



CDCC/WP/78/4

17 January 1978

SECTION 1: CREATION OF AN INSTITUTE FOR RESEARCH INTO THE USE OF SUGAR-CANE AND ITS BY-PRODUCTS FOR THE PRODUCTION OF FOOD, MEAT AND MILK, FUELS AND FERTILIZERS IN THE CARIBBEAN REGION

Submitted by the Dominican Republic Delegation to the Second Session of the CDCC, Santo Domingo, 16-22 March 1977

SECTION 2: NOTE BY CDCC SECRETARIAT ON THE PROPOSAL

10 JUL 1978



UNITED NATIONS

ECONOMIC COMMISSION FOR LATIN AMERICA Office for the Caribbean

VEHICLES

Bus

3 Jeeps/Vans

5 automobiles

DISSEMINATION EQUIPMENT

CLASSROOM AND AUDIO-VISUAL EQUIPMENT

OFFSET EQUIPMENT

SECTION 2

NOTE BY CDCC SECRETARIAT

In the past the Caribbean sub-region has been oriented towards thinking of sugar-cane as a primary source of sugar and as a secondary source of molasses and bagasse. Scarcity of cereal grains in the tropics and the belief that fast growing tropical grasses are usually of low nutritive value have been responsible for the absence of development of intensive beef and milk production. Recent research, however, indicates that sugar-cane can be used as a basis for intensive animal production systems. The two possibilities for using this crop are:

- (a) in the form of by-products from normal sugar production - the molasses and bagasse; and
- (b) by processing the entire sugar-cane without extraction of sugar.

In some Caribbean countries new approaches of separating sugar-cane into various components have been sought to utilize individual components to produce manufactured products such as board, pulp and paper, animal feeds, cane waxes, yeast, etc.

The following journals devote considerable attention to the subject matter:

- (i) Tropical Animal Production published by Consejo Estatal del Azúcar Division CEAGANA, Dominican Republic
- (ii) Cuban Journal of Agricultural Science
- (iii) ATAC: Revista Técnico Informativo - Asociación de Técnicos Azucareros de Cuba

Research continues to be undertaken by the following institutions:

1. Consejo Estatal del Azúcar
Division CEAGANA
Km 10-1/2 Carretera Mella
Santo Domingo
Dominican Republic

2. Instituto de Ciencia Animal
Apartado 24
San José de las Lajas
La Habana
Cuba
3. Grupo Técnico de Microestaciones de Pasto
Dirección General Pecuaria
La Habana
Cuba
4. El Instituto Cubano de Investigaciones de
los Derivados de la Caña de Azúcar (ICIDCA)
La Habana
Cuba
5. Caribbean Industrial Research Institute (Single Cell Protein)
University of the West Indies Campus
St. Augustine
Trinidad and Tobago
6. Canadian Cane Consultants
Newham Corner 1st Avenue and George Street
Belleville
Barbados
7. Sugar Industry Research Institute of the Sugar Industry Authority
Mandeville Post Office
Jamaica

The following Reviews and Abstracts give an indication of the work being done in this field:

1. LENS, R.A. and PRESTON, T.R., "Sugar Cane for Cattle Production: Present Constraints, Perspectives and Research Priorities".
Tropical Animal Production, 1(1): 1-26, 1976

This review article, presented at the first Annual Meeting of the Centro Dominicano de Investigación Pecuaria con Caña de Azúcar, draws together the result of some 50 recent basic and applied research conducted in Santo Domingo, Barbados, Cuba and Mexico and Costa Rica, on the feeding of sugar-cane to fatten animals and in particular the processes of digestion and metabolism on this feed.

The authors hypothesize that: "the chief constraint to animal productivity on sugar cane diets is feed intake, which in turn is limited by the supply of amino acids for protein synthesis and gluconeogenesis and of propionic acid for glucose synthesis", and suggest priority areas for research and development work with this feed. Much of this research is reported in subsequent issues of Tropical Animal Production.

