AL26A- Livestock Products Technology

MODULE 1: UNIT #1

1.0 Background and Rationale

1.1 Livestock Production Systems in the Caribbean

1.1.1 An Overview of Livestock Production in the CARICOM Region

In the Caribbean swine and poultry production have become very well developed over the last 20 years. On the other hand, the production of ruminants and ruminants' products remain underdeveloped. It is also to be noted that CARICOM countries and most tropical developing countries are net importers of food and products of animal origin. Fish and fish products are also imported despite the abundance of fish life in the Caribbean marine environment. The animal products of major nutritional importance to mankind are : milk (from dairy cattle, buffaloes, goats and sheep); eggs (from the modern breeds of poultry); fish and seafood (mainly as sources of protein which are harvested from the sea) and animal fat (from poultry, pork and beef).

Ruminants offer a good possibility for expansion of the food production efforts, but this subsector's low state of development particularly in the Caribbean [with the exception of Jamaica] , has been partially attributed to:
a) the sub-sector's inability to compete with the developed countries' commercial forces,
b) changes in technology and
c) a lack of improved managerial abilities (both within the commercial sector and the Governments' decision making infrastructure).

There is a lack of development on the part of the ruminant livestock sub-sector in CARICOM, with costly foreign exchange implications which seriously threatens the region's food security. The total cost of the imports of all animal products and the inputs for local animal production, continues to constitute more than 50% of the regions' more than **1 billion US$ annual food import bill.** This food is required for the feeding the region's 5 to 6 million people (CARICOM). The apparent lack of development of the

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region's livestock sub-sector possibly lies in the fact that the Caribbean Community has a common history of **the production of crops for export with corresponding importation to satisfy food requirements.** Until the last few decades, most of the agricultural research efforts were directed towards the production of these traditional export crops. Consistent efforts leading to the successful development of a major livestock production industry has not been applied, excepting the case of Jamaica.

Earnings from the export of crops and recently from the Tourism and Mineral Extraction Industries have been used to finance the **food imports**. Present economic conditions and those which existed over the last decade have now demanded that this situation be changed. In this setting, **RUMINANT PRODUCTION** is to be encouraged since:

1) there has been a tradition of low input in small ruminant (sheep and goat) production;
2) ruminants can utilise crop residues and other fibrous products which man cannot digest; and
3) imported ruminant products are a major foreign exchange user.

1.1.2 Importance of ruminants to our economies and to mankind

This importance can be highlighted as follows:

- ruminants convert Fibre and Structural Carbohydrates, indigestible by man and monogastrics, into food and useful animal products;
- these they produce from crop residues and from waste of uncropped areas;
- they convert agro-industrial by-products which are normally considered wastes into food or useful animal products;
- they are able to convert inorganic N [in the form of non-protein-nitrogen **(NPN)**] into animal protein;
- ruminant animal waste can be used
  i. as a source of fuel or energy e.g. dried manure or for the generation of biogas; and
  ii. as a source of organic fertilizer for food crop production;
- they provide draft, transportation or power.

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1.1.3. Non-Ruminant Livestock Production

In general non-ruminants do not digest fibre to the same extent as do ruminants. Therefore, theoretically, they compete with humans for food. In the Caribbean swine and poultry production industries have become very well developed over the last 20 years. Rabbit production on the other hand, is still relegated to the status of being a backyard hobby, and fish are simply harvested from the sea with few direct efforts at inland fish production (Trinidad, Guyana, Puerto Rico and Jamaica). The production and processing of Poultry and Pork products make an important contribution to the protein needs of the region, though this is mostly achieved by the importation of eggs for the production of broilers and grain and feed additives for the blending of formulated animal feeds. This has great demand for foreign exchange.

The Poultry Industry

The poultry industry is characterized by its high degree of Vertical Integration as follows:
1.Grain Terminal to store the imported feeds -> 2.Feed Miller-> 3. Feed Distributor -> 4. Egg Importer/Hatchery-> 5. Contract Processor -> 6. Contract Farmers-> 7. Fast Food Outlets; Pluck Shops and Supermarket Chains.

In Trinidad there has been the recent development of a Broiler-Breeder operation (**The National Poultry Company which has been recently privatized)** however this has been done through the initiative of the state. This would negate the need to import the eggs for hatching into broilers. **This operation is, however, <u>that</u> aspect of poultry production which is the most risky and the least profitable, but which requires the highest standards of animal and enterprise management.** In Trinidad and Tobago as within the rest of CARICOM poultry is seldom processed into products other than those for immediate meat consumption.

