysis affects amino acid and peptide flows, such that gut tissues utilize amino acids or peptides in lieu of glucose **(Harmon *et al.,* 2014)** Also, 50% increase in ruminal propionate production in steers fed grain diets with monensin despite increased irreversible loss glucose in steers **(Cappellozza *et al.,* 2014).** Average blood AST concentration was non-significantly affected by yeast and monensin supplementation treatments, meanwhile the cholesterol, creatinine concentration and activity of ALT decreased (P>0.05) (Table 5). The results are in accordance with reported by **(Komonna, 2007 and Ragheb *et al.,* 2003)** for Friesian calves and **(El-Asrhy *et al.,* 2003)** for buffalo heifers who found that feeding diets treated with yeast decrease of cholesterol concentration, which may be attributed to stimulation of bacterial lipids synthesis or due to anti-cholesteroleamic effect of yeast treatments. However, blood serum cholesterol and triglycerides was increased (P<0.05) by feeding monensin at 112d **(Fontenot and Huchettet, 1993).**

Nutrient digestibility and feeding values:

Average digestion coefficients and feeding values of the experimental diets are shown in (Table 6). Data indicated that calves in MG and YG showed the highest (P<0.05) CP, DM,

OM and CF digestibility values than the control group. These results are in agreement with those reported by others**, Shahin *et al.,* (2005)** for buffalo calves, **(Komonna, 2007; Hassan, 2009; Paryad and Rashidi, 2009; Helal and Abdel-Rahman, 2010; Ebrahim, 2004; Marghany *et al.,* 2005; Kholif and Khorshed, 2006** for lactating buffaloes**; Ghorab, 2007 and Ragheb *et al.,* 2003** with Friesian calves. An opposite trend was reported by **(El-Kholi *et al.,* 2005)** with buffalo male calves had no effect on digestion coefficient of DM due to yeast supplementation**, (Mukhtar *et al.,* 2010)** found that DM, CP and ADF digestibility's of sheep did not significantly effect by monensin or *S. cerevisiae* supplementation. **(Abdel-Ghani *et al.,* 2004)** found that OM digestibility was not affected by 10g yeast/h/d supplementation for Friesian cows. Yeast culture improvement of gut health, CP,CF digestibility through rumen maturity by favoring microbial establishment and stabilization of rumen pH and interaction with lactate utilizing bacteria and beneficial activities of lactic acid bacteria in the gastrointestinal tract and its ability to alter microbial enzyme activities **(Yang *et al.,* 2004)**.

Table (6): Effect of yeast culture and monensin supplementation on nutrients digestibility and feeding values of buffalo calves group during (6 months feeding trial).

Variable	Treatments			Overall mean	±SE
	control	YG)	MG		
Nutrients Digestibility, %					
DM	69.22 ^{b}	72.52 ^{a}	70.65 ^{ab}	70.80	1.19
OM	71.11^{c}	75.13 ^{a}	74.75 ^{b}	73.66	0.74
CP	70.62 ^{b}	74.17 ^{a}	75.09 ^{a}	73.29	1.14
CF	62.16 ^{c}	65.30 ^{a}	63.54 ^{b}	63.67	0.97
EE	73.41	74.18	74.44	74.01	0.54
NFE	73.11	75.23	75.41	74.58	0.73
Nutritive values					
TDN	64.44 ^{b}	66.15 ^{a}	65.83 ^{b}	65.47	1.45
DCP	9.58 ^{b}	10.53 ^{a}	10.54 ^{a}	10.22	0.18
Nutritive ratio	6.73	6.28	6.25	6.42	0.16
SV	58.38	59.28	58.12	58.59	1.35

***a,b,c*, Means in a row without a common superscript letter differ (P< .05). YG (yeast), MG (monensin).**

*** Apparent digestibility (%): [(nutrient intake–nutrient excretion in feces)/nutrient intake] ×100, DCP % (digestible crude protein): (digested protein/DMI) ×100, TDN %: digested CP+ digested CF+ digested NFE+ (digested EE×2.25), SV % (starch value): (digested CP×0.94) + digested CF+ digested NFE+ (digested EE× variable factor1) - (CF%× variable factor2), Nutritive ratio: TDN–DCP/DCP; (Nagah, 2002).**

In addition, yeast culture promotes rumen function absorption ability and feed digestion by improve establishment of complex rumen microbial ecosystem subsequently **(Elghandour *et al.*, 2015).** Also, may be due to YC provides stimulatory growth factors to ruminal bacteria (i.e., organic acids, B vitamins and amino acids) which increasing rumen number and activity of proteolytic and cellulolytic bacteria on rumen which increase degradability of protein, flow of microbial nitrogen, utilize lactate and digest cellulose **(Putnam and Schwab, 1997).**

The present study (Table 6), illustrates that yeast culture-supplemented groups had higher ($P<0.05$) nutritive values as TDN and DCP than control group. Yeast culture and commercial probiotic tended to significantly improve TDN and DCP was obtained by **(Al-Dabeeb and Ahmed 2002; Ali 2005; and Shahin *et al.*, 2005)** with buffalo calves, **(Marghany *et al.*, 2005; Komonna, 2007 and Helal and Abdel-Rahman, 2010)**. Yeast culture can enhance the digestive process associated related directly to stimulation of microbial activity and microbial growth in the gastrointestinal tract **(Ebrahim, 2004) and (Abdel-Latif, 2005)** found marked increase in protozoal count and microbial yield in ruminal liquor of buffaloes fed Gustor nature (mixture of yeast and malate). The differences in yeast culture effects on nutrients digestibility could be related to the variation in feeding system, species and age of animals, frequency of feeding, dose of yeast and its type, physiological state, environmental conditions, ration composition and plan of nutrition.