The major support for the hypothesis is that whenever there has been a response to supplementation on sugar-cane feeds, whether this was with an organic material such as rice polishings or an inorganic chemical such as urea, the improvement in live-weight gain has always been associated with, and can be explained by, an increase in voluntary feed intake.

The same constraints are known to determine animal production on molasses-based diets, where very definite relationships have been found between protected protein, as a supply of amino acids, and starch as a source of glucose. On molasses-based diets, clear relationships have been established between the supply of protected protein, voluntary feed intake and live-weight gain; and between substitution of molasses by maize, giving rise to increased production of propionic acid, greater voluntary intake and increased milk production.

Lack of response to blood meal, and the big response to additional rice polishings suggest that glucose supply is the primary limitation and that amino acids are secondary. Much of the apparent requirement by the ruminant for preferred amino acids largely stems from its inability to provide sufficient glucose for tissue synthesis.

2. ALMAZAN del Olmo, Oscar and GALVEZ TAUPIER, Luis, "Sugar Cane Based Feeds for Livestock Development" Tropical Animal Production 1(1): 49-50, 1976

Abstract of a review of the Cuban situation presented at the First Annual Meeting of the Centro Dominicano de Investigación Pecuaria con Caña de Azúcar.

The products and by-products of the sugar-cane industry which can be used in cattle feeding are: whole sugar-cane, final molasses, bagacillo, bagasse, leaves and trash, cane tops and filter cake mud.

"In the use of whole sugar-cane, factors to be taken into account are: inclusion or not of the tops, the cane trash and the rind of the stalk; fineness of chopping; drying and/or pelleting of the final product. In general, most economic results will be obtained from using the whole cane in fresh form and processing by simple chopping. Final molasses is the by-product of the sugar industry most utilized in cattle feeding in Cuba. Further expansion of its use is not foreseen and in fact quantities available for cattle feeding may be reduced in the future due to the needs of molasses to make domestic alcohol and the increase in the number of factories dedicated to production of tortula yeast. More animals could be fed with molasses in Cuba only if there was an improvement in the efficiency of utilization of this product by ruminants. Experiments have

been carried out to determine the most efficient procedure for improving the digestibility of bagasse by chemical and heat treatments.... The problem with cane tops is that this part of the plant is left behind in the cane field and therefore must be collected and transported if it is to be used for animal feeding. Since this would coincide with the harvest of the cane stalk, there is obviously competition in terms of availability of labour and transport. Any solution must be based on the use of mechanized collection.... Although filter cake mud is reasonably high in crude protein (6 to 8%), it is basically a source of energy because of its fibre content and certain amount of residual sugars. The protein is thought to be of low digestibility (25%). The high content of wax is not a problem for ruminants which are able to digest up to 70% of it. The major difficulty in the utilization of filter cake mud is its high content of ash and particularly silica which has an adverse effect on palatability. In the fresh state the material is not very stable. As a result, there is a danger of spontaneous combustion if the product is not dried or ensiled before being used. It has been used at levels up to 25% in rations for dairy cows, but higher levels than this were found to be deleterious".

3. LIVERPOOL, Leslie, A Survey of the Commonwealth Caribbean Livestock Feed Industry. Port of Spain, Scope Publishing Caribbean Limited, 1975. 121p.

The study represents a statistical summary of all available data on domestic production, imports, exports and utilization of all major livestock feeds and feed ingredients used in livestock production in the 12 countries that make up the Commonwealth Caribbean. While it includes sugar-cane, molasses and bagasse, pith among the 15 ingredients surveyed, it excludes Comfith and Cane tops since these were being researched extensively by others.

Import substitution efforts have been constrained by limited availability and higher prices of feed inputs.

The implementation of scientific advances in cattle production, e.g. in areas of breeding, feeding and management and control of disease problems, has not been widely adopted in CARICOM countries. Infertility is still a serious problem. Artificial insemination services are very inadequate for most farmers needs.

The author concludes that the trend of increasing importation of feed inputs will continue unless the present structure was changed to emphasize the production of more basic feeds as a direct activity, rather than as by-products from manufacturing and processing industries.

