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Efficacy of Feeding Ensiled Corn Crop Residues to Sheep

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Abstract: Chemical composition and silage quality of corn by-products silage were determined. Nutritive value was also investigated through digestibility trials and ruminal parameters (pH, TVFA`S and ammonia-nitrogen concentration). The effect of feeding the experimental diets on some blood metabolites as glucose, total protein, albumin, globulin, total lipids, triglycerides, cholesterol and BUN (Blood Urea Nitrogen) was also studied. Six healthy Baladi rams, were design to 3 different ration (control group A, fed concentrate mixture and (berseem hay), group B, fed concentrates mixture and 4% urea treated corn silage + 3% molasses and group C, fed concentrates mixture and 2% yeast treated corn silage + 3% molasses. Results revealed that Crude protein contents of treated corn silage by urea or yeast with molasses were increased. EE and Ash content as well as Crude fiber fractions (CF, ADF and NDF) were decreased due to ensilage. At the time of the feeding the pH, the total volatile fatty acids (meq/100 g DM) and the NH3-N as % of total nitrogen values of treated corn silage by urea or yeast with molasses were (4.2 and 3.85), (2.95 and 3.44) and (9.95 and 8.62) respectively which indicate good quality silage. Significant decrease in feed intake of group (B and C). Digestion Coefficient values of DM of group (B) were significantly decreased while for group (C) there are non significant difference .Digestion Coefficient values of OM and CP of group (B and C) were significantly increased. Digestion Coefficient values of EE did not show any significant difference in group (B) and significantly increased in group (C).Digestion Coefficient values of NFE and crude fiber fractions (CF, ADF and NDF), Total digestible nutrients and Digestible crude protein were significantly increased in group (B and C). The pH values were non significantly changed in group (B) and significantly decreased in group (C) at zero time. These values were significantly increased in group (B) and non significantly changed in group (C) at 3 and 6 hours post feeding. The peak of ruminal Total VFA and ammonia nitrogen concentration values reached after 3 h post-feeding in all groups. Blood glucose, total protein, albumin, globulin and BUN (Blood urea Nitrogen) were increased in groups (A and B). Total lipids, total cholesterol and triglycerides were decreased in groups (A and B), but the decrease was more in group (C) compared with the control.

Key words: Sheep, goats, corn silage

INTRODUCTION

It is useful to convert vast renewable resources from plant by-products and crop residues into food edible for humans. With Recycling of these by-products, humanly inedible nutrients in them are utilized by animal which converting them into high-quality foods for human consumption and do not become a waste-disposal problem and reducing costs and imports of animal feedstuffs.

In North America, corn silage is commonly fed as a major portion of the ration. This is because of inefficient utilization of the CP in ruminant diets and the feeding of large amounts of protein supplements that this inefficiency necessitates, leads to excessive feed costs and environmental N losses (Glen Broderick, 2008).

In Egypt, corn is considered the main important summer field crop and occupy large area of available cultivated land. There are about 21 million tons of plant by-products produced annually, among them is the corn crop resides which include (green corn, corn Stover, corn stalk and corn cobs), (El-Shahat *et al*., 2006). Average crop residues of corn stalk in Egypt is 4.1 million tons (Badawi and Tantawi, 2004) of them 7.9 tons/Fadden in Sharkia governorate (Ministry of Agriculture, 2006). Therefore, the use of these low quality roughages in making silage is of greet concern.

Corn silage is a high-quality feed that contains a high concentration of energy. Silage can be an economical source of nutrients for sheep and goats, especially on large farms where feeding can be mechanized (Susan Schoenian, 2009).

The primary purpose of this study was to evaluate the use of low quality roughages as corn by- products (green corn and corn stalk) in making silage which treated with urea or yeast with addition of molasses as a preservation method of green fodder to improve there nutritive value. the chemical composition and stability of corn silage were also evaluated.

