EFFECT OF SOME RUMINAL BACTERIA ON DIGESTION CHARACTERISTICS IN RUMINANTS

By

AMIRA MOHAMED ABDO ABD EL MAKSOUD
B.Sc. Agric. Sci. (Animal Production), Ain Shams University, 2012

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ABSTRACT

Amira Mohamed Abdo Abd El Maksoud: Effect of some Ruminal Bacteria on Digestion Characteristics in Ruminants. Unpublished M.Sc., Thesis, Department of Department of Animal Production,Faculty of Agriculture, Ain Shams University, 2019.

The present study was conducted, at the Department of Animal Nutrition. Animal Production Research Institute and Department of Animal Production lab, Faculty of Agriculture, Ain Shams University. To investigate the effect of treating different roughages with different ZAD concentration on its chemical composition after incubation times. Four roughages materials (sugarcane bagasse (SCB), rice straw (RS), corn stover (CS), wheat straw (WS)) were incubated for 4 different, times (1, 2, 3 and 4 weeks) and treated with 5 different concentration of probiotic ZAD (0, 0.5,1, 1.5, 2 ml) which consist of anaerobic bacteria (ruminococcus) and specific enzymes such as cellulase, hemicellulose, amylase and protease. Chemical analysis for four roughages materials were carried out to determine DM, CP, EE, CF, and Ash contents and NDF, ADF and ADL. In vitro rate technique was used in this trial to determine the rate of DM and OM disappearance of experimental rations, TGP and Ph. Also, acount of bacterial ruminococcus. The results indicate that treatments increased CP, EE, and decreased CF of all roughages used in the present study. Effect of treatments was significant and clear after 3 and 4 weeks of ensiling. SCB was the most affected roughage by treatments. In vitro study showed that SCB was the highest in total gas production (TGP). The highest DMD was observed for CS with ZAD concentration of 2 ml/ kg and after 48 hrs. of incubation. The highest bacterial count was observed with WS treated with 2 ml/kg of ZAD and incubated for 4 weeks.Therefore, It can be concluded that ZAD treatment increase CP and EE of all roughages and decrease CF content by about 27%. Also, treatments may increase percentage of DMD as indicator for digestion.

It was recommended to add ZAD probiotic with 1 ml/kg DM and incubate for four weeks to improve the utilization of the experimental roughages.

And it is needed for more studies to ensure the improvement of nutritional value of these by-product when treated with this treatment.

Key words: Roughages, probiotic ZAD, enzyme, incubation, *In vitro.*

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LIST OF ABBREVIATION

A.O.A.C.	Association of Official Analytical Chemical
ADF	Acid detergent fiber
ADIP	Acid detergent insoluble protein
ADL	Acid detergent lignin
APRI	Animal production research institute
BS	Barley straw
CF	Crude fiber
CP	Crude protein
CS	Corn stover
DG	Dry mixed grass
DM	Dry matter
DMD	Dry matter disappearance
EE	Ether extract
GE	Grosse energy
GS	Gram straw
IVDMD	*In vitro* dry matter disappearance
LS	Lentil straw
MST	Maize stover
NDF	Neutral detergent fiber
NFE	Nitrogen free extract
NSC	Non-structural carbohydrate
OMD	Organic matter disappearance
OS	Oat straw
PMST	Pearl millet stover
RS	Rice straw
SCB	Sugarcane bagasse

SST	Sorghum stover
TGP	Total gas production
TMR	Total mixed ration
VFA	Volatile fatty acid
WS	Wheat straw

INTRODUCTION

Many agricultural by-products have been used in ruminant nutrition for a long time in Egypt. Rice straw, wheat straw, corn stover and bagasse are common agricultural by products in Egypt .They are usually used to feed ruminant animals as low quality roughages because of their low nutritive value, high fiber and lignocellulose content **(Leng 1991),**they are also low in minerals, especially phosphorus, insufficient in crude protein and deficient in vitamins **(Tingshuag et al., 2002).** Several digestibility experiments and feeding trials have been conducted to study the effect of nutritive value of crop residues on digestibility **(Khattab et al., 2008, 2013 and Kholif et al., 2014).** It has been concluded that high fiber contents negatively affect voluntary intake and rate of organic matter fermentation. Feeding such residues without treatment or with treatment supplementation, can just or barely cover maintenance energy requirement.

Several methods have been suggested for improving feeding value of agricultural by-products. Ensiling of many dry crop by-products have been used with addition of microorganisms and/or enzymes after chopping, reconstitution of moisture and processing then saved in an anaerobic condition **(Nahla et al., 2014).**

Probiotics are common biological treatments used recently to enhance silage quality and improve nutritive value of ensiled by products. However concentrations used and incubation time recommended were not fully discussed and needed some further studies.

One of these probiotics that been used successfully through last few years is ZAD. It is a probiotic invented by **(Gado 1997)** and used by many other investigators such as: **(Nahla et al., 2014)** in rabbits, **(Ibrahim et al., 2017)** in ruminants and **(Gado et al. 2011, 2009).** To improve nutrient, value of agricultural by products in order to replace