Waste Converted to Useable Products

Feedlot waste has been converted into usable products in a two-step, laboratory fractionation process, USDA scientist reported this week.

Dr. James H. Sloneker, of USDA's Agricultural Research Service (ARS) described the research at a symposium on agricultural and municipal wastes of the American Chemical Society.

The studies were carried out by Dr. Sloneker, Richard W. Jones, Harold L. Griffin, Dr. Kenneth Eskins, Bernard L. Burher and Dr Geroge E. Inglett at ARS's Northern Regional Research Laboratory, Peoria, Ill.

Sloneker said the potential new products developed by ARS include:

—A feed fraction, comprising 43 percent of the waste, that compares with soybean meal in protein content and amino acid balance as determined in analyses by ARS chemists.

—A residue fraction, 50 percent of the waste, which contains fibrous material. The chemists treated this fiber with resin and pressed it into board. They used the residue also as a nutrient for a fungus that produces a fiber-digesting enzyme, then treated chicken feed with the enzyme to improve digestibility. The fungus itself is almost half protein.

—A soluable fraction, 7 percent of the waste, that was recombined with the fiber in some fungus-growing experiments.

Cattle industry waste amounts to more than a billion tons a year in the United States. In some areas, it has become a source of pollution. If undigested plant fiber can be removed from manure or made more digestible, refeeding manure might be developed as a way to reduce this source of pollution.

The ARS chemists estimate the feed fraction is worth $20 a ton more than the cost of recovery by screening and filtering. They found that filtering is the most satisfactory of four second steps tried in combination with the coarse-screening, first step. The feed-value estimate, $60 a ton, is based on a standard of $100 a ton for 49 percent protein soybean meal.

Amino acid composition of the feed fraction protein, determined by analyses rather than feeding, suggests the protein was produced by microorganisms in the animals' digestive tracts. The protein contains high levels of lysine and methionine. Microscopic examination of this protein also suggests microbial origin.

Analyses show that only 16.6 percent of the feed fraction consists of carbohydrate and low-value cellulose and lignin, but 72.6 percent of the residue fraction consists of these materials. These bulky materials require further processing if they are to have value in feed or other products.

Experimental board made from the feedlot waste fiber alone has neither the strength nor the water resistance of commercial hardboard. The fiber might be used, however, with other waste fiber and with oils to add strength and water resistance.

The chemists found that either the fibrous fraction or whole feedlot waste can serve as nutrient for growing the fungus, Trichoderma viride. This fungus uses carbohydrate, raising the protein level in the fermentation residue. It raises protein level also simply by growing because the fungal tissue contains about 47 percent of protein. This protein, however, is low in methionine, an essential amino acid.

The fungus also produces a fiber-digesting enzyme. Baby chicks eating enzyme-treated feed ate less, produced less manure but gained as much weight as chicks eating control feeds of two kinds.