MATERIALS AND METHODS

This work is part of the project entitled "recycling of agricultural by- products" funded by Zagazig University. About 100 kg of prepared corn silage (corn stalk and corn fodder) treated with 4% urea (Allam, 2008) or 2%

Table 1: Chemical analysis of feedstuffs used (on 100% DM basis) in formulation of experimental diets

	Nutrients composition (%)										
Ingredients	DM	OM	CP	CF	ADF	NDF	EE	Ash	Ca*	P*	NFE
Hay	91.020	90.990	15.998	29.992	38.010	49.994	2.4	9.01	1.27	0.25	42.6
Corn Stalk (CS)	89.995	93.001	5.004	35.008	44.007	70.001	1.3	6.999	0.35	0.19	51.689
Corn Fodder (CF)	37.020	93.007	8.995	25.030	29.001	48.002	2.4	6.993	0.5	0.25	56.582
Yeast*	94	93	48	3	-	-	1	7	0.1	1.56	41
Molasses*	77	86	6	-	-	-	0.8	14	0.9	0.08	79.2
Urea (46% Nitrogen)*	99	100	288	-	-	-	-	-	-	-	-
Yellow corn	87.970	97.997	8.97	1.93	2.997	8.97	4.3	2.1	0.02	0.3	82.7
Wheat bran	89.2	93.01	17.2	11.4	13.01	46.2	4.5	6.990	0.13	1.29	59.91
SBM	91.002	93.005	49.002	6.10	10.005	15.003	1.6	6.998	0.38	0.71	36.30
Dicalcium phosphate*	96	6	-	-	-	-	-	94	22	18.65	-

* According to typical composition feeds tables for cattle and sheep (2008)

yeast, (Prasad *et al.*, 1998) 3% molasses (Borderick and Radloff, 2004) was added to each treatment, then tightly packed into plastic labeled bags (40 kg), tightly closed and left over rice straw bedding, above each other and turned up weekly and kept for two month. Six healthy Baladi rams, about one year old (body weight 30- of 40 kg) were arranged in a completely randomized design of 3 similar groups (2 rams per each), housed separately in shaded pen 4*4 meter. Group A: fed on concentrate mixture and (berseem hay), Group B: fed on concentrates mixture and treated corn silage (4% urea + 3% molasses) and Group C: fed on concentrates mixture and treated corn silage (2% yeast + 3% molasses). Chemical analysis of Feed stuffs used in formulation of experimental rations and silage mixtures were carried out according to standard procedures of the AOAC (1980) for determination of the moisture, DM, CP, EE, CF, ADF, NDF and ash while NFE were calculated by difference as shown in Table 1 respectively. The proper calculated amount of prepared silage ingredients shown in Table 2. The rams were offered their dietary allowance of total ration which contain 60% concentrate mixture formed from yellow ground corn, soybean meal, wheat bran, dicalcium phosphate, salt (NaCl) and 40% roughages as hay or roughages as shown in Table 3 twice a day in equal parts at 8 am and 5 pm.

Silage quality was determined by measuring PH, the concentration of ammonia nitrogen and VFA. (Research Institute for Cattle Feeding at Horn Holland, 1961).

Three digestibility trails were carried out to determine the feeding value of experimental rations. Each digestibility trail included two sub-period, the preliminary period of 21 days (3 weeks) in which the experimental diet was offered to rams at regular time 8 am, 5 pm, daily feed intake was recorded. And collections period (7 days) in which experimental diet was offered daily and also daily fecal out put was collected each 24 h (at 8 am) in collecting bags (having a polyethylene inner side and an outer water proof one) from each ram during the collection period, however, directly before collecting the feaces, the remaining food from previous day was collected and weighed to determine the actual amount of food consumed. The moisture content of daily fresh sample of food and feaces was determined in order to calculate the daily feed intake and fecal out put on dry matter basis.

Table 2: Formulae of corn silage mixture (on as fed basis)

	Treatments	
Ingredients	Corn silage with urea and molasses	Corn silage with yeast and molasses
Green corn	92	92
Corn stalk	4.8	4.9
Urea	0.2	-
Yeast	-	0.1
Molasses	3	3

A representive sample 25% of fresh feaces was taken every 24 h just after collection. The facal sample of each animal was dried for 48 h at 65°C for 48 h in hot air oven, thoroughly mixed, weighed and ground and kept in suitable bags to be used in chemical analysis.