The Pig Industry

This industry is characterized by **some degree of vertical integration** but not as much as that which exists for the poultry industry. Some large

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production units are owned and operated by people with major interests in processing facilities. The situation can be described as follows:

1. Large Farms-> Processing Facilities;
2. Large Farms -> Wholesale hogs to the most convenient buyers;
3. Small Farms-> Sell mainly to the fresh meat market;
4. Back yard producer-> Produces for the fresh meat trade, for special events and for extra income.

The Rabbit Industry

The Department of Livestock Science of the UWI, and The Ministry of Food Production have embarked on the development of units for Rabbit rearing. There is a small rabbit unit at the University Field Station and some small rabbit units exist throughout Trinidad and Tobago. However this industry is still in its embryonic stages. The 4H movement has also been active in promoting rabbit rearing in. In the French speaking Caribbean (Martinique and Guadeloupe), rabbit rearing is much more developed, to the extent where rabbit meat can be purchased at supermarkets year-round, and rabbit dishes are served at restaurants.

The Fish Industry

In almost all of the CARICOM and the other Caribbean countries, the fish industry is made up of many small fishermen who own and operate one or a few small boats, and who operate alongside large fleet owners. These fleet owners are either within the private or the public sector. The most striking feature of this livestock industry however is that it is based on **chance** harvesting from the sea with limited processing. A high degree of wastage is therefore present and almost no efforts are made at monitoring the natural fish populations, or at attempting to sustain existing populations. Yet fish has been, and continues to be, one of the major sources of animal protein in our diets.

1.1.4. The linkage between the production of food from livestock and crop

Figure 1 demonstrates how crop production for food is linked to livestock production for food. It demonstrates further that there is more to this linkage than meets the eye.

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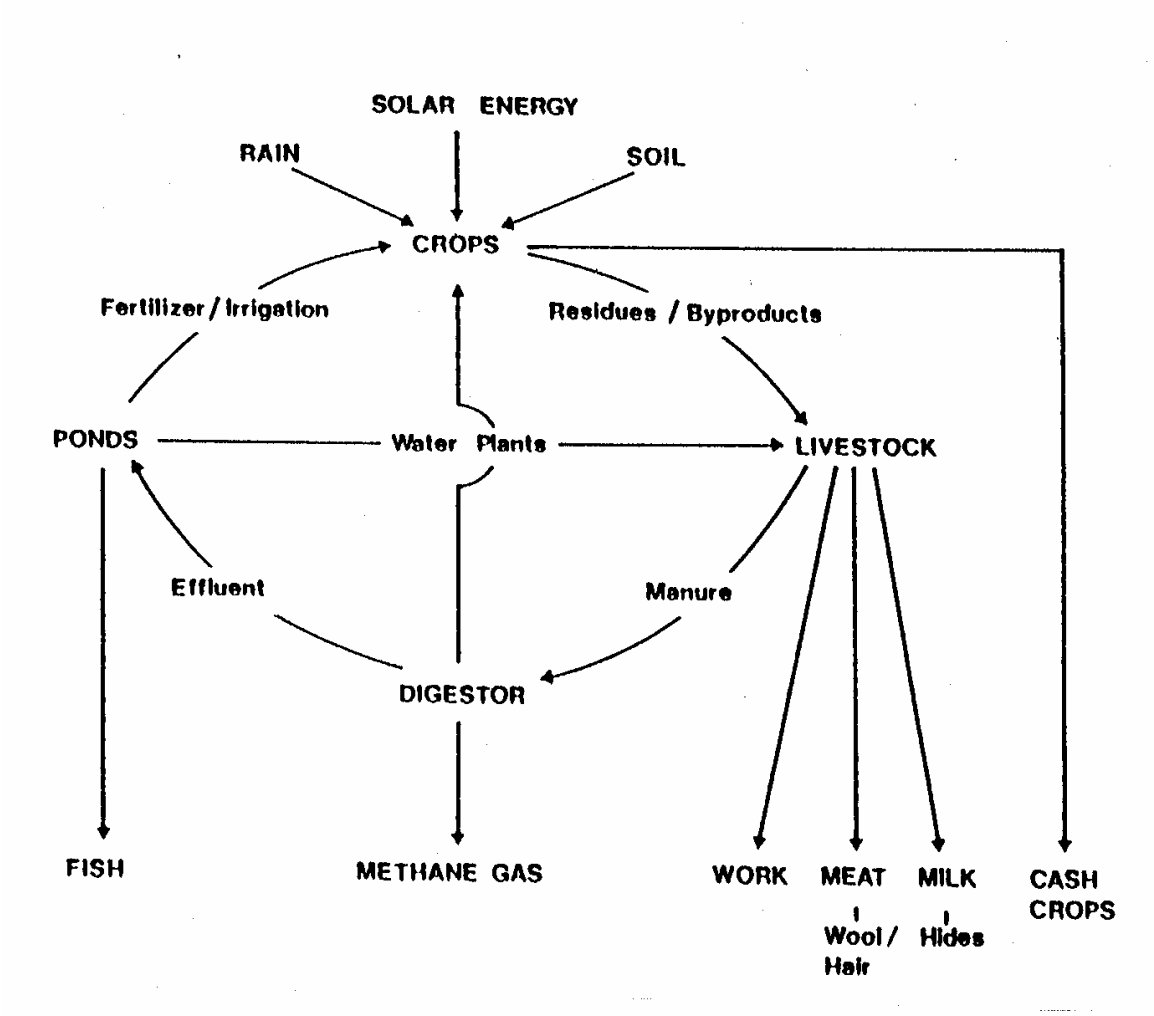

