

STUDIES ON THE POSSIBLE METHODS  
FOR IMPROVING UTILIZATION OF LOW  
QUALITY ROUGHAGES FOR RUMINANTS

By

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ABSTRACT

The main objective of this study was to identify the possible methods that could be used for improving the utilization of maize stover and wheat straw for ruminants. Three experiments were conducted. The 1<sup>st</sup> experiment studied the effect of treating maize stover and wheat straw with urea, sodium hydroxide and sulphuric acid solutions individually or in combinations on chemical composition, cell wall constituents and *In Vitro* DM and OM disappearance for the two tested roughages. The 2<sup>nd</sup> experiment was conducted on three mature Rahmani rams fed on six sequent experimental rations including untreated or treated maize stover by different methods as follows: untreated maize stover ration (I), 3% urea treated maize stover ration (II), 3% urea + 2% NaOH treated maize stover ration (III), 3% urea + 2% H<sub>2</sub>SO<sub>4</sub>

treated maize stover ration (IV), 2% H<sub>2</sub>SO<sub>4</sub> treated maize stover ration (V) and 2% NaOH treated maize stover ration (VI).

The concentrate feed mixture was offered in all rations to provide animals with half of their maintenance requirements of energy as starch value (SV), while untreated or treated roughage material was offered *ad lib*. The same experimental rations were used in the third experiment except of using wheat straw instead of maize stover. The more important results recorded could be summarized as follows:

- The treated roughages showed lower crude fiber content relative to untreated materials. The pronounced effect was found for acid treatment. All urea treatments applied increased the crude protein content of the tested roughages. The highest values for *In Vitro* dry matter and organic matter disappearance were recorded for 3% urea + 2% NaOH treated maize stover and 4% H<sub>2</sub>SO<sub>4</sub> treated wheat straw.

- Most chemical treatments applied increased nutrients digestibility and feed intake of the experimental rations except for acid treatment which decreased crude fiber digestibility and DM intake of maize stover ration and 2% H<sub>2</sub>SO<sub>4</sub> or 2% NaOH treated wheat straw decreased crude protein digestibility. The highest improvements in nutrients digestibility and feeding value in terms of SV or TDN were recorded for ration III which containing 3% urea + 2% NaOH treated maize stover or wheat straw. The improvements in DM intake ranged from 26 to 74 and from 7 to 55% for maize stover and wheat straw, respectively.

- All animals in all treatments were in positive nitrogen balance. The highest values were recorded for sheep given ration containing urea treated maize stover or wheat straw rations (II, III, IV).

- The results obtained for rumen fluid analysis and blood serum analysis were within the normal range and indicated that the chemical treatments applied did not give any abnormal condition on rumen activity, liver and kidney functions.

It may be concluded that the simple urea treatment method of low quality roughage holds promise for improving their utilization as it increase the crude protein content and fiber digestibility. However, more improvement could be achieved with urea + NaOH treatment.

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## LIST OF ABBRIVIATION

ADF	= Acid detergent fibre.
ADG	= Average daily gain.
ADL	= Acid detergent lignin.
A/G	= Albumin : globulin ratio.
CF	= Crude fibre.
CFM	= Concentrate feed mixture.
CP	= Crude protein
CWC	= Cell wall constituents.
DCP	= Digestible crude protein.
DM	= Dry matter.
DMI	= Dry matter intake.
EE	= Ether extract.
g	= gram.
GOT	= Glutamic oxaloacetic transaminase.
GPT	= Glutamic pyrophic transaminase.
HA.HWR	= High acid hydrolyzed wood residue.
HCl	= Hydrochloric acid.
HNO <sub>3</sub>	= Nitric acid.
H <sub>2</sub> SO <sub>4</sub>	= Sulphuric acid.
ISDMD	= <i>In Sacco</i> dry matter disappearance.
IVDMD	= <i>In Vitro</i> dry matter disappearance.
IVOMD	= <i>In Vitro</i> organic matter disappearance.
kg	= Kilogram.
L	= Liter
LA.HWR	= Low acid hydrolyzed wood residue.
meq.	= Milli equivalent.
mg	= Milligram.
ml	= Milliliter
N	= Nitrogen.
NaOH	= Sodium hydroxide.
NDF	= Neutral detergent fibre.
NFE	= Nitrogen free extract.
NH <sub>3</sub> -N	= Ammonia nitrogen.
NPN	= Non protein nitrogen.
OM	= Organic matter.
SV	= Starch value.
TDN	= Total digestible nutrients.
TN	= Total nitrogen.
TVFA's	= Total volatile fatty acids.
W <sup>0.75</sup>	= Metabolic body weight.

