CHEMICAL TREATMENT OF RICE HUSKS

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ABSTRACT

Rice husks are of low biodegradability and its voluntary intake by ruminants is poor. There are 2 types of rice husks, which are whole husks and ground husks. Whole husks is a husks from milling process and ground husks is a husks was grind in the grinding machine which are their particle size had been reduced to be less than 1mm. The main objectives of this research are to determine chemical composition, digestibility and degradability of rice husks and to identify a method of upgrading the nutritional value of rice husks as a feed for ruminants. Rice husks obtained from a commercial rice miller were treated with 4% urea or 4% sodium hydroxide solution and untreated as a control. Untreated and chemically treated of rice husks was estimated and analysed for its chemical composition and in vitro digestibility (IVD). Dry matter degradability was estimated by incubating rice husks samples in a cellulase buffer solution for 3,6,12,24,48 and 72 hours at 38^0C. Degradation characteristic were calculated from the exponential equation $p=a+b(1-e^{-ct})$. p= degradation at time at time t(hours) and a, b and c are contants (%) representing the rapidly degradable fraction, slowly degradable fraction and degradation rate of b respectively. Data were statistically analysed on a SAS (Statistical Analysis System) package.

Result showed the composition and digestibility of ground husks was approximately similar to whole husks. For ground husks after NaOH treatment, total ash (TA) was 23.2% and In Vitro Digestibility (IVD) was 48.5% but for control and urea treatments TA was 13% and IVD 16%. Differences were significant ($P<0.001$). The control and urea treatments were approximately similar in neutral detergent fiber (NDF) 80% but NaOH treatment reduced NDF to 61%. For insoluble ash (IA), control and NaOH was 6.3% but urea reduced to 3%. Difference were significant ($p<0.01$) and for crude protein (CP), control and NaOH was 2.3% but urea increased to 5.0%. For whole husks, after NaOH treatment, total ash (TA) was 21.1% and In Vitro Digestibility (IVD) was 45.7% but for control and urea treatments TA was 13% and IVD 13%. Differences were significant ($P<0.001$). The control and urea treatments were approximately similar in neutral detergent fiber (NDF) 82% but NaOH treatment reduced NDF to 63%. For insoluble ash (IA), control and NaOH was 7.6% but urea reduced to 6%. Difference were significant ($p<0.01$) and for crude protein (CP), control and NaOH was 2.3% but urea increased to 3.4%.

In cellulase degradability the potentially degradable fraction (a + b) of the NaOH treatment was significantly higher than control and urea. For ground husks the mean value of a, b and c for control was approximately similar to urea, 2.5%, 2.3% and 0.058 per hour, respectively. These parameters were increased after NaOH treatment. Whole husks the mean value of a, b and c These parameters were also increased after NaOH treatment.

This study has shown that rice husks is of poor quality without chemical treatment but that the quality of ground husks and whole husks is similar. NaOH treatment can of up-grade the nutritional value of rice husks by partial removal of

CHAPTER 1

INTRODUCTION

1.1.0 The world rice production

The world rice production outlook for 2001 leans toward production and consumption, but slower global trade. The USDA forecast global rice output to be 598 million in 2001, up from 585 million tons in 2000.This increase in paddy production will produce approximately 397.71 million tons rice. However major rice producing countries, such as Vietnam and Argentina will decrease their rice output for 2001. Hope reduction will be more than offset by the surplus of rice of Japan, South Korea and Indonesia. Despite the increase global rice output, 2001 rice trade is quite sluggish because of an oversupply of rice from major producing country, such as China and Vietnam, but low by major importing countries, particularly Indonesia, Philippines and Bangladesh due to self sufficient rice production.

Between now and 2020, 1.2 billion new rice consumer will be added in Asia. Feeding this people will require the greatest effort in the history of agriculture: rice production must be increased by one third from today's 320 million tons. Farmer will have to grow an extra 3.7 million tons every year-at the very time that rice land is decreasing and the remaining fields seem to be wearing out. By the year 2000 rice will be the chief sources of energy for about 40% of the world's people, thereby surpassing wheat. With a projected world population of more than 6 billion by the year 2000, 100 million metric tons of grain will be need to meet the demand.