

THE FEASIBILITY OF DAIRYING IN THE
NIGER DELTA AREA OF NIGERIA

By

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Scope and Method of Study: Prompted by an apparent lack of incentive on the part of federal and state governments involved in agricultural development in this densely populated area of Nigeria, the author attempted to explore all constraints that limit dairying in the humid tropics as a basis for recommending such procedures necessary for a viable dairy industry in the area. This study was confined to an extensive review of related literature, and a personal interview with a senior lecturer at the University of Ife. The author also drew on his personal experience of seven years of working as a meat inspector in the Rivers State Ministry of Agriculture.

Findings and Conclusions: It was found that the absence of dairying in this area is the result of varying degrees of influence from climatic conditions, moisture control and soil stability, land resources, predators and pests, technological adaptation, economic infrastructure, installation of dairy processing plants, livestock importation, nutrition, and the experts we consult on these subjects. This led to the conclusion that efforts must be intensified to bring research results from the colleges and universities to the farmers in rural areas by providing a better agricultural extension service, if government efforts to improve agricultural production have to succeed. Therefore, a greater involvement and participation in dairying by governments, rural cooperatives, institutions of higher learning, the oil companies, and businesses that operate in the Niger Delta was recommended, including the investment of revenue from oil in the development of resources needed for dairy production in the area.

ADVISER'S APPROVAL




STATEMENT OF DEDICATION

. . . of the cry of the suckling babe,
echoing on the wings of the four winds
in the middle of a very dark night,
he said,
'its mother's breast is gone dry,
her milk is sour--too bitter for the child.'
. . . to us young men,
listening to tales of battles lost,
of eagles' wings dripping with the dew of the morn,
to us he said;
'go get me a gourd-full of the cow's milk.'
'For who?' we asked, 'for the weeping child?'
'No,' he replied; 'for me.'
Then he laughed, the laughter of time
about to pass away; it hung with a chill in the air.
'Children,' he said afterwards,
'the cow, she is the only fool left in this world.
'She feeds on the stubble of the barnyard,
that's what I feed her; yet she passes more milk
than her children can drink.'

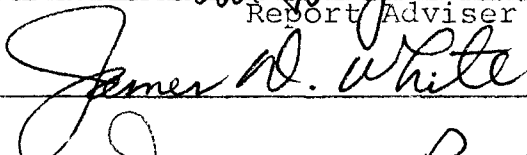
--Anonymous verse
from a language not
written in books.

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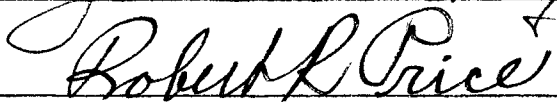
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CHAPTER I

INTRODUCTION

The Niger Delta area of Nigeria is located between 5 - 7.5°C and 4.5' - 4.4°N, and it consists mostly of heavily wooded forests along the banks of the tributaries of the river Niger, as it flows into the Atlantic Ocean (see Figures 1 and 2). Temperature in the area ranges from a low of 60°F during the dry and windy harmattan season in December to March, to a high of 90°F on very hot days. However, the major feature of climatic inconvenience is the relatively high humidity of 80°RH all the year round. There are two distinct seasonal changes, the dry season beginning in late October which may sometimes result in poor crop harvest if the duration of the northeast winds that blow in dry air from across the Sahara desert is prolonged. Likewise, occasional floods may result from intense rains which fall during early April until October, when the prevailing wind is the Southwesterly from the Atlantic Ocean.