At the end of experimental period rumen fluid sample were taken individually from two animals of each group before feeding and at 0, 3 and 6 h post feeding for 2 successive days through rubber tube with a suction pump. Each sample was strained through four fold of gauze and divided in two portions: the first portion was used immediately for the estimation of rumen PH and ammonia nitrogen concentration. The second portion was preserved by addition of 2 ml N/10 HCl and 1 ml orthophosphoric acid to each 2 ml of ruminal juice for determination of total volatile fatty acids.

At the end of each digestibility trail, blood samples were collected from jugular vein of rams at 4 h post feeding, in evacuated centrifuge glass tubes, left for 2 h at room temperature then centrifuge for 10 min at 3000 rpm. Sera were carefully aspirated by pasture pipette and transferred into dry, clean and sterile labeled glass vials, then kept in deep freeze until analysis.

Rumen was measured immediately after straining the samples using PH meter. (HANNA instrument H1 8424 micro computer PH meter). Ammonia-nitrogen concentrations were determined immediately after collection of the rumen fluid samples (Conway, 1957). Fractionation of fibers in the feed ingredients, chemically treated, experimental silages and fecal samples were

Table 3: Physical composition and calculated analysis of the diets

Ingredients	Groups (A) Control	(B) 4% ureated Corn silage + 3% molasses	(C) 2% yeast supplemented Corn silage + 3% molasses
Yellow corn, ground	46.75	46.75	46.75
Wheat bran	7	7	7
Soybean meal	5.2	5.2	5.2
Dicalcium phosphate.	0.25	0.25	0.25
NaCl	0.5	0.5	0.5
Vitamin. mineral premix**	0.3	0.3	0.3
Clover hay	40	-	-
4% ureated Corn silage + 3% molasses	-	40	-
2% yeast supplemented Corn silage + 3% molasses	-	-	40
Total	100	100	100
Calculated analysis			
DM (%)	88.76	68.69	68.68
OM (%)	94.43	95.14	95.14
CP (%)	14.35	11.66	11.44
CF (%)	14.06	11.94	11.95
ADF (%)	18.08	14.39	14.41
NDF (%)	28.21	27.21	27.24
EE (%)	3.37	3.32	3.33
Ash (%)	5.57	4.64	4.85
NFE (%)	62.65	68.44	68.43
Ca (%)	0.6	0.29	0.29
P (%)	0.41	0.41	0.41

**Each one kgm of ASU Minreral mix powder contain Na 0.14%, (Ca) 1.10%, (P) 0.82%, (Mag) 0.30%, (K) .029%, (I) 0.03%, (Fe) 0.20%, (Cu) 0.03 %, (Co) 0.005%, (Mn) 0.20%, (Zn) 0.03% and (Se) 1.1%. Silver zinc vit mix contain 200.00000 IU Vit A, 200.00000 IU Vit D3, 10000 IU Vit E and 500 gm bastracen

analyzed (Goering and Van Soest, 1970). Fibers were fractionated into Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF). The total VFA was determined by steam distillation methods as described by Warner (1964). Determination of total lipids using kits supplied by Diamond Diagnostics Company according to the method described by Schmit (1964).

Serum total cholesterol was determined calorimetrically by using total cholesterol kits of SPINREACT according to the method described by Natio and Kaplan (1984). Serum triacylglycerols was determined calorimetrically by using triacylglycerols kits of Biocon® Dignostics according to the method described by Wahlefeld and Bergmeyer (1974). Serum glucose was measured according to Trinder (1969). Serum total proteins was determined by Biuret method as described by Henry (1974). Plasma albumin concentration was determined by using kit obtained from Bio- Merieux -France based on out lined by Doumas *et al.* (1971). Determination of plasma globulin: by subtracting the albumin value from the value of total for each sample. Serum urea concentration was determined by using diagnostic kits the technique of Patton and Crouch (1977). All data were analyzed using the general linear model of SAS institute (2002).

RESULTS AND DISCUSSION

Chemical analysis of feedstuffs mixtures (on 100% DM basis): The fecal matter analysis was carried out according to standard procedures of the AOAC (1980) for determinations of the moisture, DM, CP, EE, CF, ADF, NDF and ash while NFE were calculated by difference as shown in Table 5.

