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FLUENCE OF SOME NITROGEN SOURCES ON FERMENTATION AND DIGESTION OF DIFFERENT POOR QUALITY ROUGHAGES.

1. THE DRY MATTER, NEUTRAL DETERGENT FIBER AND ACID DETERGENT FIBER DISAPPEARANCE OF LOW QUALITY ROUGHAGES AND SOME RUMEN PARAMETERS IN SHEEP.

Mehrez, A. Z*; M. M. El-Shinnawy*; M.A. El-Ashry and H.M.E. Ead*****

*** Animal Production Department, Faculty of Agriculture, Mansoura University.**

**** Animal Production Department, Faculty of Agriculture, Ain Shams University.**

***** Animal Production Research Institute, Agriculture Research Center, Dokki, Giza, Egypt.**

ABSTRACT

Three mature male ruminally canulated sheep were fed at 90% of their *ad libitum* intake. The three control rations, one from each tested roughage were formulated along with concentrate feed mixture (CFM) at the commonly practiced ratio being:

30% rice straw (RS) + 70 CFM

30% maize stalks (MS) + 70 CFM

40% clover straw (CS) + 60 CFM

With the objective of increasing the use of roughage, six tested diets were formulated (two from each roughage) by almost doubling their ratio as in the respective control diets and reducing the traditional CFM as a protein supplement to less than one half by either quality soybean meal (SBM) ,10% or equivalent urea (U), 1.2% as follows:

1. 60 % RS + 30% CFM + 10% SBM
2. 60 % RS + 38.8% CFM + 1.2% U
3. 60 % MS + 30% CFM + 10% SBM
4. 60 % MS + 38.8% CFM + 1.2% U
5. 75 % CS + 17% CFM + 8% SBM
6. 75 % CS + 24 % CFM + 1.0% U

These proportions were chosen to achieve iso-nitrogenous diets containing about 12% CP necessary for optimal utilization and fermentation of roughages in the rumen (∅rskov *et al.,* 1972).

The *in situ* dry matter disappearance (DMD) values increased significantly (P<0.01) when feeding on CS than MS or RS (50.63, 40.24 and 34.17%, respectively) and the neutral detergent fiber disappearance (NDFD%) increased significantly (P<0.01) when feeding on CS than MS or RS (29.81, 28.48 and 27.49%, respectively). The acid detergent fiber disappearance (ADFD%) followed the same trend of NDF disappearance %. The potential degradability (a+b) of DM for CS and MS were higher (P<0.01) than RS (56.72, 56.37 and 54.08, respectively). The potential degradability (a+b) of NDF for MS was higher significantly (P<0.01) than RS and CS (53.32, 48.32 and 37.91%, respectively). The potential degradability (a+b) of

ADF for MS and RS were higher (P<0.01) than CS (55.64, 55.08 and 47.05, respectively).

The mean rumen volatile fatty acids (VFA) values increased significantly (P<0.01) when feeding on MS than CS or RS (9.30, 8.68 and 8.5 ml Eql/100 ml RL, respectively), and the concentration of NH3 was higher (P<0.01) when feeding on MS than CS or RS (18.86, 16.4 and 15.71 mg/100 ml RL, respectively).

The DMD% increased significantly when added CFM+U than CFM+SBM or CFM (42.85, 41.93 and 40.26, respectively). The NDFD and ADFD% followed the same trend in DMD (29.74, 28.36 and 27.69, respectively), and (35.97, 35.08 and 34.91, respectively). The potential degradability (a+b) of DM increased significantly (P<0.01) when added CFM+U or CFM+SBM than CFM (56.83, 56.65 and 53.69%, respectively). The potential degradability (a+b) of NDF increased significantly when added CFM+SBM than CFM+U or CFM (48.4, 46.59 and 44.63%, respectively). The potential degradability (a+b) of ADF increased significantly when added CFM+SBM than CFM or CFM+U (56.75, 51.65 and 49.37%, respectively). The buffering capacity (BC) values increased significantly (P<0.01) when added CFM+U than CFM or CFM+SBM (11.03, 10.26 and 9.64 ml Eq./100ml RL, respectively). The VFA values were increased significantly (P<0.01) when added CFM than CFM+U or CFM+SBM (9.84, 9.96 and 7.67 ml Eq./100 ml RL, respectively). The concentration of NH3 increased (P<0.01) when added CFM + U than CFM or CFM + SBM (19.91, 15.63 and 15.18 mg/100 ml RL).

Keywords: sheep, rice straw, maize stalks, clover straw, soybean meal, urea, *in sacco e*valuation

INTRODUCTION

A decline in the quality of forage has an impact on the amount of other feedstuffs that the animal is able to consume. The slower passage time of the forage results in reduction in intake of not only the forage but also other feed that the animal is consuming (Groen and Korver, 1989).

The ability of animals to consume feeds in sufficient amounts to meet their metabolic and production requirements is one of the most important factors in feeding systems wholly dependent on crop residues and roughages. The characteristics that contribute most to intake of crop residues (when tannins and anti-nutritive factors are low) are : the solubility cell content of the roughage , the insoluble but potentiality fermentable fraction, food degradation rate, rumen outflow rate and the rate at which long particles are reduced to small particles thus allowing outflow (∅rskov and Ryle, 1990).

The main objective of this investigation, therefore, was to study the influence of supplemental some nitrogen sources on fermentation of rice straw, maize stalks and clover straw in the rumen.

MATERIALS AND METHODS

The experimental work of the present study was conducted at the Agricultural Experimental Station and the Laboratories of Animal Production Department, Faculty of Agriculture Mansoura University

Experimental Design

The three control rations, one from each tested roughage were formulated along with concentrate feed mixture (CFM) at the commonly practiced ratio being :

1. 30 % rice straw (RS) + 70 % CFM
2. 30% maize stalks (MS) + 70 % CFM
3. 40 % clover straw (CS) + 60% CFM

With the object of increasing the use of roughage, six tested diets were formulated (two from each roughage) by almost doubling their ratio as in respective control diets and reducing the traditional CFM as a protein supplement to less than one half by either quality soybean meal (SBM), 10% or equivalent urea (U), 1.2% as follows:

1. 60 % RS + 30% CFM + 10% SBM
2. 60 % RS + 38.8% CFM + 1.2% U
3. 60 % MS + 30% CFM + 10% SBM
4. 60 % MS + 38.8% CFM + 1.2% U
5. 75 % CS + 17% CFM + 8% SBM
6. 75 % CS + 24 % CFM + 1.0% U

These proportions were chosen to achieve isonitrogenous diets containing about 12% CP necessary for optimal utilization and fermentation of roughages in the rumen (∅rskov *et al.,* 1972). The target of 12% CP in each experimental diets was achieved in all diets since the ingredients were analysed before formulating the experimental diets.

The rice straw, maize stalks and clover straw were chopped to length of about 5 cm. The CFM contained about 15.81% CP.

Experimental animals and their management:

Three healthy Rahmany rams were used. They were about 1.5-2.0 years old, with an average live body weight of 45 kg. They were fitted with wide permanent rumen cannula (4 cm diameter). Ecah experiment diet was offered *ad lib* at 8.00 am to the experimental animals. During the fermentation studies, 90% of *ad lib* intakes was offered.