The Niger Delta covers an area of about 65,000 square miles and extends into the western part of the Cross River State, Southern Imo, Southeastern Bendel State, and all of the Rivers States, and reliable estimates of population in

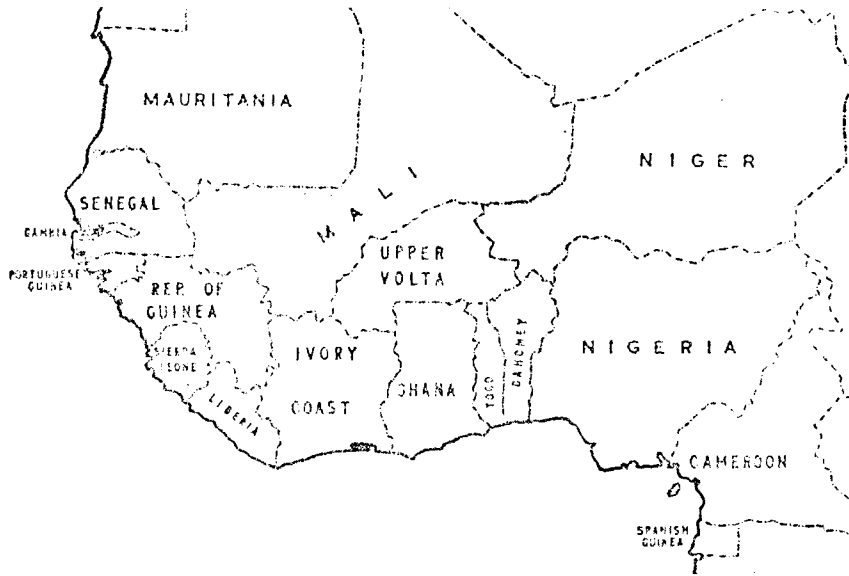


Figure 1. Map of West Africa

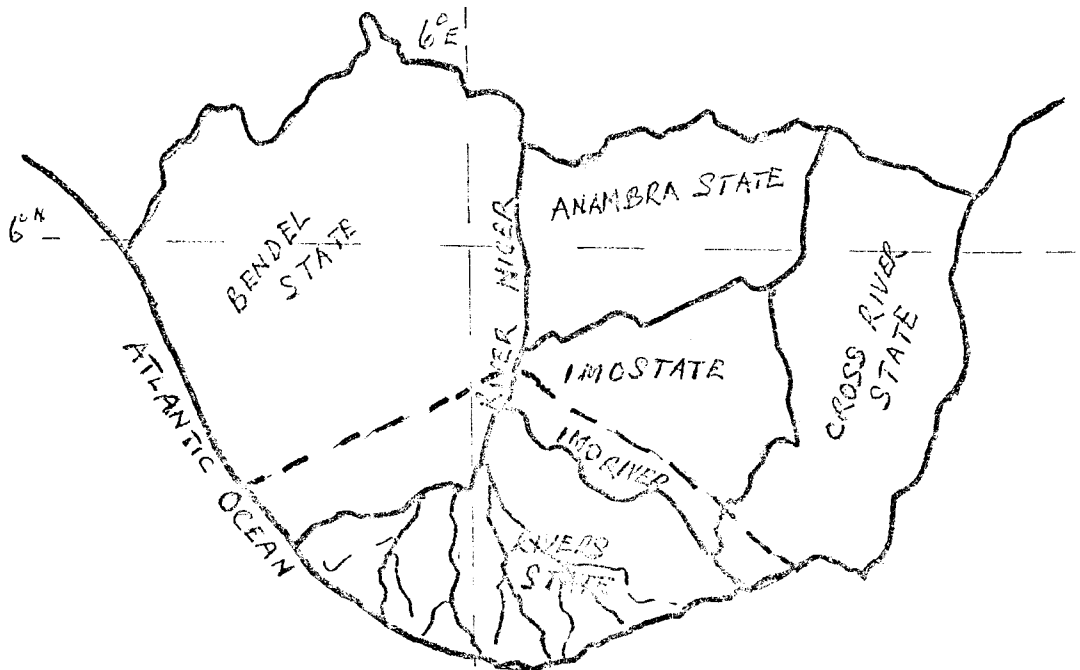


Figure 2. Sketch of the States Surrounding the Niger Delta Area

these states total 12,513,876 people (1963 census), living in an area of 61,673.6 square miles. In 1963, that represented approximately 190-200 persons per square mile. Figures released after the 1973 census doubled these estimates, although they were disputed. In 1980, no one expects these figures to come any less than they were almost 20 years ago.