Figure 1: Flow Diagram for Integrated Farming Systems

1.1.5. Factors Affecting Livestock Production

The factors affecting livestock production are enumerated as follows:

1. **Genetic**
2. **Health**
3. **Nutrition**
4. **Environment**
    - Climatic Factors
        - Humidity
        - Temperature
        - Light

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Wind
Rainfall
Soil Factors
Chemical Composition, pH, OM, etc.
Moisture Extremes
Altitude
Topography

5. Economics and Marketing

Cost and availability of Land
Cost of animal inputs
Cost of non animal inputs
Market price of the Products Produced

1.1.6. Types of Livestock Production Systems

The types of livestock production systems can be generally classified as being Extensive, Intensive and Semi-Intensive.

Extensive Systems:

A. Subsistence or Semi- Subsistence
- -Pastoralism
- -Crop agriculture with extensive cattle or sheep production
- -Fishing: the harvesting of fish from the sea

B. Commercial
- -Ranching of Cattle, Sheep, Goats

The Extensive systems are characterized by the use of vast expanses of land or sea (as in the case of marine fishing), which must be easily and cheaply available; a low animal to land ratio; low levels of technical and managerial inputs; minimum cash outlays, which may be used only to procure harvesting facilities and equipment; minimum labour demands; and a product output and product quality which may be variable.

Intensive Systems:

A. Commercial
- Rotational Dairy and Beef Cattle - forage crop production
- Integrated Dairy and Beef Cattle- perennial crop production
- Modern sector Dairy and Beef Cattle production

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Modern sector Poultry and Pig Production
Inland Aquaculture Production

The Intensive systems are characterized by: the use of relatively limited amounts of well-developed land, which must be well supplied with potable water and electrical power; a high animal to land ratio; high levels of technical and managerial inputs; high levels of cash outlays; exacting labour demands; and a product output and quality which must be well-defined to suit specific and high volume markets.

Semi- Intensive Systems:

A. Semi-Subsistence or Semi- Commercial

Sedentary crop agriculture with cattle or ruminant production

These systems lie between the two extremes defined above.

Land Less Farming Systems:

This system is characterized by "Farmers" having no land or title to land, but still having large numbers of ruminants [both large and small]. The contain the animals during the night in their backyards or enclosures, then during the day they allow the animals to graze on marginal, communal or roadside lands. They also practice cut and carry zero grazing systems with the animals housed in their backyards.

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MODULE 1:UNIT #2

2.0 Features of the Tropics Influencing Livestock Products and Products of Animal Origin

2.1 The Tropics Defined:

- that area of the world between the Tropic of Cancer and the Tropic of Capricorn.

2.2 The Diversity of the Tropical Environment:

The tropical environment is very diverse, as reflected by the six major climatic groups enumerated below:

- Humid Tropics
- High Altitude Tropics
- Monsoon Tropics
- Wet and Dry Tropics
- Arid Tropics
- Semi-Arid Tropics

The Caribbean lies basically in the Wet and Dry Tropics generally characterized by six rainy months and six dry months. However, pockets of the Humid Tropics and Semi- Arid Tropics exists. Guyana, North East Trinidad, Central Guadeloupe, Central Puerto Rico, and the Blue Mountains of Jamaica represent areas of the humid tropics. Antigua and Nevis represent areas of the Semi-Arid Tropics.