The three canulated sheep were used for studying some rumen fluid parameters at different intervals after feeding and for determining the rate of DM and CF fractions disappearance in the rumen using the artificial fiber bag technique (Mehrez and ∅rskov, 1977). These measurements were repeated twice during each experimental period.

Rumen fluid samples were collected through the cannula from different locations in the rumen just before offering the morning feed and at 2, 4 and 8 hrs post-morning feeding. The samples were filtered through two layers of surgical guaze and were used for determining pH, buffering capacity (BC), total volatile fatty acids (VFA) and ammonia-N concentrations.

***In situ* disappearance**

The artificial bag technique developed by Mehrez and ∅rskov (1977) was applied measuring rate of DM disappearance in he rumen. On each of the sampling days, 6 weighed dacron bags were incubated in the rumen of each sheep (8, 16, 24, 36, 48 and 72 hrs incubation interval). Each bag contained about 3 grams DM of the tested roughage (RS or MS or CS) with their corresponding experimental ration. The data of disappearance were fitted by the exponential equation derived by ∅rskov and McDonald (1979) to describe the relation between disappearance and elpase of time of incubation and to predict the degradable potential of the tested material.

In order to define and divided the portions of materials, which disappear from the bags during incubation in the rumen into, they described the relationship between disappearance and elpase of time of incubation through an exponential equation:

$P= a+b\ (1-e^{-ct})$

"P" represents the percentage degradability at time t.
"a" represents the readily soluble fraction which disappears irrespective to fermentation (the intercept with Y axis).
"b" represents the fermentable fraction which disappears with the elpase of incubation intervals.

In other words "a+b" represents the fermentable part of the material.
"C" represents the undegradable fraction.
"t" time (hr).

Chemical analysis:

The NDF and ADF were determined by the methods of Goering and Van Soest (1970), while the pH of rumen liquor (RL) was estimated immediately using battery operated pH meter, ml-equivalents of HCL required to bring the pH of 100 ml rumen liquor to pH 4.5 (Nicholson *et al.,* 1963) was determined immediately after sampling for BC.

The total VFA were determined by the method outlined by (Abou Akkada and El-Shazly, 1964). The concentration of ammonia-N was determined according to the method of Conway and O'Malley (1942).

Statistical analysis

The data collected for each parameter were analyzed by Factorial Design in order to ascertain whether. The observed treatment effects were real and discernible from chance effects. The null hypothesis was tested by F-test of significance (Gomez and Gomez, 1984). The differences between treatment means were tested by Duncan's Multiple Range Test (Duncan, 1955).

RESULTS

1. Effect of low quality roughage type and N-sources on DM, NDF and ADF disappearance in the rumen:

Table (1) shows the effect of CFM, CFM+SBM and CFM+U supplements on DM disappearance of the three tested roughages.

There were no significant effect of adding either CFM, CFM+SBM or CFM+U to three rice straw on dry matter disappearance (DMD) of three tested roughages at any incubation interval. The DMD of RS was lower at 8 h with added CFM+SBM than added CFM or CFM+U, then DMD increased from 16 hrs up to 72 hrs with added CFM+SBM or CFM+U more than added CFM, but DMD was higher with added CFM+SBM than added CFM+U from 24 hrs up to 72 hrs, while MS the DMD was higher from 8 hrs up to 72 hrs with added CFM+SBM and CFM+U than added CFM, but DMD was higher with added CFM+U than added CFM+SBM from 8 hrs up to 72 hrs.

Table (1): Effect of N-sources on DM disappearance of the three tested roughages at different incubation periods.

Period	RS			MS			CS		
	CFM	CFM + SBM	CFM+ Urea	CFM	CFM + SBM	CFM+ Urea	CFM	CFM+ SBM	CFM + Urea
8h	16.23	15.78	18.37	18.33	19.30	25.76	33.28	36.38	34.60
16h	24.58	25.24	25.86	29.26	30.27	35.39	48.59	49.10	46.95
24h	30.81	32.51	31.80	36.38	37.94	42.32	52.63	53.52	52.15
36h	37.35	40.39	38.47	42.95	45.36	49.25	55.33	55.52	55.01
48h	41.64	45.73	43.18	46.72	49.74	53.50	56.53	56.06	55.86
72h	46.42	51.84	48.88	50.28	53.90	57.73	57.37	56.25	56.23

SEM (standard error of means)= 0.97; n= 6.

The DMD with CS was higher from 8 hrs up to 24 hrs with added CFM+SBM than added CFM or CFM+U.

Table (2) shows the effect of CFM, CFM+SBM and CFM+U supplements on NDF disappearance of the three tested roughages.

The NDFD of RS was significantly (P<0.01) higher with added CFM than added CFM+SBM at 8 hrs, then there were no significant effect of adding either CFM, CFM+SBM or CFM+U from 16 hrs up to 36 hrs. The NDFD increased significantly (P<0.01) with adding CFM+SBM or CFM+U than added CFM at 48 hrs, then NDFD increased (P<0.01) with added CFM+SBM than added CFM or CFM+U at 72 hrs.

The NDFD of MS was significantly (P<0.01) higher with added CFM or CFM+U than added CFM+SBM at 8 hrs, then NDFD increased significantly (P<0.01) with added CFM+U than added CFM or CFM+SBM from 16 hrs up to 72 hrs. The NDFD was higher (P<0.01) with added CFM than added CFM+SBM from 16 hrs up to 24 hrs, then there were no significant effect from 36 hrs up to 72 hrs.

Table (2): Effect of N-sources supplements on NDF disappearance of the three tested roughages at different incubation periods.

	RS			MS			CS		
Period	CFM	CFM + SBM	CFM + Urea	CFM	CFM + SBM	CFM + Urea	CFM	CFM + SBM	CFM + Urea
8h	6.63^{xy}	2.61^{z}	4.49^{yz}	9.06^{x}	2.91^{z}	6.95^{xy}	6.42^{xy}	18.25^{uv}	1.65^{z}
16h	17.02^{uv}	15.40^{vw}	17.49^{uv}	17.96^{uv}	12.60^{w}	21.93^{st}	26.72^{pqr}	29.83^{nop}	23.37^{rst}
24h	24.48^{rs}	25.09^{rs}	26.47^{qr}	24.81^{rs}	20.40^{tu}	31.70^{lmno}	31.55^{mno}	34.27^{ijklm}	33.08^{jklmn}
36h	32.00^{lmno}	35.18^{hijkl}	35.03^{hijklm}	32.30^{klmno}	29.34^{opq}	41.43^{de}	35.13^{hijklm}	37.21^{fghi}	35.21^{hijkl}
48h	36.67^{fghij}	41.66^{de}	40.00^{ef}	37.45^{fghi}	35.80^{ghijk}	47.37^{be}	36.88^{fghi}	38.39^{efgh}	35.62^{ghijk}
72h	41.51de	48.54^{b}	44.59^{cd}	43.53^{d}	43.87^{d}	53.26^{e}	38.22^{efgh}	39.09^{efg}	35.74^{ghijk}

From a to z: Means within the same raw with different superscripts are significantly different (P<0.01). SEM (standard error of means)= 1.10; n= 6.

