Constraints to the Promotion of Integrated Farming Systems in Small Island States

F. A. Neckles
Sugarcane Feeds Centre, Trinidad, West Indies

Abstract
Over the last 50 years when agricultural modernisation was attempted, farmers were encouraged to forsake mixed farming for monoculture systems aimed at achieving high technical efficiency and with the expectation of increased income. In the highly "monetised" though small economies of the islands, this was taken as being a valid approach for agricultural development. Integrated farming, the traditional agriculture of both larger and smaller farmers, was not encouraged.

The new systems resulted in increased production and improved quality of product. Being based on imported feed, the devaluations which occurred in the value of local currencies, with consequent increase in prices of imported inputs, have resulted in higher costs to the producer and ultimately higher prices to the consumer. The options seemingly available have been to seek high technical efficiency of production, seek alternative feed inputs from local sources, or to get out of production.

Some smaller farmers are increasingly dependent on production methods based on a mixture of new and traditional practices. These include utilising local natural feeds, recycling waste, integrating their livestock with cropping activities, limited aquaculture production, etc. The technical parameters are not as high, but the economic returns are satisfactory and the systems are apparently more sustainable. The more "commercial", medium-sized farmers are attempting to purchase only essential inputs, while growing and utilising what they can create or obtain as feed from their holdings.

The climate is such that some islands experience relatively low rainfall, 1,100 mm in Antigua and Barbuda with drier year-round conditions, while some at the other extreme have levels as high as three times this. This influences the growth, availability and quality of the forages, products and by-products useful for feeding. But these are problems that could be solved technically.

The limit of land availability dictates that integrated, intensive methods of production with recycling of effluent to soils, most of which have been heavily exploited, eroded and denuded from centuries of commercial export agriculture, must be preferred. Systems will have to be based on the economic and social environment in which agriculture operates. This presentation hopefully raises some of the issues beyond those that are only technical.

KEY WORDS: Integrated Farming System, island, Caribbean, modernisation, extension, imported feed, local feed, feeding system, sustainability

Introduction

Over the centuries, agriculture in the small island states of the Caribbean has been dominated by export crops such as cocoa, cotton, coconut, coffee, citrus, bananas, nutmeg, etc. Up to the middle of this century, "agriculture" was therefore taken to mean "export crop" agriculture. Crops such as bananas and sugar are still very important at the present time in specific countries. Bananas are important in Dominica, Jamaica, St. Vincent, St. Lucia and Grenada; sugarcane in Barbados, Jamaica, St. Kitts and Trinidad; cocoa and nutmeg in Grenada; coconuts in Dominica, Jamaica, St. Lucia, and Trinidad; and, citrus in Dominica, Jamaica and Trinidad.

While these commodities were exported, the territories imported much of their food needs. Yet food was produced for local consumption. There was dichotomy in agriculture as mainly small farmers, landless peasants and estate workers were engaged in such production. Food crops were allowed on the estates as long as they did not interfere with or reduce resources allocated to the "main" crops. Production of local food was not

given recognition in terms of statistics on agriculture, so that it would have been difficult to assess levels of poultry or eggs, mutton or root crop production. There were however integrated systems of production, crops with animals as shown below:

(i) Prior to the widespread use of inorganic fertilizers, inter-planted crops of cocoa, nutmeg, citrus and bananas were fertilised mainly with manure from pens of zero-grazed cattle. Animals were tied to stakes in the fields and fed legumes such Leucaena, Glyricidia, Spondias spp., and grasses such as Brachiaria mutica, Pennisetum spp. and guinea grass, and crop or agro-processing wastes. The organic matter, after a period of curing, was used on the crops.

(ii) Sugarcane cultivation was carried out on both estates and small farms with animals - water buffalo, zebu or creole cattle - providing traction/haulage and also, manure, meat and milk. Animals utilised molasses, cane tops, grasses and legumes as the main feeds.

(iii) Coconut plantations had either estate or worker/peasant- owned cattle, small ruminants and pigs tethered between the trees. These controlled the under-storey vegetation at low cost, allowing a more complete harvest of fallen nuts. On larger estates, herds of cattle were (and are still) kept. Often, the importance of the coconuts was diminished as trees aged, with little replanting or maintenance. This has been due to competition from soya bean oil with the coconut oil. Soya bean is imported and processed in the region.

(iv) The small landholder, squatter or landless peasant practised mixed farming on small holdings, growing mixtures of fruit trees, annual plants, vegetables, etc., and rearing free-range poultry for eggs and meat, and tethered pigs, sheep, goats or cattle on roadsides or open lands. Pigs were also fed mainly on household wastes, sometimes collected from neighbours or institutions.

