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

By

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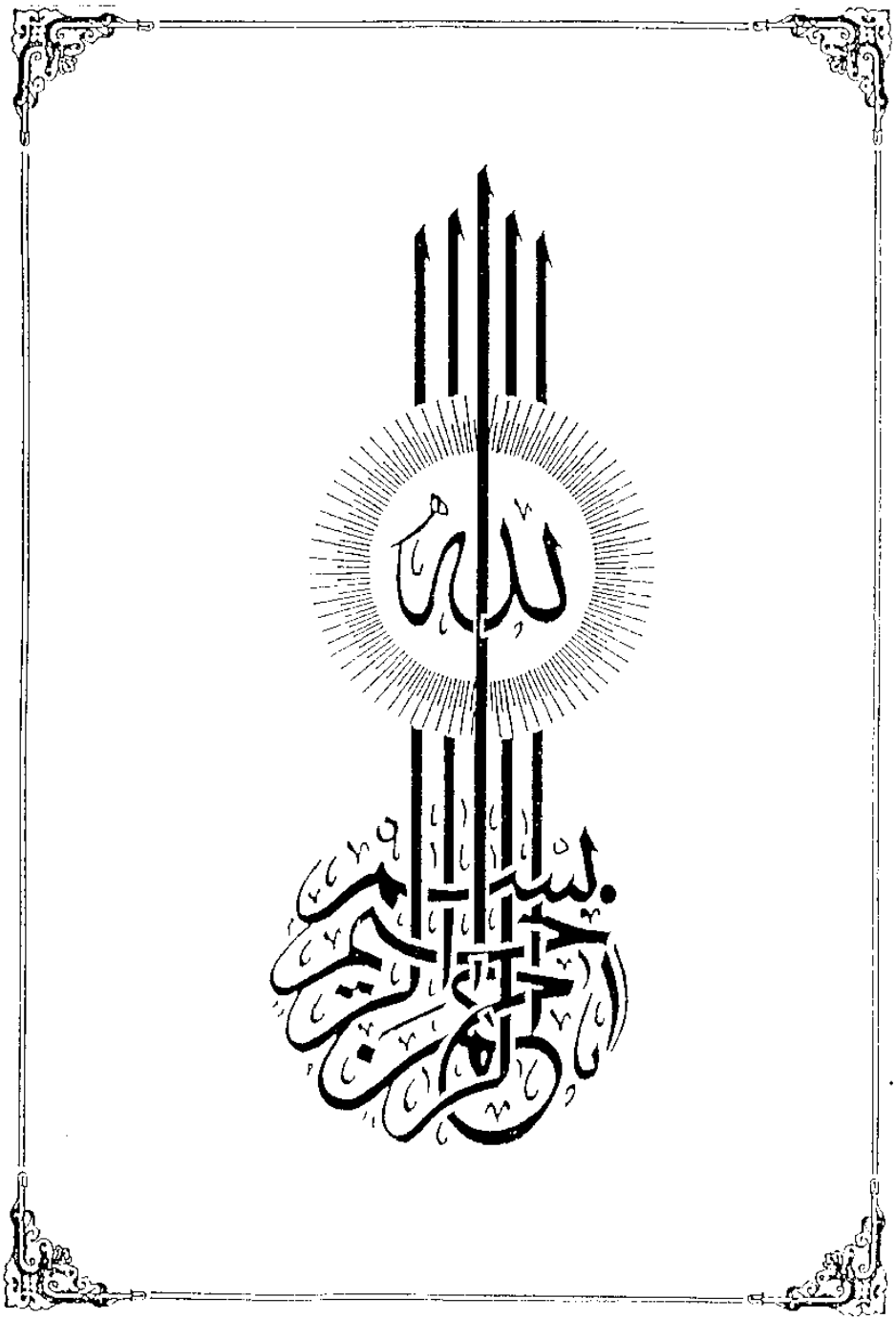

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ABSTRACT

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 expriments were conducted. The 1st 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 2nd 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_2SO_4

treated maize stover ration (IV), 2% H_2SO_4 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 importants 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_2SO_4 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_2SO_4 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 gave 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_3	= Nitric acid.
H_2SO_4	= Sulphuric acid.
ISDMD	= *In Sacco* dry matter disappearance.
IVDMD	= *In Vitro* dry matter disappearance.
IVOMD	= *In Vitro* 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_3-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.
$W^{0.75}$	= Metabolic body weight.

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