The NDFD of CS was significantly (P<0.01) higher with added CFM+SBM than added CFM or CFM+U at 8 hrs. On the other side, NDFD was higher (P<0.01) when CFM was added than added CFM+U at 8 hrs.

There were no significant effect of adding either CFM, CFM+SBM and CFM+U on NDFD from 24 hrs up to 72 hrs.

Table (3) shows the effect of CFM, CFM+SBM and CFM+U supplements on ADF disappearance of the three tested roughages.

The ADFD of RS was significantly (P<0.01) higher with added CFM or CFM+U than added CFM+SBM at 8 hrs, then ADFD increased (P<0.01) when added CFM+U than added CFM+SBM at 16 hrs, but there was no significant effect of adding either CFM or CFM+SBM at the same period. There were no significant effect of adding either CFM or CFM+SBM and CFM+U from 24 hrs up to 36 hrs, but ADFD increased significantly (P<0.01) when added CFM+SBM than added CFM at 48 hrs and than added CFM or CFM+U at 72 hrs.

There was no significant effect of adding CFM, CFM+SBM and CFM+U on ADFD of MS at 8 hrs. The ADFD was significantly (P<0.01) higher with added CFM+U than added CFM or CFM+SBM from 16 hrs up to 72 hrs, and there were no significant effect of adding either CFM or CFM+SBM on ADFD at the same period.

Table (3): Effect of N-source supplements on ADF disappearance of the three tested roughages at different incubation periods.

Period	RS			MS			CS		
	CFM	CFM + SBM	CFM + Urea	CFM	CFM + SBM	CFM + Urea	CFM	CFM + SBM	CFM + Urea
8h	16.27^{mxy}	10.25^{i}	15.24^{xy}	12.24^{xz}	15.53^{xz}	13.95^{xyz}	26.75^{rst}	32.00^{opq}	17.40^{mx}
16h	22.38^{uv}	20.38^{vw}	25.06^{stu}	23.15^{stu}	22.09^{tuv}	26.93^{rst}	42.63^{efghij}	39.44^{hijklm}	38.27^{jklm}
24h	27.48^{qrst}	27.98^{qrs}	31.52^{opq}	30.17^{opq}	27.72^{qrs}	35.63^{lmn}o	45.56^{cde}	42.81^{efghij}	43.03^{efghi}
36h	33.63^{ndp}	36.84^{klmn}	37.37^{klmn}	36.52^{klmn}	34.76^{mno}	43.75^{defgh}	47.55^{bcde}	45.27^{cdef}	44.49^{cdefg}
48h	38.41^{ijklm}	43.15^{efg}h	40.60^{fghijk}	40.06^{fghijk}	40.38^{fghijk}	48.45^{bcd}	48.37^{bcd}	46.41^{bcde}	44.60^{cdefg}
72h	45.13^{cdef}	50.88^{ab}	43.45^{efgh}	43.29^{efgh}	48.50^{bcd}	53.08^{a}	48.86^{abc}	47.23^{bcde}	44.64^{cdefg}

From a to z: Means within the same raw with different superscripts are significantly different (P<0.01).
SEM (standard error of means)= 1.02; n= 6.

The ADFD of CS was significantly (P<0.01) higher with adding CFM+SBM than added CFM or CFM+U at 8 hrs. There was no significant effect of adding either CFM, CFM+SBM and CFM+U on ADFD from 16 hrs up to 72 hrs.

1.1. Effect of low quality roughage type on DM, NDF and ADF disappearance irrespective to N-sources :

Table (4) shows the main effect of the low quality roughages type, N-sources on the dry matter, NDF and ADF disappearance.

The DMD of clover straw (CS) was higher (P<0.01) than that of maize stalks (MS) or rice straw (RS). On the other side, the DMD of maize stalks was higher (P<0.01) than that of rice straw. The same trends were observed with NDFD and ADFD.

Table (4): Effect of the low quality roughages type, and N-sources on the dry matter, NDF and ADF disappearance.

	Roughage				N-sources			
	RS	**MS**	**CS**	**SEM**	**CFM**	**CFM+SBM**	**CFM+U**	**SEM**
DM	34.17^{c}	40.24^{b}	50.63^{a}	0.22	40.26^{c}	41.93^{b}	42.85^{a}	0.22
NDF	27.49^{c}	28.48^{b}	29.81^{a}	0.26	27.69^{b}	28.36^{b}	29.74^{a}	0.26
ADF	31.43^{c}	33.12^{b}	41.41^{a}	0.24	34.91^{b}	35.08^{b}	35.97^{a}	0.24

a, b, c, d, e, f: Means within the same raw with different superscripts are significantly different (P<0.01).
SEM = standard error of means; n (for roughage and N-sources)= 108 .

1.2. Effect of N-sources on DM, NDF and ADF disappearance irrespective to roughage type :

The DMD, NDFD and ADFD were significantly higher (P<0.01) with added CFM+U than added CFM or CFM+SBM. On the other hand, DMD increased significantly (P<0.01) with added CFM+SBM than added CFM, however, there were no different effect between CFM and CFM+SBM supplements on NDFD or ADFD.

2. The degradability (a+b) for DM, NDF and ADF of the low quality roughages:

2.1. Effect of the low quality roughage type and N-sources on the degradability (a+b) of DM, NDF and ADF:

Table (5) shows the effect of the low quality roughage type and N-sources supplement on the degradability (a+b) of DM, NDF and ADF.

Table (5): Effect of the low quality roughage type and N-sources on the degradability (a+b) of DM, NDF and ADF.

	Roughage (a+b) %			SEM*	N-sources (a+b) %			SEM*
	RS	MS	CS		CFM	CFM+SBM	CFM+U	
DM	54.08^{b}	56.37^{a}	56.72^{a}	0.78	53.69^{b}	56.65^{a}	56.83^{a}	0.78
NDF	48.63^{b}	53.32^{a}	37.91^{c}	1.01	44.63^{b}	48.64^{a}	46.59^{ab}	1.01
ADF	55.08^{a}	55.64^{a}	47.05^{b}	1.52	51.65^{b}	56.75^{a}	49.37^{b}	1.52

a, b, c: Means within the same raw with different superscripts are significantly different (P<0.01).
*** SEM = standard error of means; n = 18.**

2.1.1. Effect of the low quality roughage type on the degradability (a+b) of DM, NDF and ADF:

The degradability of DM for MS and CS were significantly increased (P<0.01) more than RS. The NDF degradability of MS was higher (P<0.01) than that of RS and CS. However, the ADF degradability of RS and MS were higher than that of CS.

2.1.2. Effect of N-sources on the degradability (a+b) of DM, NDF and ADF:

The DM, NDF and ADF degradability were significantly increased (P<0.01) with adding CFM+SBM. However, there were no significant differences between CFM and CFM + U supplements with regard to NDF and ADF degradability, but DM degradability was significantly (P<0.01) increased with adding CFM+U than that supplemented with CFM only.