This general situation of integrated farming practices has been mainly reversed and there are at least three aspects to this:

- the search for modernisation of agriculture;
- pressures of the wider economy on agriculture and resource use; and
- the failure to recognise and deal with agriculture for local consumption.

Modernisation of Agriculture

The plans of the larger Caribbean states in the 1960's were to encourage economic development with modernisation and industrialisation of agriculture. These involved "improved technology". There were some influential factors:

(a) Being situated close to North America and its agriculture with yields based on high levels of technology, equipment, pesticides, irrigation, etc., this model was adopted.

(b) Even though the islands had limited land with small and fragmented agricultural holdings, "economies of scale" parameters were promoted. Poultry, pigs, milk and, to a lesser extent, beef production were encouraged as monoculture operations. (State assisted farms were forbidden to engage in any secondary enterprises).

Imported feed ingredients - corn and soya bean meal - were fed to imported, ill-adapted breeds of cattle. Backyard poultry and pigs were deemed unacceptable. The new feeding systems ignored traditional mixed crops/livestock farming.

(d) The replacement of animals with tractor power started in the 1950's and spread to even the smaller farmers. Today, livestock production by the sugar companies is separated almost entirely from the cultivation of the crop.

(e) "Modern" agricultural education reinforced the above developments. Technical efficiency became the goal with efficiency of general resource use and sustainability ignored. Monoculture economic models of production were promoted and accepted.

Pressures of the National Economy

A national economy is made up of several sectors with agriculture being one and livestock production as a sub-sector of agriculture. The other sectors heavily influence agriculture from many points of view such as return on investment, labour status, alternative land and resource use (opportunity cost), etc. In all these, agriculture comes out second best. Labour is attracted to public works, light industry, hotels and tourism, and the service sector, i.e. to virtually any non-agricultural activity.

This either leaves land idle or it makes the farmer a part timer with crop production abandoned and animals kept on systems such as "uncontrolled grazing". Animals are let out in the morning to forage where they wish and return to the owner's holding in the late afternoon to be secured. Milk production is no longer promoted (too time-consuming) and there is only occasional slaughter and sale of meat. Manure use declines. There may be some element of forage harvesting by the owner of the animals for night feeding or, especially in the dry season, on his way home from work.

In the drier areas of the islands and particularly on the coast, the "natural" land for livestock is being diverted into housing, hotels and related facilities (golf courses, etc.). The value of land earmarked for such purposes far exceeds its value for agriculture, so more and more land is lost in the absence of land utilisation plans or laws or, where they may exist, enforcement.

Dealing with Local Consumption

It has been noted that production for local use, with the notable exception in recent decades of vegetables and root crops, has been largely ignored and under reported. That was the case for meat and milk but change has come about with the attempted modernisation in pig, poultry and dairy farming. Even in these cases, the official statistics still ignore production that does not officially enter into processing. For example, Trinidad and Tobago milk production statistics are generally given as the milk intake of the single large milk processor. Yet this is variously estimated to be 1/2 to 2/3 of actual national production.

Feed Production, Cost and Feeding Systems

Feed manufacturing developed rapidly in response to the livestock development thrust. Most mills had working relations with or parent companies in the USA or Canada. In Trinidad and Tobago, there were as many as 15 mills by 1980. Initially, feed provided to the farmer was heavily subsidised by the national government to encourage farm production and "development". Subsidies were removed and, with successive devaluations of local currency and increase in international

commodity prices, the quantity of feed manufactured there has declined markedly. Between 1985 and 1994, prices of dairy, pig and poultry feed to the farmer have doubled, tripled and doubled, respectively (Table 1). Manufactured feed use has likewise decreased. The efficiency of feed use has increased on the fewer, larger, more capital-intensive units that remain in production. The other farm units, mainly the middle-sized pig units, small poultry units and dairy large units, have dropped out of production. Some information on these trends is provided below.

Table 1 :Production of dairy, pig and poultry feed in Trinidad and Tobago ('000 tonnes) and unit cost per 45 kg bag ($TT) 1985 to 1994

FEED	DAIRY		PIG		POULTRY	
YEAR	Tonnage	Cost	Tonnage	Cost	Tonnage	Cost
1985	48.8	25.6	27.6	27.2	168.3	37.8
1988	28.3	28.9	23.8	34.9	148.5	43.8
1991	18.9	37.1	20.4	49.1	139.3	58.0
1994	10.2	50.7	5.7	72.4	107.6	81.6

Source: CSO

Dairy:

Annual production of milk as reflected by sales to the major processor has been approximately 10 million litres annually between 1985 to 1994, in spite of increasing feed prices. Increasingly this milk is attributed to production from smaller, mixed farms using more forage and by-products with little manufactured feed.