2.3 Climatic factors of prime importance to agriculture and animal production in the Tropics:

- Temperature:
    - Annual range
    - Daily range
- Rainfall
    - Monthly distribution
    - Annual distribution
    - Intensity of Rainfall

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2.4 Physical factors of prime importance to agriculture and animal production in the Tropics:

- Distance from the sea
- Direction of prevailing winds
- Altitude
- Soil parent material
- Nature of the sub-soil

2.5 Some socio-economic considerations of relevance to the Tropics:

1) Duality of production:
   crop vs livestock with the production of large and small ruminants being the least organized generally large highly capitalized farms vs small undercapitalized farms;

2) Some degree of infrastructure development:

3) Production tends to be traditional;

4) Limited product and animal grading and the absence of widespread structured livestock marketing systems:
   -marketing and grading systems for ruminants and ruminant products are not well developed and generally the ruminant and livestock producers are price takers;

5) Equipment and inputs are high priced, and are usually imported;

6) Limited livestock processing exists except for the poultry and swine sectors;

7) Low per capita levels of consumption of livestock products:
   -where the levels are high it is usually as a result of high imports;

8) Religious taboos:
   - these affect the consumption of livestock products from one place to another and from product to product;

9) Plantation Economies:

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- tropical countries generally show low levels of widespread development with the economies being PLANTATION MODEL ECONOMIES (Best-Beckford Model)
- the NEW WORLD ECONOMIC ORDER and the OPENING UP of WORLD ECONOMIES are threatening further to exacerbate the low productivity and competitive state of the Tropical Third World Economies.

QUESTIONS FOR THOUGHT

What is a Plantation Type Tropical economy?
Does the nature of the Tropical environment predispose Tropical Countries to under-development?

RECOMMENDED READING

1. Pagot, J. (1992): Animal Production in the Tropics Mac Millan CTA, Mac Millan Press Ltd., London and Basingstoke.

Chapter 2: Climate and the Fundamentals of the Tropical climate
pp 32-68
Chapter 3: Animal production and Climate
pp 69-97

2.6 Animal Production in the Tropics: Status and Horizons

The Role of Animal Production in the Tropics

To be discussed in class.

World Trade in Animal Products

To be discussed in class

The Components of the Animal Industry in The Developed World, Temperate, Sub Tropics and Tropics
- Temperatures
- Sub Tropics
- Tropics- Tropical Australia- Queensland

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QUESTIONS FOR THOUGHT

Why is ruminant animal productivity low in the Tropics?
What is the major resource of the Tropics which would favour Ruminant animal production and Why?

RECOMMENDED READING

1. Pagot, J. (1992): Animal Production in the Tropics Mac Millan CTA, Mac Millan Press Ltd., London and Basingstoke. Chapter 1: The role of Tropical Animal Production in the World, pp 1-25

2. ANON (1993): Proceedings of a Workshop on " OPPORTUNITIES AND CONSTRAINTS FOR THE DEVELOPMENT OF A SUSTAINABLE SMALL RUMINANT SUB-SECTOR IN THE CARIBBEAN REGION" 15-17 September, 1992, Barbados, CARDI, CIDA and Ministry of Agriculture Food and Fisheries, Barbados. 34 papers , 305 pages.

3. ANON (1983): FEEDINGS OF ANIMALS IN THE CARIBBEAN. Proceedings of a Workshop sponsored jointly by CARDI and The SFC, 11-16 April, 1983, St Augustine, Trinidad and Tobago; Editors F. Neckles, W. Cateau and D. Walmsley. 228 pages.

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2.7 - Features of Tropical Livestock Commodities

To be discussed in class.

The three main features of the Tropics that Affects the Stability and Wholesomeness of Livestock Commodities are:

- **High Temperatures**
- **High Humidities**
- **An abundance of Fungal and Bacterial Spores within the environments**

Land animals

Commodity	Features	Notes

Aquatic animals

Commodity	Features	Notes

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MODULE 1: UNIT #3

Factors affecting the Demand and Use for Tropical Livestock Commodities

Generally the factors affecting the quantity demanded of a commodity are:

1. Price
2. Household's income
3. Price of other commodities
   - particularly the price and form of the product substitutes
4. Household's tastes
   - affected by religion
   - affected by social taboos other than religion
   - lack of product knowledge
5. Size of the population or market {and the composition of the households}
6. Distribution of income amongst the households
7. Availability of the product in the market-place
   - the presence of the product in the market in a particular form, could stimulate demand
8. Season or time of the year: this can be related back to the household's tastes
   - Little meat sold during Lent and during the month of Rammadan
   - Lots of live animals sold in the weeks prior to Bacra Eid
   - Demand for fish increases during Lent
   - Demand for turkeys increases just before Christmas

Reference:

Lipsey, R. G. (19): an introduction to POSITIVE ECONOMICS ELBS, Longman, UK. Chapter 7, Fourth edition.

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