The DM and NDF degradability of RS were significantly increased (P<0.01) with adding CFM+SBM only, while the ADF degradability was higher (P<0.01) adding CFM or CFM+SBM than with added CFM+U.

Table (6) shows the effect of the interaction between low quality roughage type and CFM, CFM+SBM and CFM+U on the degradability (a+b) of DM, NDF and ADF.

Table (6): Effect of the interaction between low quality roughage type and N-sources on the degradability (a+b) of DM, NDF and ADF.

	RS			MS			CS			SEM*
	CFM	**CFM + SBM**	**CFM + U**	**CFM**	**CFM + SBM**	**CFM + U**	**CFM**	**CFM + SBM**	**CFM + U**	
DM	51.01^{d}	57.42^{ab}	53.82^{bcd}	52.44^{cd}	56.28^{bc}	60.39^{a}	57.63^{ab}	56.27^{bc}	56.28^{bc}	1.35
NDF	45.23^{c}	53.61^{ab}	47.06^{c}	49.93^{bc}	53.04^{ab}	56.98^{a}	38.72^{d}	39.27^{d}	35.75^{d}	1.75
ADF	60.90^{a}	59.39^{a}	44.95^{b}	45.07^{b}	63.35^{a}	58.52^{a}	48.98^{b}	47.52^{b}	44.64^{b}	2.64

a, b, c, d: Means within the same raw with different superscripts are significantly different (P<0.01).
*** SEM = standard error of means; n = 6.**

The degradabilities of DM and NDF of maize stalks were increased (P<0.01) when adding CFM+U. The degradability values of ADF were increased significantly (P<0.01) when added CFM+SBM or CFM+U than those supplemented with CFM only.

The results showed that there were no significant effect when adding CFM or CFM+SBM or CFM+U on the degradabilities of DM, NDF and ADF of clover straw.

3. Rumen liquor parameters:

3.1. Effect of low quality roughages and N-sources on pH of the rumen liquor at different times of sampling:

The effects of feeding the three different types of roughages along with either CFM, CFM+SBM or CFM+U supplement on some rumen liquor parameters are presented in table (7).

There were no significant effect when either CFM or CFM+SBM or CFM+U were added to RS, MS or CS on the pH of the rumen at liquor different times of sampling from 0 hr up to 8 hr of feeding, although the pH tended to decrease after feeding when CFM was added. The mean values were higher (P<0.01) when CFM+SBM or CFM+U were added than CFM was added, 6.77, 6.86 and 6.32, respectively.

3.2. Effect of low quality roughage type and N-sources on BC of the rumen liquor at different times of sampling:

Table (7) shows that there were no significant effect when adding either CFM or CFM+SBM or CFM+U to RS, MS or CS on the BC of the rumen liquor at different times of sampling from 0 hr up to 8 hr of feeding. The mean value of BC was higher (P<0.01) when CFM+U was added than CFM or CFM+SBM. The means were 11.14, 9.02 and 9.83 ml eq./100 ml RL for CFM+U, CFM+SBM and CFM, respectively.

3.3. Effect of low quality roughage type and N-sources on VFA of the rumen liquor at different times of sampling:

The results with RS showed that the VFA was higher (P<0.01) at 0 hr when adding CFM+U than added CFM or CFM+SBM, and then VFA values were higher (P<0.01) when adding CFM+U than added CFM+SBM from 2 hr up to 8 hr, but there were no significant effect when added CFM+U and CFM from 2 hr up to 8 hr after feeding. The mean values were higher (P<0.01) when CFM or CFM+U were added than CFM+SBM was fed, the first two supplements were not significant.

The VFA levels in rumen liquor was not similar with MS when either CFM+SBM of CFM+U was added. On the other side, supplementation with CFM only resulted in significantly higher VFA levels at 2, 4 and 8 hrs post feeding. The mean value was higher (P<0.01) when CFM+U was added than CFM or CFM+SBM were added, but the mean value was significantly (P<0.01) less when CFM+SBM was fed than CFM was fed.

Table (7): Effect of low quality roughages and N-sources on some rumen liquor parameters at different times of sampling.

Period	RS			MS			CS			LSD (P<0.05)	SEM*
	CFM	CFM + SBM	CFM + U	CFM	CFM + SBM	CFM + U	CFM	CFM + SBM	CFM + U		
pH 0h	7.06	7.10	7.06	6.81	7.50	7.18	7.23	7.16	7.25		
2h	6.05	6.70	6.67	5.63	6.70	6.70	6.08	6.65	6.78		
4h	5.98	6.70	6.67	5.80	6.70	6.83	6.03	6.55	6.55		0.12
8h	6.20	6.70	7.05	6.36	6.90	7.10	6.56	6.43	6.31		
Means@	6.32cd	6.77ab	6.86ab	6.26d	6.93a	6.95a	6.47c	6.70b	6.72b		0.06
** BC 0h	10.53	9.36	10.97	10.58	10.31	10.35	10.95	10.30	10.51		
2h	9.45	9.08	10.36	9.93	9.05	10.81	9.83	10.18	11.02		
4h	9.31	9.15	10.78	11.00	10.09	11.56	9.95	9.54	10.45		0.50
8h	10.03	8.51	12.46	11.75	9.94	11.93	9.78	10.23	11.20		
Means@	9.83c	9.02d	11.14a	10.81ab	9.85c	11.16a	10.12bc	10.06bc	10.79ab		0.25
**VFA0h	5.92	6.20	8.62	6.34	5.17	11.32	5.55	7.23	6.32		
2h	9.72	7.49	9.36	10.54	7.11	12.38	8.88	9.60	8.31		
4h	10.81	6.84	9.63	11.97	8.06	8.97	9.72	11.12	9.19	1.798	0.64
8h	9.79	6.43	11.20	10.65	6.12	12.97	7.66	10.65	9.87		
Means@	9.06bc	6.74e	9.70b	9.87b	6.62e	11.41a	7.95d	9.65b	8.42cd		0.32
#NH_3 0h	11.31	16.14	17.23	22.19	11.48	20.35	11.75	16.14	15.26		
2h	14.55	19.19	23.94	20.78	16.93	28.77	18.24	14.20	28.24		
4h	15.61	14.12	18.94	19.65	16.93	20.52	17.01	13.52	20.17		1.84
8h	9.11	13.94	14.45	14.90	16.66	17.19	12.89	12.89	13.65		
Means@	12.65d	15.85c	18.64b	19.38ab	15.50c	21.70a	14.86cd	14.19cd	19.38ab		0.92

From a to e: Means within the same raw with different superscripts are significantly different (P<0.01).
*** SEM = standard error of means; n = 6. @ n = 24.**
**** mleq/100 ml RL.**
 # mg/100 ml RL.

Rations containing CS, VFA increased (P<0.01) from 0 hr up to 2 hr when CFM or CFM+SBM were added than CFM+U was added. There were no significant effect of adding either CFM or CFM+SBM or CFM+U on VFA values from 2 hr up to 4 hr after feeding, but at 8 hr after feeding the VFA values were higher (P<0.01) when adding CFM+SBM or CFM+U were added than added CFM. The mean values were higher (P<0.01) when CFM+SBM was fed than CFM or CFM+U were added, the difference between the later two supplements were not significant.