The bigger producers, with over 100 head, went out of production by the early 1980's. Even the 266 specialised 10- hectare pasture grazing units are now either more integrated farms, with mixed cultivation, or a few are very specialised but high cost producers, or the farms are out of production altogether. The smaller, integrated, zero-grazing farms with cross-bred stock (some are probably ill-advisedly upgrading their cattle with North American semen) are now producing more milk than the 10 hectare units.

A look at two dairy farms known to the author reveals the following:

FARM RESOURCE	FARM A	FARM B
1. Size (ha)	10	10
2. Grasses	Improved + off-farm cut grass	Partially improved, no cut grass
3. Water Resources	No pond	Pond
4. No of milk cows (yield-litres)	30 (15 - 18)	25 (10 - 13)
5. Other Products:		
a)	Heifers/bulls	Heifers/bulls
b)	-	Fish (Cascadura)
c)	-	Pumpkin/Melons
d)	-	Pigs
e)	-	Ducks
f)	-	Common fowl/eggs: (home use or sold)
g)	-	Manure (sold)
h)	-	Dahee
I)	-	Fruit (home use)

RESULTS FARM A	RESULTS FARM B
a) Higher milk income	a) Mixed income
b) Higher cash outflow for feed, medication, etc.	b) Lower milk income
c) More "dependence", lower sustainability	c) Lower cash outflow
	d) Smoother cash inflow
	e) More sustainable

Pigs:

Pig sales increased from 50,000 head to 79,000 head between 1988 and 1989, but returned to the former level by 1993 (CSO, 1994). While, in mid-1988, a total of 17,000 pigs were on farms of 21 to 500 head, by 1994 the number in this size range was 5,263. Farms with less than 20

and more than 500 head increased their population, indicative of the dichotomy in the industry. The smaller farms use less purchased feed, the larger are vertically integrated. The few large units have integrated feed manufacture, pig production, processing and marketing (and export) for high technical efficiency. Small pig farmers have reverted to farm by-products, household waste, waste from agro-industrial processing, forages, offal from poultry slaughter, etc.

Broilers:
The broiler production statistics are also of interest. Table 2 shows that, while total liveweight production of chicken has remained steady, the percentage produced by "contract farmers" who are part of the integrated feed miller/hatchery/ producer/processor/sales complex, as compared to that of "independent" non-contract farmers, rose from 55.5 to 89.3% between 1988 and 1994. Efficiency of feed use and marketing of products are important factors in this development. The small, independent poultry producers with integrated farm operation and limited use of manufactured feed (but using forages, waste grains, etc.) is making a come-back (with some free range production).

Table 2: Broiler production in Trinidad and Tobago by contract and non-contract farmers 1988 to 1994 ('000 tonnes).

Year	Total	Contract farms	Non-contract	Contract % of total
1988	25.6	14.2	11.4	55.5
1990	28.5	18.0	10.5	63.2
1992	24.3	19.6	4.7	81.4
1994	26.3	23.5	2.8	89.3

Source: CSO 1994

These indications are still not readily accepted by "officialdom" for reasons given in earlier sections. There is admittedly more recent interest in integrated farming and its validity is gradually being accepted and recognised by traditionally trained economists.

The Problem

The Caribbean region should be seeking to improve its agriculture and particularly its livestock production. A few reasons include:

- the need to provide for some measure of "food security";
- the need to use the resources of soils, climate, etc. to provide employment and economic activity;
- the need to increase inland fish production, given the water resources available and static world fish output and that the rapidly developing sub-sectors of the economy (e.g. tourism) are not only fragile but can ultimately be self-destructive if not carefully handled and also dramatically increase food importation;
- with the new world trade situation of reduced farm and export subsidies, the cost of imported food (and feed) is rising; and
- developed, "modern" agriculture is not necessarily energy-efficient agriculture.

With all the modernisation Trinidad & Tobago imports approximately TT$ 1.5 billion worth of food ($1US = $6TT) for a population of 1.2 million persons. In islands with "well-developed" tourist industries, the situation is even more dramatic.

Grenada, with less than 100,000 total population but tourist arrivals of over 200,000 persons, imported EC$ 21 million ($1US = $2.70 EC) of milk products in 1995. For Trinidad and Tobago, a development economist has noted that the index of food imported (1973 = 100) rose to over 470 by 1983 and in 1990 was 247 (Ifill, 1993). Food imports as a percentage of total imports rose from 10.3% in 1973 to 20.4% in 1990.

The macro-economic policy of devaluation and later the open liberalised economy are appearing not to work for the development of agriculture. In fact the liberalised agricultural regime is expected to have negative output and reduced employment implications. Countries of the region are, however, committed to such policies.

References

Central Statistical Office (CSO) (1994) Quarterly Agricultural Reports, Government of Trinidad and Tobago.

Ifill, M. (1993): "How the country got on the devaluation ladder and why we are likely to stay there"