World Population,



Figure 3. Current Distribution of the World Population

TABLE I
 POPULATION OF SELECTED AREAS OF THE
 WORLD COMPARED WITH NIGERIA'S
 DURING THE 1960s

Selected Areas	Millions
World	3,947
China	822
India	608
U.S.S.R.	254
U.S.A.	214
Indonesia	132
Japan	111
Brazil	107
Bangladesh	74
Pakistan	70
Nigeria	63
Mexico	60
U.K.	56
France	57
Italy	53
Australia	14

Land Type and Vegetation

The Niger Delta area falls into the zonal altitude of under 1,000 feet above sea level, and this ranges from partially submerged woody forests along the southern shorelines to ranges and grasslands in the Imo hinterland well below 200 feet above sea level (see map in Appendix A). According

to Duckham and Masefield (1970):

the soils [of Nigeria] are classified as porous sands to sandy clays. . . . Some very dramatic erosion with enormous gullies on hill lands in Onitsha and Owerri provinces is largely due to geological youth of these hills which are still being eroded by natural processes but imposes the necessity for very careful agricultural practices in these areas. . . . The natural vegetation of this zone is high forest, from which all land now used for agriculture has at some time been cleared . . . a great deal of this zone is in fact now covered by secondary forest which has succeeded earlier clearings (pp. 379-80).

It must be noted here that many of the provinces named above are not covered by this study, since only the southern region of Imo state traditionally falls within the Delta area. However, the abundance of potential pasture and grain cultivation fields along the Niger river basin and the Imo river tributary cannot be ignored as having potential for future significance on dairying in the Niger Delta area. The zone that Duckham and Masefield classified as the coastal area comprises much of the creeks, lagoons, and mangrove and coastal forests, "which might perhaps, if future regional food needs demand it, be reclaimed for rice cultivation. . . ."

(p. 379). The soil behind the shoreline consists of marine sands which support the growth of some grasses and coconuts. Beyond this narrow stretch are richly watered forest lands which support the growth and cultivations of fruit trees, vegetables, and root crops, including yams, cassava, and potatoes.

Background of Problem

Most of the people in the area live in rural areas, and even those who earn their living working in the urban centers still maintain a close affinity to their villages and towns. As a result, most of the population grow their own crops and trade the earnings of their surplus for the products of fishermen and for imported commodities. A substantial portion of such goods is made up of milk and milk products. Unfortunately, prices for imported items, especially milk products, have skyrocketed over the last decade. In the sixties, the price of one-half pint of pasteurized evaporated milk was five cents. During the early seventies, it sold for 15 to 20 cents. By August, 1979, one-half pint of evaporated milk sold in a government subsidized store, when available, for 50 cents. In seasons of scarcity, some people may pay as much as 80 cents per one-half pint through forced use of the black market. According to statistics provided by the International Livestock Center for Africa, import of dairy products into tropical Africa amounted to over \$350 million in 1977, thus representing approximately 5% of overall world trade in dairy products. Of this amount the value of 290 million dollars consisted of fresh, powdered, or condensed milk, representing slightly over 11% of the overall world trade in milk. According to this same report, this trend is rapidly advancing at an annual rate of 19%. A

redistribution of these figures showed that Nigeria's amounted to over 33% of the total volume of imports into tropical Africa, with peak demand in the coastal and densely populated cities and towns in the southern part of the country. Many of these cities, including Port Harcourt, capital of the Rivers State, Aba, Owerri, and Ikot Ekpene, fall well within the Niger delta geographic region. They are either industrial and/or administrative centers, such as Port Harcourt; seaports, such as Warri or Sapele in Bendel State; or commercial centers as in the case of Aba. But, whether these population centers fall within the designated area of the Niger delta or they occur further inland, as in the case of Onitsha and Asaba on opposite banks of the Niger, they are all densely populated, and with distances of less than 100 miles between any two of these cities, there is very little variation in the prices of commodities. Traders are constantly transporting commodities, particularly imports, upland from the coastal cities, and locally produced foods and commodity exports back to the coast.

