FUNGI ENRICHED HOMINY CHOP AS A PROTEIN SOURCE FOR RUMINANTS

by

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ABSTRACT

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South Africa faces a shortage in conventional animal feed protein sources in the very near future. Single cell protein sources have been proven to be excellent sources of alternative protein. The division for Food Science and Technology at the CSIR (Pretoria) developed a product where energy rich sources are upgraded to protein sources through a solid substrate fermentation process with a fungus, for use in animal feed.

This study dealt with the evaluation of this product, Fungi Enriched Hominy Chop (FEHC), as a protein source for ruminants. Through the course of the study, three variations of the product were tested. FEHC (Product 1) was found to be both highly palatable (23% in a concentrate diet for sheep), and highly degradable (85.79% *in situ*; FR=0.05). The high degradability was ascribed to an extraordinary large soluble N fraction (78.17%), thought to be residual urea, from the fermentation process.

Four variations, Products 2a, 2b, 2c and 2d, were tested to quantify the effect of different inclusion levels of urea and spores in the inoculum medium on the soluble N fraction and degradability of the product. Raised levels of spores/ml inoculum medium and decreased quantity of urea added during fermentation, did not result in substantially lower degradabilities. A small improvement was observed in the insoluble, but degradable N fraction of Product 2c.

It was decided to maximize the amino acid content (AA) of the product, and to protect it against degradation to increase the AA yield of the product in the duodenum. By varying the

levels of different additives (urea, spores, $MgSO_4.H_2O$ and KH_2PO_4) in the inoculum, Product 3 was produced. The crude protein content was lower, but the percentage true protein was 34.72% higher than in Product 1. Commercially produced Product 3 yielded a product slightly lower in true protein content than the laboratory produced version.

Heat treatment was chosen as the method of protecting the true protein content of FEHC. Effectiveness of heat treatment to protect the product was evaluated through a degradability study (IIV method - Broderick, 1987) and a digestibility study (FDNB-available lysine - Booth, 1971), where the highest product of the values obtained in the two studies indicate the time-temperature combination for optimum protection. Due to a number of factors (such as necessary differences in laboratory equipment and certain sample characteristics) causing variation in the data obtained through the IIV method, no conclusive answers were obtained as to the optimum time-temperature combination. However, molecular changes such as increased %ADIN and decreased FDNB-available lysine and total AA content, indicate that heat treatment is a viable method to protect FEHC against degradation in the rumen.

The production of FEHC, as stipulated in this study, is too costly a process to allow the use of the product as a protein source for ruminants. However in the final instance, it will be factors such as the chosen production system, and availability and cost of materials, that will influence the specific nutritional characteristics of the protein fraction of the product. This in turn, will finally determine the specific niche that FEHC will fill in the spectrum of protein sources for ruminants.