The results revealed that the pH values of corn silage were 4.2 and 3.85 with urea and yeast respectively (Table 6). Theses results agreed with Gupta *et al.* (1988), who mentioned that silage with the pH value of 4.2 or less could be good silage. The pH value of silage below 4.4 has been considered as an index of good silage (Harrison *et al.*, 1995). Simillar results reported by Eweedah (2005) indicated that good quality silage made from corn Stover has pH value of 4.1.

In the current work, the ammonia-nitrogen values of corn silage with urea was 9.95 and 8.62 as % of total nitrogen in corn silage because of the action of plant and microbial proteases with yeast on forage protein (Table 6). Theses results agreed with those obtained by Church (1991), who stated that good silage should have pH of 4.2 and less than 11% ammonia-N content. Silage made from corn Stover has NH3-N of 10.69 as a percent of total nitrogen indicate good quality silage (Eweedah, 2005).

The results of this study revealed that, the total VFA values were 2.95 and 3.44 meq/100 g Dm of urea and yeast supplemented corn silage respectively (Table 6). A pattern of total VFA of good silage ranged from 237-984 mmol/kg DM was previously recorded (Etman *et al.*, 1994). Eweedah (2005) reported that silage made from

Table 4: Chemical analysis of feedstuffs mixtures (on 100% DM basis)

	Nutrients composition (%)											
Ingredients	DM	OM	TDN	CP	CF	ADF	NDF	EE	Ash	Ca	P	NFE
Silage (CF 92% + CS 4.8% + Molasses 3% + Urea 0.2%)	40.68	92.8	66.72	9.28	24.68	28.79	47.52	2.29	7.2	0.5	0.24	56.55
Silage (CF 92% + CS 4.9% + Molasses 3% + Yeast 0.1%)	40.85	92.79	66.68	8.75	24.72	28.84	47.59	2.3	7.21	0.5	0.24	57.02

Table 5: Chemical analysis of fecal matter of experimental diets

	Nutrients composition (%)							
Groups	DM	OM	CP	EE	CF	NDF	ADF	Ash
Control diet	50.25	83.5	14	2	20	40	25	16.5
Diet containing corn silage with 4% urea + 3% molasses	44.6	82.2	12	2	14	28	16	17.8
Diet containing corn silage with 2% yeast + 3% molasses	42	82.1	12	2	14	28	16	17.9

Table 6: Average of pH, total volatile fatty acids and NH3-N concentration in ureated corn silage with molasses and yeast supplemented corn silage with molasses

Silages	pH	Total volatile fatty acids (meq/100 g DM)	NH3-N as % of total nitrogen
Ureated corn silage + molasses.	4.2	2.95	9.95
Yeast supplemented corn silage + molasses.	3.85	3.44	8.62

[Abc]Mean in the same row with different superscripts are different at ($p<0.05$)

corn Stover has total VFA value (meq/100 g) of 2.90 indicated its good quality.

The results of chemical composition of urea or yeast corn silage with molasses revealed that CP, Ash and EE were increased while CF, NDF were decreased (Table 5). Like wise, treatment of mango, lemon and corn Stover silage with 3% molasses and 2% urea with 2.5% molasses increased CP content ($p<0.05$) and nitrogen and decreased NDF content (Aguilera *et al*., 1997). In keeping with this line, treatment of corn Stover silage with El- Muffed 3% containing 2.5% urea increased CP, EE and Ash contents by 34.78, 14.88 and 20.00% respectively (Sabbah *et al*., 2006). In just the same way, decreasing crude fiber content of biologically treated corn stalks may be a consequence of the utilization of CF by fungi (Kim *et al*., 1985). This proposition is reinforced by Grajek (1988) and Garcia *et al*. (1993), who stated that increase protein content of biologically treated corn stalks may be due to release of water soluble sugar from polysaccharides leading to faster growth of fungus which in turn resulted in higher CP content. Moreover, Khorshed (2000) mentioned that fungal or yeast culture treated corn stalks increased CP, EE and Ash contents.