In 1977 the nations of tropical west Africa imported dairy products valued at 350 million dollars. That 33% of these imports came into Nigeria can be substantiated. Thus, the Nigerian share for 1977 amounted to 115.5 million dollars. At an annual increase of 19%, it can be

estimated that Nigeria imported dairy products worth \$163.6 million in 1979. These are very conservative estimates, however, and do not reflect the willingness of the people to sacrifice to meet their need for dairy products. It would also seem significant that these imports are subsidized by a government concerned with other major development projects, including the construction of hospitals, schools and universities, interstate highways, and public housing, to name a few. When the above figure is weighed against a total food import of \$1.7 billion in 1979, according to Time magazine (October 6, 1980), it shows that about 10% of the 1979 import cost of foods into Nigeria was for dairy products. There is no way of finding out how much of these imports reach the northern population centers of Kaduna, Kano, Sokoto, Maidnguri, etc. A significant amount does go, according to government reports. It is worth noting, however, that cities like Zaria, Kaduna, and Kano have two or more dairy plants in each city, although these plants hardly produce enough to meet domestic needs. However, it is a widespread practice for natives of suburban towns in the north to milk their own cows, with the produce sold in the urban markets by milk maids.

In contrast to the relatively meager production of dairy products in Nigeria is the quite adequate production in countries of the European Economic Community, New

Zealand and the United States. In these countries, production of milk and milk products often exceeds demand of the domestic market, leaving behind a build-up in stocks. In the United States, the federal government purchases the excess products of dairy farmers to "assure farmers that the milk price will not fall below a predetermined amount" (Mason, 1979, p. 1365). Producers and exporters of EEC and New Zealand, in the course of the 20th World Milk Congress held in Paris in June of 1980 (ILCA, 1979), rejected a proposal to draw up an international agreement to control the supplies of dairy products and fix minimum export prices. If this proposal had been endorsed, it would have placed limitations on how much dairy products any exporting country can dump on the market, and the result would have been yet higher prices paid by consumers. Production in many of these developed countries spreads across a wide span of climatic zones ranging from humid subtropical areas, such as Louisiana and Texas in the south, to Wisconsin in the northern United States, where production flourishes under very cold conditions. Thus, dairymen in these countries have been able to successfully adjust to existing climatic, environmental, and economic conditions, even though these may vary somewhat from country to country and in some countries from area to area. It should be pointed out that within developed nations producers were able to find a ready market for their products. On the other hand, the people in most developing countries, as is

abundantly typified by the people of the Niger Delta, are forced to meet increasing import costs for a much needed component of their diet, milk, and milk products.

Why are milk and milk products essential for the well being of the population? As a food, Kon (1972) states:

. . . it is almost unique as a balanced source of most of man's dietary needs. Only the whole carcass of an animal, including the bones and the liver, could contribute as much as milk, taken as a single food. Some peoples, such as the nomadic M'Bororo of West Africa, live for months exclusively on milk . . . half a litre of cow's milk supplies some 25 percent of the calories, some 40 percent of the protein, some 70 percent of the calcium and the riboflavin, and about one-third of the vitamin A and thiamin believed, on a generous assessment, to be required daily by a five-year-old child (p. 11).

In the Niger Delta, milk is a common component of such meals as the traditional cornstarch broth, 'akamu,' eaten as breakfast with buttered bread. It is often blended with yam and potato pastries, and it is not unusual to see people drink their coffee or tea with as much as a quarter of its content being condensed milk. As the urbanization trend increases and more housewives join the work force, demand for milk products will certainly increase, since this may well entail a greater shift from traditional breast feeding of babies to a greater dependence on the bottle feeding. And as production costs increase in the developed countries of the west, and prices of imported milk products advance accordingly, less and less people in such regions as the Niger Delta can afford to buy milk in sufficient quantity to meet dietary needs.