4. LAMBIE and Company. "Canefeed Livestock Study in the Less Developed Territories of the Caribbean: A feasibility Report". Kingston, Jamaica, Lambie and Company for Caribbean Development Bank, 1975. 197p.

The Study indicates that canefeed can be commercially used for the diets of beef livestock. Market research in the territories also indicates the potential for a viable livestock industry if implemented with adequate management practices, using cane as the basal diet in intensive systems. Evaluation of all known and predictable constraints shows that it is feasible to introduce the intensive livestock production in the territories, provided the requisite expertise and commercial systems are mobilized to administer the operations.

Advantages - Expansion and upgrading of livestock population - Development of a local fodder which spans both dry and wet season with consistent quality - Saving of foreign exchange averaging EC\$4 million in the first five years. While both derinded and wholecane methods produce comparable feeding results, types of machinery differ. The basic design of the separator used in the derinded method is fairly complex and not currently in commercial production. The wholecane method was selected on the basis of being readily adaptable to immediate commercial application. It was recommended that a simultaneous experimental program be undertaken aimed directly at exploring factors related to the commercial application of the canefeed technology. The Study recommended start-up projects to be located in Belize, Nevis and St. Vincent.

The following four appendices were listed in the Report:

- (i) Appendix A: The Use of Sugarcane for Production of Beef and Milk, T.R. Preston
- (ii) Appendix B: Engineering Evaluation of Cane Separators and Cane Choppers, Derwent Engineering Consultants Ltd.
- (iii) Appendix C: Nutritional Analysis, A. Wood
- (iv) Appendix D: Agronomy Report, C. Wein

Also, a CIDA sponsored Seminar on Sugar-Cane as Livestock Feed was held in Barbados on January 30-31, 1973, to discuss some of the results of a research programme being carried out in Barbados on a process known as Sugar-Cane Separation and specifically concerned with the feeding of the separated derinded pith to livestock.

The following papers were presented:

- Preston, T.R. - Beef and Milk Production from Sugar-Cane
- Pigden, W.J. - Evaluation of COMFITH as a Commercial Livestock feed in the Caribbean
- James, J.A. - Comfith in Rations for Livestock
- Donefer, E. - Comfith as an animal feed
- Miller, R.B. - The theory and practice of sugar-cane separation
- Miller, R.B. - Some General Considerations in Application of Comfith technology to meat production systems
- Warnaars, B.C. - Growing of Sugar-Cane as an animal feed
- Henry, J.N.R. - Health Status of Birds and Animals on Comfith feeding trials
- Laurie, C.K. - Processing of Sugar-Cane for Comfith Production
- Laurie, C.K. - Meat Production: Processing and Marketing of Comfith Beef
- Mayers, J. - Consumption and Imports of Meat and Poultry

The feeding of crushed sugar-cane to animals has been attempted in the past but there have always been major problems in performance due to the tough and unpalatable rind. Through the process of separation, the rind (15%) can be removed from the highly palatable COMFITH (pith and fibres - 85%), thereby allowing the more efficient utilization of this carbohydrate source in animal feeding. COMFITH consists of 70% water and 30% dry matter. The dry matter has 92% sugar and 1.5% protein. COMFITH could therefore supply the carbohydrate requirements of livestock and can be supplemented with non-protein nitrogen (urea), protein, vitamins and minerals. Because of the low protein content, the feed being produced with Comfith could be accurately tailor-made to the requirements of the animals by the addition of the right kind and amount of supplemental protein. In this way, the protein to energy ration of the final feed could be fairly well controlled and so prevent wastage of either calories or protein. In terms of overall costs, because so much carbohydrate has to be used in relation to the rest, the total cost of the carbohydrate component far exceeds the costs of the protein or supplements. It is therefore necessary in the Caribbean to look

at substitution of imported carbohydrate which takes the form mainly of corn. In addition, sugar-cane is the most efficient living converter of solar energy into chemical energy. It is this solar energy locked in the carbohydrates as chemical energy which animals utilize and which is the source of all energy for all animals.