The averages feed intake of urea with molasses or yeast with molasses treated corn silage were significantly ($p<0.05$) decreased (Table 7). Our data clearly fit with those previously obtained (Bassuny *et al*., 2003), who found that DM intake for rams fed rations containing urea decreased by 25.33%. On the other hand, Broderick and Radloff (2004) mentioned that, adding sugar as dried molasses (3%) to a diet formulated from alfalfa and corn silage plus high moisture shelled corn on DM basis 18% CP, 42% non fibrous carbohydrates and 2.6% total sugar improved DM intake. Also, Titi *et al*. (2008) showed that yeast culture supplementation increased digestibility with no effect on growth, feed intake or feed conversion ratio of fattening lambs and kids.

Table 8 shows that digestion coefficient values for DM did not show any significant difference in yeast and molasses group and significantly ($p>0.05$) decreased in urea treated corn silage groups compared with the control (70.55±0.36, 68.02±0.65 and 69.23±0.45 respectively).

The digestion coefficient values for OM, CP, CF, NFE, NDF, ADF and TDN of (urea + molasses and yeast + molasses) treated corn silage were significantly higher ($p<0.05$) than control, but the highest values was recorded by yeast + molasses treated corn silage. In this context, it is important to mentioned that live yeast supplementation release essential enzymes, vitamins, and amino acids during digestion which may have a beneficial effect on rumen efficiency. These benefits may arise as a result of their metabolites or their interaction with rumen microbes (Shelly, 2002).

On the other hand the digestibility % for DM and OM for hay with concentrates was higher (73.68 and 75.91 respectively) (Maklad and Eman, 2006) while the digestibility % for DM and OM for corn silage with concentrates without treatment was lower (66.18 and 69.05 respectively) (El-Shinnawy *et al*., 1999). So the treatment of corn silage with urea and yeast improve their digestibility of DM and OM. It was demonstrated that addition of the urea and molasses to the silage improved digestibility (Paturau, 1982). Further evidence was provided by, Angeles *et al*. (1998). The authors

Table 7: Average of daily feed intake (kg/day) of rams fed on diet containing ureated corn silage with molasses and diet containing yeast supplemented corn silage with molasses according to the body weight

	Groups		
Items	(A) Control	(B) (Fed on diet containing ureated corn silage + molasses	(C) (Fed on diet containing yeast supplemented corn silage + molasses
Average daily feed intake of concentrates (kg/day)	0.9[a]	0.8[b]	0.8[b]
Average daily feed intake of roughages (kg/day)	0.426±0.01[a]	0.376±0.01[b]	0.372±0.007[c]
The Average of total daily feed intake (kg/day)	1.33±0.01[a]	1.17±0.01[b]	1.16±0.008[b]

[abc]Mean in the same row with different superscripts are different at ($p<0.05$)

Table 8: The effect of treatment of corn silage by urea with molasses and by yeast with molasses on digestion coefficients (mean±SE), total digestible nutrients and digestible crude protein

	Groups		
Items	(A) (Control)	(B) (Fed on diet containing ureated corn silage + molasses)	(C) (Fed on diet containing yeast supplemented corn silage + molasses)
DM	69.23±0.45[a]	68.02±0.65[b]	70.55±0.36[a]
OM	72.86±0.39[c]	73.75±0.39[b]	78.41±0.26[a]
CP	69.43±0.47[c]	72.87±0.47[b]	74.65±0.31[a]
EE	82.20±0.25[b]	81.83±0.44[b]	85.63±0.17[a]
CF	50.56±1.38[b]	63.71±0.83[a]	64.10±0.59[a]
NFE	77.36±0.32[c]	79.06±0.38[b]	80.67±0.23[a]
NDF	52.83±1.05[b]	70.61±0.58[a]	71.45±0.41[a]
ADF	52.15±1.31[b]	67.84±0.85[a]	67.43±0.52[a]
Nutritive value %			
TDN*	72.55±0.37[c]	76.75±0.37[b]	78.59±0.26[a]
DCP	9.88±7.5[a]	8.69±6.62[c]	8.87±3.95[b]