Out of the author's personal experience as a meat inspector for seven years in the Port Harcourt division of the Rivers State, part of which responsibility involved dairy products inspection at the port and in the markets, he makes the observation that there has not been a concerted effort on the part of the Ministry of Agriculture to introduce improved dairy breeding and approved milk production practices into this area or anywhere else in the state; neither can one find a dairy project of commercial proportion in any of the Delta States. Furthermore, this duty of meat and dairy products inspection gave the author an opportunity to verify the large extent to which dairy products are imported. It is alarming to imagine how much canned milk and baby foods are unloaded at the Port Harcourt wharf annually. A very significant fraction of these products must be declared unfit for human consumption because of pest-related spoilage, "blown cans," or because of suspected contamination with *Clostridium botulinum*--a food poison bacteria. Of somewhat lesser magnitude, but nevertheless a concern, is the dumping of these unuseable materials posing a threat to the environment, especially in the region of the seaport, although this may not be a primary concern at the moment. Constant shortages of milk from the shelves, coupled with the fact that people can still buy milk even at exorbitant black market prices, is more than an indication that people of the region are

thoroughly convinced that increased use of milk and milk products is indispensable for their welfare of their families.

Statement of Problem

What possible causative factors contribute to the fact that presently there is practically no dairy industry in the Niger Delta area? Why is it that there is little, if any, indication that dairying is being treated as a priority matter in the current "Agrarian Revolution" being undertaken by the federal and state governments? Demand for milk and dairy products resulting in these massive imports has apparently, to date, not prompted any reappraisal of this lack of priority. In fact, one is tempted to think that policy makers, who vote these lump sums of money into subsidizing import costs of dairy products, must have actually lost touch with the reality of milk coming from cows and not from cans. The question arises, what are the possible factors which apparently inhibit the development and maintenance of a functional dairy industry in the Niger Delta region? Can answers be found which will, at least in part, satisfy the question as to why the dairy industry remains dormant and possibly account for the apparent apathy of government officials in this regard?

Purpose of Study

The major purpose of the study was to describe the present situation with regard to dairying in the Niger River Delta and to assess future possibilities in terms of overcoming certain real, alleged, or implied constraints.

In order to achieve the major purpose, contributing purposes were listed as:

1. Identify and spotlight real or imaginary constraints which may have helped create this anomaly, and determine whether it is feasible or not to encourage the further development of a dairy industry in the Niger Delta.

2. Discuss some aspects of dairying characterized in a successful economic entity like the United States, and compare the strong and less than strong points in that country with those factors that are propounded as having resulted in the present negligible state of dairying in the Niger Delta.

3. Make recommendations based on such findings to governmental agencies, individuals and organizations directly or indirectly involved in the Niger Delta economic life, particularly those most closely related to agriculture.

Questions to be Answered

1. To what degree do climatic conditions and other environmental stresses limit dairy production in the Niger Delta area of Nigeria?

2. What is the impact of moisture control and soil stability on agriculture (dairying) in this area?
3. What improvements in land tenureship restrictions, land management, etc. are needed for dairy improvement in the area?
4. Are predators and pests the primary setback to dairying in this area?
5. Can adaptation of new technology contribute to a better forest and land resource management, hence providing forage and grain for the dairy industry?
6. Are there any weaknesses in the present economic infrastructure, and can a new system be evolved to improve the condition of rural residents?
7. What is the prospect for installation of dairy processing plants?
8. Is it more economical to import livestock and/or frozen semen instead of processed dairy foods?
9. What is the effect of nutrition on livestock in general, and dairy cattle in particular, as it relates to this study?

To answer these questions involves a lot of factors which can only be addressed from this distance by a review of studies and other documented information related to the subject, since engaging in a practical demonstration is impracticable at this stage.

In a nutshell, the author attempted to use a literature review to expose any facts that support the notion

that dairy cattle can or cannot be bred in the Niger Delta area. Secondly, a study of the historical background as well as the present stage of a successful dairy industry, in this case, that of the United States, were made, with the intent to support or dismiss the notion that breeding dairy cattle in the Niger Delta is within the realm of the possible.

Finally, conclusions were made, based on the facts of the literature review, and recommendations were also made on that basis.