## CONTENTS

	Page
I. INTRODUCTION .....	1
II. REVIEW OF LITERATURE .....	3
1. Poor quality roughages and its characteristics ....	3
2. Improving utilization of low quality roughages ....	6
2.1. Chemical treatments of low quality roughages.....	6
2.2. Mode of action of chemical treatments .....	9
3. Effect of some chemical treatments of poor quality roughages on chemical composition .....	10
3.1. Urea treatment .....	10
3.2. Alkali treatment .....	12
3.3. Acid treatment .....	14
4. Effect of some chemical treatments on <i>In Vitro</i> and <i>In Sacco</i> DM and OM disappearance .....	16
4.1. Urea treatment .....	16
4.2. Alkali treatment .....	18
4.3. Acid treatment .....	19
5. Effect of some chemical treatments of low quality roughages on <i>In Vivo</i> nutrients digestibility and nitrogen balance .....	20
5.1. Urea treatment .....	20
5.2. Alkali treatment .....	23
5.3. Acid treatment .....	27
6. Effect of some chemical treatments of low quality roughages on feed intake and animal performance....	28
6.1. Urea treatment .....	28
6.2. Alkali treatment .....	30
6.3. Acid treatment .....	33
7. Effect of some chemical treatments of low quality roughages on rumen activity .....	35
7.1. Urea treatment .....	35
7.2. Alkali treatment .....	36
7.3. Acid treatment .....	38
8. Effect of some chemical treatments of low quality roughages on some blood parameters .....	40
8.1. Serum protein .....	41
8.2. Serum urea .....	43
8.3. Serum creatinine (kidney function) .....	44
8.4. Serum transaminase activity (liver function) ....	45



Cont.:

	Page
III. MATERIALS AND METHODS .....	46
1. Experiment I .....	46
2. Experiments II and III .....	48
2.1. Chemical treatments .....	48
2.2. Experimental rations .....	50
2.3. Animals and their management .....	51
2.4. Urine and faeces collection .....	54
2.5. Sampling of rumen liquor .....	54
2.6. Blood sampling .....	55
3. Analytical methods .....	55
3.1. Proximate analysis .....	55
3.2. Determination of cell wall constituents .....	56
3.3. Determination of <i>In Vitro</i> dry matter and organic matter disappearance .....	56
3.4. Rumen fluid analysis .....	56
3.4.1. Determination of rumen pH .....	56
3.4.2. Determination of ammonia nitrogen .....	56
3.4.3. Determination of total nitrogen .....	57
3.4.4. Determination of total volatile fatty acids ..	57
3.5. Blood serum analysis .....	57
3.5.1. Serum total protein .....	57
3.5.2. Serum albumin .....	57
3.5.3. Calculated serum globulin .....	57
3.5.4. Calculated albumin : globulin ratio .....	57
3.5.5. Serum transaminases.....	58
3.5.6. Serum urea .....	58
3.5.7. Serum creatinine .....	58
4. Statistical analysis .....	58
IV. RESULTS AND DISCUSSION .....	59
Experiment I: Effect of some chemical treatments on the proximate chemical analysis, cell wall constituents, <i>In Vitro</i> DM and OM disappearance of maize stover and wheat straw .....	59
1. Proximate chemical analysis .....	59
2. Cell wall constituents .....	65
3. <i>In Vitro</i> DM and OM disappearance .....	70
4. Effect of urea and urea + NaOH or H <sub>2</sub> SO <sub>4</sub> treatments on N fixation, ammonia and urea nitrogen content of maize stover or wheat straw .....	75
Experiment II:Effect of some chemical treatments of maize stover on feed intake, nutrients digestibility, nitrogen balance along with some blood and ruminal parameters with sheep given rations containing untreated or treated maize stover .....	81

Cont.:

	Page
1. Nutrients digestibility .....	81
2. Nutritive values (feeding values) .....	88
3. Dry matter intake and drinking water .....	90
4. Nitrogen balance .....	99
5. Ruminal activity .....	103
5.1. Ruminal pH .....	109
5.2. Ruminal total volatile fatty acids (TVFA's) .....	110
5.3. Total nitrogen .....	111
5.4. Ruminal ammonia nitrogen .....	112
6. Blood serum analysis .....	114
Experiment III:Effect of some chemical treatments of wheat straw on feed intake, nutrients digestibility, nitrogen balance along with some blood and ruminal parameters with sheep given rations containing untreated or treated wheat straw .....	120
1. Nutrients digestibility .....	120
2. Nutritive values (feeding values) .....	126
3. Dry matter intake and drinking water .....	129
4. Nitrogen balance .....	138
5. Ruminal activity .....	142
5.1. Ruminal pH .....	148
5.2. Ruminal total volatile fatty acids (TVFA's) .....	148
5.3. Total nitrogen .....	151
5.4. Ruminal ammonia nitrogen .....	152
6. Blood serum analysis .....	154
SUMMARY AND CONCLUSIONS .....	160
REFERENCES .....	172
ARABIC SUMMARY.	