[abc]Mean in the same row with different superscripts are different at ($p<0.05$). TDN* = DCP + DCF + DNFE + DEE x 2.25 according to AOAC (1980)

indicated that yeast culture supplementation influenced initial rate or increased fiber digestion with little or no effect on total tract digestibility of DM, OM. These findings are confirmed by El-Shinnawy *et al.* (1999), who mentioned that nutrients digestibility of Ensiling of urea treated maize stalks supplemented with 3% molasses increased (as DM%): DM; 58.65, OM; 64.18, CP; 65.67, CF; 61,21 EE; 67.53 and NFE; 65.40. Increased digestibility of urea treated maize stalks silage could be predicted as a result of urea treatment which may cause structural carbohydrates of cell wall to become more accessible to rumen microorganism (Yulistiani *et al.*, 2003). Further support submitted by Sabbah *et al.* (2006), who reported that the digestibility % of cross bred Rahmany male lambs fed on rations containing corn stover silage with 3% El-muffed containing 2.5% urea + CFM increased for OM.

The digestion coefficient values for CP were significantly higher ($p<0.05$) in group (B and C). Moreover the CP was significantly higher ($p<0.05$) for corn silage treated with yeast with molasses than corn silage treated by urea with molasses. These results may be explained as the addition of yeast supplement increased number of proteolytic bacteria (Yoon and Stern, 1996; El-Shinnawy *et al.*, 1999). It is well known that yeast culture increased protein digestion and propionic acid production (Miller-Webster *et al.*, 2002). These results disagreed with Roav *et al.* (1997), who stated that no effect on DM, NDF or CP degradation rate of different fibrous feeds with yeast addition.

The digestibility coefficient values of EE did not show any significant difference for urea and molasses treated corn silage groups compared with the control and significantly ($p<0.05$) increased in yeast and molasses treated corn silage. These results agreed with Sabbah *et al.* (2006) who reported that the digestibility % of cross bred Rahmany male lambs fed on rations containing corn stover silage (5 g yeast/head/day) was increased (86.66) for EE.

The digestibility coefficient values of NFE significantly increased in urea and molasses treated corn silage groups and yeast and molasses treated corn silage compared with the control, but the increase in yeast was more than in urea. These results agreed with Sabbah *et al.* (2006), who reported that the digestibility % of cross bred Rahmany male lambs fed on rations containing corn Stover silage with 5 g yeast/head/day increased and it was 80.34 for NFE.

The digestibility coefficient values of fraction (CF, ADF and NDF significantly ($p<0.05$) increased for urea with molasses and yeast with molasses treated corn silage groups as it were 63.71±0.83 and 64.74±0.59 respectively for CF, 70.61±0.58 and 71.45±0.41 respectively for NDF and 67.84±0.85 and 67.43±0.52 respectively for ADF when compared with the control one which was 50.56±1.38 for CF, 52.83±1.05 for NDF and

52.15±1.31 for ADF. Moreover the CF, NDF and ADF was significantly higher ($p<0.05$) for corn silage treated with yeast with molasses than corn Silage treated by urea with molasses. This may be explained by Newbold and Mcintosh (1996) mentioned that response of cattle to yeast related to stimulation of cellulytic bacteria there by increasing the potential to enhance fiber digestion in the rumen. Also, Debasis and Singh (2003) reported that ADF digestibility was increased ($p<0.01$) with urea molasses mineral block supplementation. Ayyat *et al.* (2007) and Guides *et al.* (2008) mentioned that yeast preparation enhanced the activities of digesting fungi and the bacterial fibrolytic activity in the rumen. These results disagreed with Roav *et al.* (1997) who stated that no effect on DM, NDF or CP degradation rate of different fibrous feeds with yeast addition. El-Shaer (2004) and Abou-Aiana *et al.* (2007) mentioned that addition of molasses to rice straw improved the nutritive value (DCP% TDN%).

The results revealed that pH values were above 6 at different sampling times. In this concept, Van Soest (1983) mentioned that the optimum pH value for growth of cellulytic organisms is 6.7 and the range for normal condition is about ±0.5 pH units. The results revealed that pH values at zero time significantly ($p<0.05$) decreased in corn silage treated with yeast and molasses group while there was non significant difference in corn silage treated with urea and molasses group compared with the control. At 3 and 6 hours post feeding the pH vales significantly ($p<0.05$) increased in corn silage treated with urea and molasses group and non significantly differ in corn silage treated with yeast and molasses groups (Table 9).