CHAPTER II

METHODOLOGY AND DESIGN

Introduction

It was apparent very early in the study that the author's mission in conducting this study was primarily that of exploring both negative and positive aspects and factors related to dairying in the Niger Delta. Nigeria is a long way from Oklahoma, over 7,000 miles to be exact, thus accessibility to real life situations and personalities that could furnish relevant information was limited. As a result of this limitation on achieving more direct communication with the study area, this work was of necessity limited to a review of related literature. Any information derived from such a review was then analyzed in light of selected established feasibility factors for successful agricultural enterprise establishments.

Objectives

As the purposes of the study as stated in Chapter I were further subjected to the reality of implementing the methodology possible within limitations placed upon the conduct of the study, the following statements were deemed appropriate:

Specifically, the major objective of the study was to critically examine certain items or feasibility factors established by Duckham and Masefield (1970), as far as these might constitute a valid constraint upon dairy production in the Niger Delta area. To follow these guidelines (listed below) will lead into technicalities beyond the scope of this study. The author has therefore drawn a list of related subject areas (p. 19) which will greatly enhance the literature review.

1. Effective climate (temperature, rainfall, attitude, etc.)
2. Land--physical form (terrain, soil types, etc.)
3. Land--biotic or bio-geochemical status (flexibility, organic matter, organisms, pH, etc.)
4. Moisture control facilities (irrigation, drainage, floods)
5. Soil stability (erosion, salinity, etc.)
6. Unwanted species (weeds, predators, pests, diseases)
7. Technological adaptation feasibility (machines, chemicals, usage, etc.)
8. Economic infrastructure (markets, prices, wages, government controls, subsidies, etc.)
9. Social infra-structure (dietary customs, work ethics, class status, rigid traditional practices, land tenure, educational levels, knowledge dissemination status, etc.)

As stated in Chapter I in the form of contributing purposes, a secondary objective would be that of drawing up recommendations for:

1. Development of educational programs which may be initiated and/or strengthened in order to more effectively reach producers and potential producers.

2. Actions which the appropriate government agencies might take in order to enhance the further development of dairying.

Structure and Content of Literature Review

The review of related literature was attempted with emphasis in two parts: 1) information related to Nigeria, and 2) information related to a successful dairying industry, in this case the United States dairy industry. This will include a review of the historical background and other developments that led to the achievements of this industry in the United States.

Facts exposed in this review were further analyzed and comparisons made between the Nigerian situation and the United States' industry. Summarization will then be made and conclusions derived, which will form the backbone of any recommendations made.

Use of Author's Experience

The author's heritage includes a wealth of knowledge derived from working with his parents on a farm in one of the rural communities in the Niger Delta. This knowledge was further enhanced by high school gardening practices in the same area, and this was followed by seven years of working in the area after a brief period of travel and studying the livestock industry in the northern part of Nigeria. The author is of the view that personal experience

handed down by five generations or more, who have farmed the same plots, is dependable to a significant degree. Where such an experience is further enhanced by travel and studies abroad, the degree of dependability can be graphed beyond the common realms of oral traditions. In making conclusions based on the opinion of experts, the author's personal experience and point of view will also be considered.

Subject areas to be reviewed fall under two broad scenes, Nigeria and the United States. These include:

- a. The Nigerian Scene
 1. A historical preview of the people and their livestock.
 2. Problems related to disease.
 3. Nutrition problems.
 4. Agricultural Education and Extension in Nigeria.
 5. Agricultural Extension Services.
 6. Cooperative Movements.
 7. The Nigerian Agrarian Revolution.
- b. The United States' Dairy Industry
 1. Historical preview.
 2. Importance of dairying in the South.
 3. Breeder's associations.
 4. Feeds and feeding.
 5. Scientific research and dairy machinery.
 6. Cooperative Extension and United States' dairy industry.
 7. Current situation in the United States' dairy industry.

c. A summary of facts derived from the above review will be analyzed as they relate to dairying in the Niger Delta area.