## LIST OF TABLES

No.		Page
1.	Fibrous agricultural residues in Egypt (million ton/year) .....	4
2.	Chemical composition of experimental rations used in experiment II (DM basis) .....	52
3.	Chemical composition of experimental rations used in experiment III (DM basis) .....	53
4.	Effect of some chemical treatments on proximate chemical analysis of maize stover .....	60
5.	Effect of some chemical treatments on proximate chemical analysis of wheat straw .....	61
6.	Effect of some chemical treatments on cell wall constituents of maize stover .....	66
7.	Effect of some chemical treatments on cell wall constituents of wheat straw .....	67
8.	Effect of some chemical treatments on IVDMD and IVOMD of maize stover .....	71
9.	Effect of some chemical treatments on IVDMD and IVOMD of wheat straw .....	72
10.	Analysis of variance for IVDMD and IVOMD of maize stover and wheat straw .....	73
11.	Effect of urea or/and + NaOH or H <sub>2</sub> SO <sub>4</sub> treatments on nitrogen content, NH <sub>3</sub> -N and urea-N of maize stover and wheat straw .....	76

Cont.:

No.	Page
12. Apparent digestibility coefficients and feeding value of rations containing untreated or treated maize stover with different methods by sheep .....	82
13. ANOVA for nutrients digestibility and feeding value recorded on sheep fed different experimental rations containing untreated or treated maize stover .....	83
14. Dry matter intake and drinking water as affected by some chemical treatments of maize stover recorded on sheep fed rations containing untreated or treated maize stover.	91
15. ANOVA for dry matter intake and drinking water recorded on sheep fed different rations containing untreated or treated maize stover .....	92
16. Average TDN, SV and DCP intake recorded on sheep given rations containing maize stover untreated or treated with different methods .....	98
17. Nitrogen balance as affected by some chemical treatments of maize stover, recorded on sheep given rations containing untreated or treated maize stover with different methods .....	100
18. ANOVA for nitrogen balance recorded on sheep fed different experimental rations containing untreated or treated maize stover .....	101
19. Mean values of pH and TVFAs <sup>3</sup> (meq/100 ml) in the rumen fluid of sheep received untreated or treated maize stover with different methods plus concentrate feed mixture ...	104

Cont.:

No.	Page
20. Mean values of total nitrogen (mg/100 ml) and ammonia nitrogen (mg/100 ml) in the rumen fluid of sheep received untreated or treated maize stover with different methods plus concentrate feed mixture .....	105
21. ANOVA for some ruminal parameters recorded on sheep fed rations containing untreated or treated maize stover.	106
22. Effect of some chemical treatments on some blood parameters recorded on sheep fed rations containing untreated or treated maize stover .....	115
23. ANOVA for some blood serum parameters recorded on sheep fed different experimental rations containing untreated or treated maize stover .....	116
24. Apparent digestibility coefficients and feeding value of rations containing untreated or treated wheat straw with different methods by sheep .....	121
25. ANOVA for nutrients digestibility recorded on sheep fed different experimental rations containing untreated or treated wheat straw .....	122
26. Dry matter intake and drinking water as affected by some chemical treatments of wheat straw recorded on sheep fed rations containing untreated or treated wheat straw .....	130
27. ANOVA for dry matter intake and drinking water recorded on sheep fed different rations containing untreated or treated wheat straw .....	131

Cont.:

No.	Page
28. Average TDN, SV and DCP intake recorded on sheep given rations containing wheat straw untreated or treated with different methods .....	136
29. Nitrogen balance as affected by some chemical treatments of wheat straw recorded on sheep given rations containing untreated or treated wheat straw with different methods .....	139
30. ANOVA for nitrogen balance recorded on sheep fed rations containing untreated or treated wheat straw..	140
31. Mean values of pH and TVFAs(meq/100 ml) in the rumen fluid of sheep received untreated or treated wheat straw with different methods plus concentrate feed mixture ....	143
32. Mean values of total nitrogen (mg/100 ml) and ammonia nitrogen (mg/100 ml) in the rumen fluid of sheep received untreated or treated wheat straw with different methods plus concentrate feed mixture ....	144
33. ANOVA for some ruminal parameters recorded on sheep fed rations containing untreated or treated wheat straw.	145
34. Effect of some chemical treatments on some blood parameters recorded on sheep fed rations containing untreated or treated wheat straw .....	155
35. ANOVA for some blood serum parameters recorded on sheep fed different experimental rations containing untreated or treated wheat straw .....	156

## LIST OF FIGURES

Figure No.	Page
1. Treatments available for improving the nutritive value of crop residues.....	7
2. Effect of some chemical treatments and sampling time on rumen liquor pH and TVFA's concentration of sheep fed rations containing maize stover .....	107
3. Effect of some chemical treatments and sampling time on total nitrogen and $\text{NH}_3\text{-N}$ concentration in the rumen liquor of sheep fed rations containing maize stover .....	108
4. Effect of some chemical treatments and sampling time on rumen liquor pH and TVFA's concentration of sheep fed rations containing wheat straw .....	146
5. Effect of some chemical treatments and sampling time on total nitrogen and $\text{NH}_3\text{-N}$ concentration in the rumen liquor of sheep fed rations containing wheat straw .....	147