Concerning the effect of sampling time on ruminal pH indicated that its values were slightly higher before feeding than after feeding as their pH values tended to be significantly decreased ($p<0.05$) at 3 h after feeding which were 6.23±0.02, 6.60±0.04 and 6.28±0.10 for control, corn silage with urea and molasses and corn silage with yeast and molasses respectively then slightly increased up to 6 h after feeding of all diets (6.68±0.08, 7.05±0.12 and 6.88±0.13) for control, corn silage with urea and molasses and corn silage with yeast and molasses respectively. These results agreed with Sabbah *et al.* (2006) who reported that ruminal pH values of cross bred Rahmany male lambs fed on rations containing corn Stover silage were 6.53 at 0 h, 6.51 after 3 h, 6.72 after 6 h also the total VFA concentration (meq/100 ml) was 7.87 at 0 h, 13.00 after 3 h, 9.00 after 6 h. Similar results were obtained by Sittisak *et al.* (2009), who recorded that the ruminal pH of lactating dairy cows fed corn silage treated with 5% urea was 6.8 after 4 h post feeding. These results disagreed with Van Soest (1994) who mentioned that treating corn silage with urea increased ruminal pH due to producing of ammonia resulting of high buffering capacity. Also, Demirel *et al.* (2003) and Nursoy *et al.* (2003) stated that addition of the urea or urea + molasses into corn or sorghum silage increased silage pH.

The result presented in Table 10 revealed that at zero time, 3 h and 6 h post-feeding the ammonia nitrogen concentration significantly ($p<0.05$) increased in ureated corn silage with molasses group and yeast supplemented corn silage with molasses group compared with the control. The maximum values of ammonia-N were found 3 h after feeding, being significantly ($p<0.05$) increased, which were 30.63±0.72, 25.03±0.60 for corn silage with urea and molasses and corn silage with yeast and molasses 5% respectively versus 12.25±0.67 for the control group. After 6 h ammonia-N concentration started to decline but still significantly higher than the control, recording 22.40±0.57, 18.20±1.28 for corn silage with urea and molasses and corn silage with yeast and molasses 5% respectively versus 10.50±0.40 for the control group. Rumen ammonia-N more significantly decreased in corn silage with yeast than corn silage with urea due to its disappearance by rumen microorganism and yeast so after 6 h (Sabbah *et al.*, 2006). Oelker *et al.* (2009) mentioned that molasses with urea increased ruminal ammonia nitrogen when cow fed corn silage diets.

Results revealed that total VFA values at zero time and were significantly ($p<0.05$) decreased in ureated corn silage with molasses and yeast supplemented corn silage with molasses compared with the control (Table 11). Total VFA values at 3 h post feeding significantly ($p<0.05$) decreased in ureated corn silage with molasses and non significantly differ in yeast supplemented corn silage with molasses compared with the control. Total VFA values at 6 h post-feeding significantly ($p<0.05$) increased in both ureated corn silage with urea and molasses and yeast supplemented corn silage with molasses compared with the control. These previous results agreed with Moore *et al.* (1986) who concluded that addition of ammonia to silage increase total VFA values due increase in energy available for fermentation due to ammonization. The total VFA significantly increased with time post feeding and reached to maximum level at 3 h post-feeding then decreased (Abd-El-Wahab, 2005; Sabbah *et al.*, 2006). Van Soest (1983) explain the possible reason for the decrease which may be due to conversion of soluble forage components to different acids in silage which increase the addition of buffers as urea in turn some energy substrate become less available for rumen microorganism which forced to subsist on a performed diets.

The results revealed that rams fed on yeast with molasses treated corn silage group have the highest blood glucose level which was 65 mg/dl than rams fed on ureated corn silage with molasses group which was

Table 9: Effect of addition of urea with molasses and yeast with molasses in corn silage in the diets on ruminal pH (mean ±Se) values of rams compared with control diet

Time post feeding (h)	Groups (A) (Control)	(B) (Fed on diet containing ureated corn silage + molasses)	(C) (Fed on diet containing yeast supplemented corn silage + molasses)
0	7.30±0.04[a]	7.15±0.06[a]	6.65±0.12[b]
3	6.23±0.02[b]	6.60±0.04[a]	6.28±0.10[b]
6	6.68±0.08[b]	7.05±0.12[a]	6.88±0.13[b]