CONCLUSION

The findings in the present study showed that, supplementation at levels 15g/h/d of dried yeast culture *Saccharomyces cerevisiae* as probiotics and 1mg of monensin/kg BW/day as growth promoters to growing buffalo male calves diets has positive and beneficial effects on protein and crud fiber digestion, nutritive values, rumen fermentation and dry matter intake as well as daily weight gain for calves and improved blood constituents consequently of the most blood plasma animals parameters especial plasma globulin which may be related in good nutritional status and their liver function safe for physiological and in normal health condition for buffalo calves fed the experimental diets.

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اثر استخدام بعض منشطات النمو على الاداءالانتاجى ونشاط الكرش وكفاءة الهضم وبعض مكونات الدم فى عجول الجاموس

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الملخص العربى

نمت هذه الدراسة لتقدير تاثير اضافة الخميرة الجافة وميونسين الصوديوم على اداء وكفاءة هضم المركبات الغذائية وبعض نواتج تخمرات سائل الكرش وكذلك تقدير بعض مكونات الدم فى عجول الجاموس وتم اختيار 18 عجل جاموسى فى عمر 10-11 شهر بمتوسط 8.08+164.6 كجم وزن حى لهذه الدراسة عشوائيا وتم تقسيمهم الى ثلاثة مجاميع تجريبية متساوية بالنسبة لوزن الجسم (6 حيوانات لكل مجموعة) لتجربة استمرت لمدة 6 اشهر وقسمت هذه المجاميع الى (1) مجموعة كونترول تتغذى على عليقة المحطة بدون اضافات (2) المجموعة الثانية تتغذى على عليق المحطة بالاضافة الى 15جم/راس/يوم من الخميرة الجافة (سكارومايسس سرفسيا) (3) المجموعة الثالثة تتغذى على عليقة المحطة بالاضافة الى 1مجم/كجم وزن حى من ميونسين الصوديوم. وتتكون عليقة المحطة من علف مركز ودريس برسيم وقش ارز. وفى نهاية التجربة تم اختيار ثلاث عجول عشوائيا من كل مجموعة لاجراء تجارب الهضم عليهم وكانت النتائج كالاتى:

لوحظ زيادة معنوية للعجول التجريبية بالنسبة للماكول من المادة الجافة(كجم/يوم) والقيم الغذائية كنسبة من معامل هضم مادة الجافة الكلية والماكول من البروتين الخام بالمقارنة بالكونترول كما اظهرت مجموعة الميونسين زيادة معنوية للزيادة فى وزن الجسم اليومى بينما كان هناك تناقصا فى معدل التحويل الغذائىلكلا المعاملتين.

التغيرات فى حموضة سائل الكرش نتيجة المعاملات بعد ثلاث ساعات من الاكل كانت محددودة بينما اظهر التغير فى تركيزالامونيا بسائل الكرش زيادة معنوية خاصة لمجموعة الميونيسين, اما الزيادة المعنوية لمجموع الاحماض الدهنية الطيارة فكانت لمجموعة الخميرة بينما تناقصت مجموعة الميونسين بالنسبة لمجموعة المقارنة . كذلك فتبا ينت نسب الحماض الدهنية فى سائل الكرش نتيجة المعاملات فكانت هناك زيادة معنوية لنسبة البربيونات وتناقص للاستيات والبيوترات لمجموعة الميونيسين بينما نجد زيادة فى البيوترات وتناقص البربيونات والاستيات لمجموعة الخميرة بينما كانت نسبة الاستيات الى البربيونات متقاربة بين المعاملاتين ومنخفضة معنوية بالنسبة للمقارنة.

كذلك فان تجربة الهضم اظهرت زيادة معنوية لمعاملات هضم المادة الجافة والبروتين الخام والالياف الخام لمجموعة الميونيسين والخميرة مع تحسن فى النسبة الهضمية للمعاملتين بالنسبة للكونترول. كمد اظهرت بلازما الدم زيادة معنوية فى تركيز الجلوكوز والجلوبيولين واليوريا بالدم بينما ملونات الدم الاخرى خاصة الكرتينين والكولستيرول وانزيمات الكبد كانت قليلة الاثر نتيجة المعاملة بالخميرة والميونسنين.

من ذلك يتضح ان اضافة 15 جم/حيوان/يوم من الخميرة الجافة او 1مجم /كجم وزن حى من الميونيسين كان ذا تاثير ايجابى فى تحسين اداء الحيوان من ناحية الهضم والنمو وتحسين بيئة الكرش وصحة الحيوان بدون تغير فى مكونات االدم.