3.4. Effect of low quality roughage type and N-sources on NH_3 concentration of the rumen at liquor different times of sampling:

Table (7) shows that there was no significant effect of adding either CFM, CFM+SBM or CFM+U on NH_3 at different times of sampling with three tested roughages. The mean value with RS was higher (P<0.01) when CFM+U was fed than CFM+SBM or CFM was fed, the mean value was also higher (P<0.01) when CFM+SBM was fed than CFM.

The mean values with MS were higher (P<0.01) when CFM or CFM+U were fed than CFM+SBM was fed. While, the mean value was higher (P<0.01) when CFM+U or CFM were fed than or CFM+SBM was fed, the difference between the former two supplements were not significant.

3.5. Effect of different low quality roughages and N-sources on the pH, BC, VFA and NH_3 concentrations in the rumen liquor:

The effects of the three tested roughages, three N-sources of supplementation and time of sampling on some rumen parameters are presented in Table (8).

3.5.1. Effect of different low quality roughages on the pH, BC, VFA and NH_3 concentrations in the rumen:

The effects of the three tested roughages irrespective to supplement on some rumen parameters are presented in Table (8).

There was no significant effect for either RS, MS or CS on the pH of the rumen liquor.

Table (8): Effects of the three tested roughages, N-sources and time of sampling on some rumen parameters.

Item	Roughage			SEM*	N-sources			SEM*
	RS	MS	CS		CFM	CFM+SBM	CFM+U	
PH	6.65	6.71	6.63	0.03	6.35^{b}	6.80^{a}	6.84^{a}	0.03
BC	10.00^{b}	10.61^{a}	10.33^{ab}	0.14	10.26^{b}	9.64^{c}	11.03^{a}	0.14
VFA	8.50^{b}	9.30^{a}	8.68^{b}	0.18	8.96^{b}	7.67^{c}	9.84^{d}	0.18
NH_3	15.71^{b}	18.86^{a}	16.14^{b}	0.53	15.63^{b}	15.18^{b}	19.91^{a}	0.53

From a, b, c, d : Means within the same raw with different superscripts are significantly different (P<0.01).

*** SEM = standard error of means; n (for roughage and N-sources)= 72 and n (for incubation periods)= 54.**

The buffering capacity of the rumen was higher ($P<0.01$) with feeding on MS than on RS. It was intermediate with feeding CS with no significant differences from the other two roughages.

The VFA was the highest ($P<0.01$) when feeding on MS than RS and CS, the difference between the later two roughages were not significant.

The concentration of NH_3 was the highest ($P<0.01$) when feeding on MS than RS and CS, which did not significantly differ from each other.

3.5.2. Effect of N-sources on the pH, BC, VFA and NH_3 concentraions in the rumen:

The effects of the three protein supplements on some rumen parameters irrespective to type of roughage or time of sampling are also presented in Table (8).

The pH in the rumen liquor significantly the lowest when CFM was added than when CFM+SBM or CFM+U were added. There were no significant differences between the later two supplements.

The buffering capacity varied significantly ($P<0.01$) among the three supplements, being the highest ($P<0.01$) with CFM+U followed by CFM then CFM+SBM.

The total VFA was the highest ($P<0.01$) when CFM+U was supplemented followed by CFM and CFM+SBM, the difference among the three supplements were significant ($P<0.01$).

The concentration of NH_3 was the highest ($P<0.01$) when CFM+U was added followed by CFM and CFM+SBM, which did not significantly differ from each other.

DISCUSSION

Patton (1994) showed that lignin is negatively correlated with the amount of fiber that can be fermented, while hemicellulose is negatively correlated with the rate at which fiber is digested.

When fiber fractions were determined in the three tested roughages of the present study, the results revealed that the contents were as follow:

	NDF%	ADF%	Cell.%	Hemicell.%	Lignin%
RS	74.66	51.67	38.67	22.99	13.00
MS	75.01	45.25	34.64	29.76	10.61
CS	65.21	50.15	36.62	15.06	13.53

This indicated that CS was the lowest in NDF and hemicellulose and MS in ADF and lignin. This might partly explain the lower digestibility values of the CS rations.

Increasing rate of CF digestion (0.04%/hr) should decrease particle buoyancy over time, increasing rate of passage (0.025%/hr) and decreasing fill while counteracting the decrease in digestibility due to increase rate of passage (Jung and Allen, 1995). While, particles must be digested before passage (Allen and Mertens, 1988).

On the other hand, protein supplementation has been shown to increase ruminal rate of passage of feed particles as a result of higher liquid dilution rate than when roughage is fed alone. A decrease in ruminal retention time would result in lower fiber digestibility values. Digestibility of energy was increased by protein supplementation because protein supplement had a higher gross energy value than the roughage (Guthrie and Wagner, 1988).

The ruminal fiber digestion may be more reponsive to source of supplemental protein than to either the percentage of protein supplements or level of feeding (Freeman *et al.*, 1992). Barton *et al.* (1992) showed also that the beneficial effects of cottonseed meal as a protein supplement for ruminants consuming low-quality forages are documented for a variety of forage types.

The utilization of NPN by ruminants is often less efficient than the utilization of natural protein supplements. Part of the inefficiency of NPN utilization has been attributed to excess NH_3 production in the rumen that is absorbed, converted to urea and excreted in the urine (Chalupa, 1972).

Another attempt was made by measuring the disappearance % and the rate of disappearance of NDF and ADF for the three tested roughages in the rumen through the *in sacco* artificial fiber bag technique during each experimental trail. The results were as follows:

1- Rice straw:

Period	**CFM**		**CFM+SBM**		**CFM+U**	
	Disappearance					
	%	**% / hour**	**%**	**% / hour**	**%**	**% / hour**
			NDF			
8 h	6.63	0.82	2.61	0.32	4.49	0.56
16 h	17.02	1.06	15.4	0.96	17.49	1.09
24 h	24.48	1.02	25.09	1.04	26.47	1.10
36 h	32.00	0.88	35.18	0.97	35.03	0.97
48 h	36.67	0.76	41.66	0.86	40.00	0.83
72 h	41.51	0.57	48.54	0.67	44.59	0.61
Mean	**26.39**	**0.85**	**28.08**	**0.80**	**28.01**	**0.86**
			ADF			
8 h	16.27	2.03	10.25	1.28	15.24	1.90
16 h	22.38	1.39	20.38	1.27	25.06	1.56
24 h	27.48	1.14	27.98	1.16	31.52	1.31
36 h	33.63	0.93	36.84	1.02	37.37	1.03
48 h	38.41	0.80	43.15	0.89	40.60	0.84
72 h	45.13	0.62	50.88	0.70	43.45	0.60
Mean	**30.55**	**1.15**	**31.54**	**1.05**	**32.21**	**1.20**

2- Maize stalks:

Period	CFM		CFM+SBM		CFM+U	
	Disappearance					
	%	% / hour	%	% / hour	%	% / hour
NDF						
8 h	9.06	1.13	2.91	0.36	6.95	0.86
16 h	17.96	1.12	12.60	0.78	21.93	1.37
24 h	24.81	1.03	20.40	0.85	31.70	1.32
36 h	32.30	0.89	29.34	0.81	41.43	1.15
48 h	37.45	0.78	35.80	0.74	47.37	0.98
72 h	43.53	0.60	43.87	0.60	53.26	0.73
Mean	**27.52**	**0.92**	**24.15**	**0.69**	**33.77**	**1.06**
ADF						
8 h	12.24	1.53	15.53	1.94	13.95	1.74
16 h	23.15	1.44	22.09	1.38	26.93	1.68
24 h	30.17	1.25	27.72	1.15	35.63	1.48
36 h	36.52	1.01	34.76	0.96	43.75	1.21
48 h	40.60	0.84	40.38	0.84	48.45	1.00
72 h	43.29	0.60	48.50	0.67	53.08	0.73
Mean	**30.90**	**1.11**	**31.50**	**1.15**	**36.96**	**1.30**

3- Clover straw:

Period	CFM		CFM+SBM		CFM+U	
	Disappearance					
	%	% / hour	%	% / hour	%	% / hour
NDF						
8 h	6.42	0.80	18.25	2.28	1.65	0.20
16 h	26.72	1.67	29.83	1.86	23.37	1.46
24 h	31.55	1.31	34.27	1.42	33.08	1.37
36 h	35.13	0.97	37.21	1.03	35.21	0.97
48 h	36.88	0.76	35.39	0.73	35.62	0.74
72 h	38.22	0.53	39.09	0.54	35.74	0.49
Mean	**29.15**	**1.00**	**32.84**	**1.31**	**27.45**	**0.87**
ADF						
8 h	26.75	3.34	32.00	4.00	17.40	2.17
16 h	42.63	2.66	39.44	2.46	38.27	2.39
24 h	45.56	1.89	42.81	1.78	43.03	1.79
36 h	47.55	1.32	45.27	1.25	44.49	1.23
48 h	48.37	1.00	46.41	0.96	44.60	0.92
72 h	48.86	0.67	47.23	0.65	44.64	0.62
Mean	**43.29**	**1.81**	**42.19**	**1.85**	**38.74**	**1.52**

The obtained data revealed that the disappearance (irrespective to protein supplement) of the NDF and ADF of CS was significantly the highest among tested roughages, which seem to be contradicting with the *in vivo* digestibilities of the rations in which it was included.

Leslie and Fahey (1994) reported that the disappearance values of legumes were higher and more rapid from 8 hr up to 24 hr of ruminal fermentation (limited energy) than cereal by-products which did not approach completion until 72 hr of fermentation.

Hussein *et al.* (1995) showed that forages and fibrous by-products are degraded by ruminal cellulolytic bacteria to different extents depending on factors such as cell wall structure and degree of lignificantion and found that the DM disappearance % of alfalfa hay, orchard grass and wheat straw when incubated in the rumen for 24 hr were 52.2, 49.6 and 32.9%, respectively.

Ørskov and McDonald (1979) divided the portion of a material which disappear from the bags during incubation in the rumen into:
Fraction "a" which a readily soluble and disappears irrespective to fermentation (the intercept with Y axis). Fraction "b" which the fermentable fraction which disappears with the elapse of the time. Fraction "c" which is hardly fermentable even with the elapse of long incubation interval. They described the relationship between disappearance and elapse of time of incubation through an experimental equation to predict the effective degradability:

$$P = a + b\ (1-e^{-ct})$$

In other words "a+b" represents the fermentable part of the material.

Fitting the obtained data of the disappearance of both NDF and ADF of the tested roughages to the previous model it was found that:

	a+b	
Roughage	**NDF**	**ADF**
RS	48.6	55.1
MS	53.3	55.6
CS	37.6	47.1

Accordingly, it was clear that the effective deradability values of NDF & ADF were the worst for CS, while those of MS and RS were nearly similar.

It was therefore possible to postulate that although the rate of NDF and ADF disappearance of CS were the fastest, yet the fermentable fractions were the least compared with those of RS & MS.

Jamot and Grenet (1991) showed that the rate and the extent of degradation in the rumen occurred very rapidly with lucerne stems; the xylem of lucerne was the only undegradable tissues whatever the stage. The collenchyma was degraded in the rumen although with acid phloroglucinol it stained positive for the presence of phenolic compounds. Ryegrass stems were digested more slowly than lucerene stems and the sclerenchyma and xylan of ryegrass were indigestible whatever the stage. The parenchyma located close to the sclerenchyma became indigestible as the cell walls lignified progressively from the third stage. These results contribute to the understading of the decrease in digestibility over the first growth stage and the variation in rate of digestion of lucerene and ryegrass in the rumen.

Nandra *et al.* (1993) reported that the graminaceous hay had higher potential (a+b) DM degradation, but it slower with continous rate of fermentation where the plateau was not reached until about 72 hr incubation than leguminous. Under *in vivo* conditions, such a low rate of degradation would result in a low level of intake and longer retention time leading to higher apparent DMD.

It should be pointed out that pH, BC, VFA and NH_3 or ruminal liqour were studied to postulate suitability for fermentation. The pH values were always with a normal range of 6-7. Such range is suitable for the growth and activity of cellulolytic bacteria (Prasad *et al.*, 1972).

Ørskov (1987) reported that the supplements fed with either untreated or treated straw diets are very important, since rumen bacteria which ferment or digest cellulosic feeds are very sensitive to low rumen pH caused by supplementation. The extent to which rumen pH is decreased by supplementation depends largely on the level and type of supplement used. The higher proportion of concentrate that is used and more rapidly its fermented, the more rumen pH will be lowered and the more seriuosly cellulolysis will be retarded and consequently the utilization of straw reduced and the reverse is true.

The buffering capacity also supports the optimal conditions in the rumen, which is a net function of saliva secretion and VFA production and absorption. A good buffering system in the rumen is that which maintains the pH near neutrality which was achieved in the present study. Naturally more saliva is excreted during mastication and rumination which increase with roughage feeding which was reflected on the buffering capacity value, when the roughages represented higher proportion in the diets.

The rumen VFA was significantly correlated with DM intake when rice straw was supplemented with groundnut oil cake, varying proportions of molasses or molasses plus urea (Calvet *et al.*, 1974).

In addition, the concentrations of NH_3 in the rumen were within the optimum level and even more when urea was used for satisfying microbial needs from N for maximal microbial protein synthesis (Slyter *et al.*, 1979 and Newbold *et al.*, 1987).

Mehrez (1992) reported that the optimal ruminal NH_3 concentration for maximal rate of fermentation in the rumen is associated with dietary source and level of energy to be fermented in the rumen. The two ingredients of the rations were barley grains (BG) and low qulaity clover hay (CH) representing concentrate (C) and roughage ® components, respectively at the ratio of 0:100, 33:67, 67:33 and 100:0. Each experimental ration was fed either unsupplemented or supplemented with appropriate levels of urea-Na_2SO_4 for each diet. Maximal rates of organic matter fermentation were associated with averages of below 7, 13.5, 17.5 and over 20 mg NH_3-N/100 ml rumen liquor for these four diets, respectively.