[abc]Mean in the row with different superscripts are different at ($p<0.05$)

Table 10: Effect of addition of urea with molasses and yeast with molasses in corn silage in the diets on ruminal ammonia nitrogen concentration (mean±SE) values (mg/100 ml) of rams compared with control diet

Time post Feeding (h)	Groups (A) (Control)	(B) (Fed on diet containing ureated corn silage + molasses)	(C) (Fed on diet containing yeast supplemented corn silage + molasses)
0	8.50±0.58[c]	17.85±1.05[b]	20.65±1.44[a]
3	12.25±0.67[c]	30.63±0.72[a]	25.03±0.60[b]
6	10.50±0.40[c]	22.40±0.57[a]	18.20±1.28[b]

[abc]Mean in the row with different superscripts are different at ($p<0.05$)

Table 11: Effect of addition of urea with molasses and yeast with molasses in corn silage in the diets on ruminal total VFA concentration (mean±SE) values (meq/100 ml) of rams compared with control diet

Time post Feeding (h)	Groups (A) (Control)	(B) (Fed on diet containing ureated corn silage + molasses)	(C) (Fed on diet containing yeast supplemented corn silage + molasses)
0	5.98±0.08[a]	3.80±0.14[c]	4.25±0.10[b]
3	7.75±0.17[b]	7.13±0.24[c]	7.98±0.19[ab]
6	6.53±0.25[b]	6.83±0.05[a]	7.13±0.18[a]

[abc]Mean in the row with different superscripts are different at ($p<0.05$)

Table 12: Concentration of some blood metabolites of rams fed on diets containing ureated corn silage with molasses and diets containing yeast supplemented corn silage with molasses, compared with control one

Parameters	Groups (A) (Control)	(B) (Fed on diet containing ureated corn silage + molasses)	(C) (Fed on diet containing yeast supplemented corn silage + molasses)
Glucose (mg/dl)	59	65	63
Total protein (g/dl)	6.3	7.1	7.2
Albumin (g/dl)	2.7	3	2.9
Globulin (g/dl)	3.6	3.9	4.4
Total lipids (mg/dl)	250	210	205
Cholesterol (mg/dl)	117	114	96
Triglycerides (g/dl)	35.56	34	27.37

63 mg/dl compared with control group which was 59 mg/dl (Table 12). These results agreed with Briggs (1967) and Ayyat *et al.* (2007) who reported that supplementation of readily available carbohydrates with NPN to the basal diet increased the level of blood glucose. In general, the blood total protein, albumin and globulin level of rams fed on urea with molasses treated corn silage and yeast with molasses treated corn silage were within the normal range (Table 12). Also theses results agreed with El-Ashry *et al.* (2002), who indicated that plasma total protein and globulin concentration tended to increase with yeast culture supplementation.

The results revealed that rams fed on ureated corn silage with molasses and yeast supplemented corn silage with molasses have the normal blood total lipids, cholesterol and triglycerides (Table 12). These values were decreased in group fed urea treated corn silage with molasses and yeast treated corn silage with molasses group compared with control group. Theses results agreed with Ayyat *et al.* (2007), who recorded that the blood cholesterol and triglycerides concentration (mg/100 ml) of Ossimi ewes fed on 60% concentrates and 40% roughages supplemented with yeast 5 gm/head/day was 73.40±9.37 and 35.40±5.66 respectively.

The results revealed that rams fed on diet containing ureated corn silage with molasses and diet containing yeast supplemented corn silage with molasses within normal range or may be slightly higher than the control. These results agreed with Ortigues *et al.* (1989) who reported that there no significant differences were recorded in the level of blood-urea-nitrogen of cattle fed hay alone or with ureated molasses (32% CP) injected in the ball or as liquid supplement (self-fed in lick tanks); or soybean meal. Taghizadeh *et al.* (2007) reported that the blood urea-n concentration in corn silage treated with 1% urea was 19.5 mg dl which is higher due high releasing of ammonia in rumen resulting of high absorption of ammonia from the rumen to the blood. The higher supplementation level of yeast culture was associated with a higher plasma urea-N (El-Badawi *et al.*, 1998).

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