The present study suggested the possibility of increasing the level of roughages in rations for ruminants with some nitrogen sources supplement such as urea or soybean meal. Further study is needed to support these results by *in vivo* evaluation.

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تأثير بعض المصادر الأزوتية على تخمر وهضم بعض الأعلاف الخشنة الفقيرة

1. معدل إختفاء وتكسير كل من المادة الجافة ، مستخلص الألياف المتعادل ، مستخلص الألياف الحامضى للمواد الخشنة الفقيرة وبعض القياسات الدالة على التخمر فى كرش الأغنام.

أحمد زكى محرز* ، محمد محمد الشناوى *، محمد عبدالمنعم العشرى ** ، حسين محمد الشافعى عيد *.**

*** قسم الإنتاج الحيوانى ، كلية الزراعة ، جامعة المنصورة.**

**** قسم الإنتاج الحيوانى ، كلية الزراعة ، جامعة عين شمس.**

***** معهد بحوث الإنتاج الحيوانى ، مركز البحوث الزراعية ، جيزة .**

أجرى هذا البحث بهدف دراسة تأثير مصادر آزوتية على تخمر وهضم العلائق التى تحتوى على مواد علف خشنة فقيرة بالإضافة إلى بعض مقاييس التخمر فى كرش الأغنام. أجريت هذه الدراسة بمحطة البحوث والتجارب التابعة لقسم الإنتاج الحيوانى بكلية الزراعة جامعة المنصورة.

وخلال الدراسة الحالية تم إختيار ثلاثة أعلاف خشنة فقيرة شائعة الإستعمال وهى:

١- قش الأرز. ٢- حطب الأذرة. ٣- تبن البرسيم.

وقد تم تكوين العلائق التالية كعلائق مقارنة فى الحدود التالية:

٣٠% قش أرز + ٧٠% علف مصنع.

٣٠% حطب أذرة + ٧٠% علف مصنع.

٤٠% تبن برسيم + ٦٠% علف مصنع.

وقد تم مضاعفة إستخدام الأعلاف الخشنة وتقليل إستخدام المركزات (مرتفعة الثمن) كهدف للدراسة مع دراسة تأثير بعض الإضافات البروتينية الحقيقية "كسب فول الصويا" أو غير الحقيقية "يوريا" لعمل خلطات علفية عالية القيمة الغذائية ، وكانت الخلطات المختبرة على النحو التالى:

١- ٦٠% قش أرز + ٣٠% علف مصنع + ١٠% كسب فول صويا.

٢- ٦٠% قش أرز + ٣٨,٨% علف مصنع + ١,٢% يوريا.

٣- ٦٠% حطب أذرة + ٣٠% علف مصنع + ١٠% كسب فول صويا.

٤- ٦٠% حطب أذرة + ٣٨,٨% علف مصنع + ١,٢% يوريا.

٥- ٧٥% تبن برسيم + ١٧% علف مصنع + ٨% كسب فول صويا.

٦- ٧٥% تبن برسيم + ٢٤% علف مصنع + ١% يوريا.

وقد إختيرت هذه النسب لتوحيد محتوى الخلطات المختبرة الثلاثة لكل نوع من العلف الخشن لتتساوى فى محتواها من البروتين حوالى (١٢%).

وقد تم إستخدام كباش تامة النمو متوسط وزنها حوالى ٤٥ كجم بها فتحات مستديمة بالكرش بواقع ٣ حيوانات لكل تجربة حيث تم دراسة:

قياس معدلات إختفاء المادة الجافة ومكونات الألياف للمادة الخشنة بطريقة التحضين فى أكياس ألياف صناعية فى الكرش. وكانت فترات التحضين ٨ ، ١٦ ، ٢٤ ، ٣٦ ، ٤٨ ، ٧٢ ساعة بعد التغذية. وقد روعى تكرار فترات التحضين لزيادة عدد المكررات.

دراسة تأثير المعاملة على بعض خصائص سائل الكرش (pH ، BC ، VFA ، NH_3) على فترات مختلفة من تقديم الغذاء (قبل التغذية ثم بعد التغذية بـ ٢ ، ٤، ٨ ساعات) حيث كرر أخذ القياسات فى دورتين.

وقد كانت النتائج المتحصل عليها كما يلى:

اولاً تأثير المعاملات على تخمر وهضم قش الأرز:

معدل إختفاء كل من DM ، NDF ، ADF:

١- زاد معدل إختفاء المادة الجافة معنوياً عند إضافة كسب فول الصويا أو اليوريا مقارنة بالخلطات التى بها العلف المصنع فقط ، كما كان هناك تأثير معنوى لفترات التحضين المختلفة بعد التغذية.

٢- زاد معدل إختفاء NDF معنوياً ($P<0.01$) عند إضافة كل من كسب فول الصويا أو اليوريا مقارنة بالعلف المصنع فقط، كما تاثر معدل إختفاء الـ NDF معنوياً بالإضافات مع فترات التحضين حيث إرتفع معنوياً

(P<0.01) بعد ٨ ساعات من التغذية على العلف المصنع فقط عن الخلطات التى بها كسب فول الصويا أو اليوريا ، بينما زاد معدل الإختفاء معنوياً (P<0.01) عند ٧٢ ساعة بالخلطات التى بها كسب فول الصويا عن الخلطات التى بها العلف المصنع فقط أو مع إضافة الاليوريا.

٣- زاد معدل إختفاء الـ ADF معنوياً (P<0.01) بالخلطات التى بها اليوريا مقارنة بالخلطات التى بها العلف المصنع فقط أو المضاف إليها كسب فول الصويا. تأثر أيضاً معدل إختفاء الـ ADF معنوياً (P<0.01) بالإضافات مع فترات التحضين حيث كان منخفضاً بالخلطات التى بها العلف المصنع فقط أو اليوريا بعد ٨ ساعات من التغذية ثم زاد معنوياً بعد ٧٢ ساعة.

وأظهرت النتائج أيضاً أن معدل تكسير كل من DM ، NDF ، ADF بتأثير الإضافات عليها .

١- زيادة معدل تكسير DM (a+b) و NDF (a+b) معنوياً (P<0.01) عند إضافة كسب فول الصويا مقارنة بالخلطات التى بها العلف المصنع فقط أو مضاف إليها اليوريا بينما زاد معدل تكسير الـ ADF (a+b) معنوياً (P<0.01) بالخلطات التى بها العلف المصنع فقط أو مع إضافة الكسب فول الصويا مقارنة بالخلطات التى بها اليوريا .

القياسات الدالة على التخمر بالكرش:

١- كان معدل pH منخفضاً معنوياً (P<0.01) عند التغذية على العلف المصنع فقط مقارنة بالخلطات الآخرى ولم يكن هناك فروقاً معنوية أثناء الفترات المختلفة بعد التغذية حتى ٨ ساعات.

٢- زاد معدل الـ BC معنوياً (P<0.01) عند التغذية على الخلطات المضاف إليها اليوريا مقارنة بالخلطات التى بها العلف المصنع فقط أو كسب فول الصويا ، ولكن لم تظهر فروقاً معنوية أثناء فترات التغذية المختلفة حتى ٨ ساعات.

٣- كان معدل الـ VFA منخفضاً معنوياً (P<0.01) عند التغذية على خلطات بها كسب فول الصويا ، كانت هناك فروق معنوية (P<0.01) نتيجة التخمرات أثناء الفترات المختلفة من التغذية حيث زاد VFA بعد ٤ ساعات والتغذية على خلطات مضاف إليها اليوريا مقارنة بالخلطات التى بها العلف المصنع مضافاً إليها كسب فول الصويا ، بينما لم يكن الفرق معنوياً عند التغذية على العلف المصنع فقط.

٤- زاد معدل الأمونيا معنوياً (P<0.01) عند التغذية على خلطات مضاف إليها اليوريا ، كما لوحظت زيادة معنوية فى NH_3 أيضاً بالخلطات المضاف إليها كسب فول الصويا مقارنة بالخلطات التى بها العلف المصنع فقط ، كما لوحظ زيادة تركيز الأمونيا بالخلطات المضاف إليها اليوريا بعد التغذية بساعتين عن الخلطات التى بها العلف المصنع فقط ولكن بفروق غير معنوية.

ثانياً: تأثير المعاملات على تخمر وهضم حطب الأذرة:

معدل إختفاء كل من DM ، NDF ، ADF:

١- زاد معدل إختفاء المادة الجافة و NDF معنوياً (١%) نتيجة إضافة اليوريا أو كسب فول الصويا مقارنة بالخلطات التى بها العلف المصنع فقط ، كما كان هناك تأثير معنوى (١%) نتيجة فترات التحضين المختلفة.

٢- زاد معدل إختفاء الـ ADF معنوياً (P<0.01) مع إضافة اليوريا مقارنة بالخلطات المضاف إليها العلف المصنع فقط أو العلف المصنع + كسب فول الصويا. كما زاد معدل إختفاء الـ ADF مع الخلطات المضاف إليها اليوريا معنوياً (P<0.01) حتى ٧٢ ساعة من التحضين مقارنة بالخلطات المضاف إليها العلف المصنع فقط أو العلف المصنع + كسب فول الصويا.

أظهرت نتائج معدل تكسير كل من DM ، NDF ، ADF أن تأثير الإضافات عليها جاء كما يلى: زاد معدل تكسير DM (a+b) معنوياً (P<0.01) مع إضافة اليوريا مقارنة بالخلطات المضاف إليها العلف المصنع فقط أو العلف المصنع + كسب فول الصويا .

القياسات الدالة على التخمر بالكرش:

١- كان معدل pH منخفضاً معنوياً (P<0.01) عند التغذية على العلف المصنع فقط مقارنة بالخلطات التى بها كسب فول الصويا أو اليوريا، ولم يكن هناك فروقاً معنوية نتيجة تأثير الفترات بعد التغذية حتى ٨ ساعات.

٢- زاد معدل الـ BC معنوياً (P<0.05) عند إضافة العلف المصنع + اليوريا أو العلف المصنع فقط مقارنة بالتغذية على العلف المصنع + كسب فول الصويا ، ولم يكن هناك تأثيراً معنوياً بعد التغذية حتى ٨ ساعات.

٣- زاد معدل الـ VFA معنوياً (P<0.01) عند التغذية على خلطات مضاف إليها العلف المصنع + اليوريا مقارنة بالخلطات المضاف إليها العلف المصنع فقط أو مع العلف المصنع + كسب فول الصويا. كما كان هذا التأثير معنوياً حتى ٨ ساعات بعد التغذية حيث كان معدل VFA.

٤- زاد تركيز الأمونيا معنوياً (P<0.01) عند التغذية على خلطات العلف المصنع + اليوريا. كما لوحظت زيادة غير معنوية فى تركيز NH_3 بعد التغذية بساعتين عند التغذية على العلف المصنع + اليوريا، العلف المصنع + كسب فول الصويا ، بينما إنخفض مع الخلطات التى أضيف إليها العلف المصنع فقط وبفروق غير معنوية.

ثالثاً: تأثير المعاملات على تخمر وهضم تبن البرسيم:

معدل إختفاء كل من DM ، NDF ، ADF:

١- لم يكن هناك فروق معنوية نتيجة تأثير الإضافات على معدل إختفاء المادة الجافة بينما كان هناك تأثير معنوى على مستوى ١% نتيجة تأثير فترات التحضين بعد التغذية حتى ٢٤ ساعة فقط.

٢- زاد معدل إختفاء الـ NDF معنوياً نتيجة تأثير الإضافات وذلك عند إضافة العلف المصنع + كسب فول الصويا ، كما تاثر معدل إختفاء الـ NDF معنوياً نتيجة تأثير الإضافات مع فترات التحضين (P<0.01) حيث كان مرتفعاً مع الخلطات المضاف إليها العلف المصنع + كسب فول الكسب فول الصويا مقارنة بالخلطات التى بها العلف المصنع فقط أو العلف المصنع + الاليوريا وذلك بعد ٨ ساعات من التغذية ، ثم لم يظهر بعد ذلك تأثير معنوى نتيجة المعاملات مع زيادة فترات التحضين.

٣- زاد معدل إختفاء الـ ADF معنوياً (P<0.01) بالخلطات المضاف إليها العلف المصنع فقط أو العلف المصنع + كسب فول الصويا كما كان هناك تأثير معنوى (P<0.01) نتيجة الإضافات مع فترات التحضين عند ٨ ساعات فقط من التغذية حيث زاد معدل إختفاء الـ ADF% مع الخلطات المضاف إليها العلف المصنع + كسب فول الكسب فول الصويا مقارنة بالخلطات المضاف إليها العلف المصنع فقط أو العلف المصنع + اليوريا

القياسات الدالة على التخمر بالكرش:

١- إنخفض معدل pH عند التغذية على الخلطات المضاف إليها العلف المصنع فقط معنوياً على مستوى ١% ، ولم يكن هناك تأثيراً معنوياً نتيجة الفترات بعد التغذية حتى ٨ ساعات.

٢- لم يكن هناك فروق معنوية نتيجة تأثير الإضافات (العلف المصنع فقط أو العلف المصنع + كسب فول الصويا أو العلف المصنع + اليوريا) على معدل الـ BC ، كذلك لم تظهر فروق معنوية بعد التغذية حتى ٨ ساعات.

٣- زاد معدل الـ VFA معنوياً (P<0.01) مع إضافة العلف المصنع + كسب فول الصويا ، بينما زاد معدل الـ VFA معنوياً (P<0.01) مع إضافة العلف المصنع + كسب فول الكسب فول الصويا أو العلف المصنع + اليوريا مقارنة بالخلطات المضاف إليها العلف المصنع فقط عند ٨ ساعات من التغذية .

٤- زاد تركيز الأمونيا معنوياً (P<0.01) عند التغذية على خلطات مضاف إليها العلف المصنع + اليوريا ، كما لوحظت زيادة فى تركيز NH_3 بعد التغذية بساعتين عند إضافة العلف المصنع فقط أو العلف المصنع + اليوريا ، بينما إنخفض تركيز الأمونيا عند إضافة العلف المصنع + كسب فول الصويا ، ولكن بفروق غير معنوية.