CHAPTER III

REVIEW OF LITERATURE

Historical Review of the Nigerian Scene

In Nigeria, there is no classification of cattle into dairy and beef type such as exists in many developed countries. "The Fulani, who are by far the largest cattle owning group in West Africa, live throughout the savanna country, from Senegal to the Sudan, a distance of over 2800 miles" (Ferguson, 1967), and they graze their cattle across territorial borders especially in times of stress such as the 1972 Sahelian drought. Because of their nomadic lifestyle, the cattle are regarded primarily as a source of beef, and selling of milk, cheese, and butter in the local markets only provides subsidiary income for purchase of grains and other chores for the family (Ferguson, 1967).

Traditionally, the term "cattle breeding" was synonymous with the Fulani tribesmen, just as beef cattle trade between northern Nigeria and the southern population centers is still an exclusive trade of Hausa Middlemen.

However, as far back as 1948, the British colonial administration in Nigeria through its Livestock Investigation Centre at Vom in the central plateau region, was

basing

further selection [of cows in the center] on milk yield. . . . A yield of 1000 lb/lactation [450 kg/lactation] was set as the minimum standard for cows in the herd, and this limit was raised a year later to 1250 lb (570 kg) (Knudson and Sohael, 1970, pp. 189-190).

Realizing that this was a very slow process, they started upgrading by artificial insemination with imported semen from British Freisian bulls (Knudson and Sohael, 1970). Other herds of dairy cows that could be described as such only occurred in the northern region of the country, of which the Shika Research Center of the Agricultural Research Institute in Samaru, Zaria is a typical example. By 1967, researchers at the Moore Plantation and Iwo road dairies of the Institute of Agricultural Research and Training of the University of Ife, working with 37 pure-bred Jersey heifers imported from New York state, could establish that environmental factors that might have contributed to a lower milk yield, compared to the American parent herd, may have been the result of a combined effect of poor nutrition, irregular and inadequate disease control, and other management practices, although degree of heat tolerance under western Nigeria conditions was not ascertained (Adeniye and Bamiduro, 1977). On the other hand, one would expect agencies of the United Nations to show concern for the situation that existed in southern Nigeria with regard to dairy production. However, the FAO master plan for agriculture development in Nigeria between

1965 and 1980 recognized the "undoubted opportunities for agricultural development" (FAO, 1966, p. 13) in the Niger Delta area, but the recommendations were completely silent on dairy or any type of livestock production; neither was the development of fodders considered for the heavily wooded forest lands in the Niger Delta.

Dairy Goats

Goats are the most numerous livestock in Nigeria, and this reached a peak of about 30 million heads in 1970-71 (refer to NFDA statistics). According to Duckham and Masefield (1970, p. 377), "the wetter regions are characterized by dwarf types." But, like other export earners of the colonial era, goats were bred primarily for their "hard-grain" skins which the industrialized economies desired for shoe uppers. In the Niger Delta, goats are raised for meat by what Sands and McDowell (1978, p. 3) describe as "small holders producing for family use." But while goat populations declined according to the pattern of the years following the 1970-71 period in Nigeria, north African countries had drastic increases in numbers; for instance, Algeria increased its numbers by 50%, while Morocco increased by about 31%. In these countries, goats supply a significant fraction of the population milk demand, according to Sands and McDowell. According to this report, some of the high producing goats may yield 3-5 kg of milk per day over a 300 day lactation period.

The FAO (1975, p. 1) has stated, "In 1974 the contribution by goats to world milk supplies was 1.65%," and

Sands and McDowell (1979) state:

This varied from 41% of milk consumed in the Americas to more than 10% in Africa. . . . In a few countries, such as Niger and the Yemen Arab Republic, goat milk comprises over 50% of the milk produced (p. 1).

The most remarkable advantages of breeding goats in the tropics are the almost year round lactation period, and the fact that most breeds are unaffected by atmospheric temperatures and less variation in photo period, thus they exhibit almost year round reproduction (Sands and McDowell (1978). Spermatogenesis in the male commences around 84 days of age, and by 120 days of age spermatozoa are present in the epididymis. However, does can only be bred 7 to 10 months after birth, and the recommended breeding age for females is one year of age (McDowell and Bove, 1977). Inadequate nutrition which limits performance in other livestock is still the major setback to reproductive performance in tropical goats and causes infant mortality among herds of the west African dwarf type up to 21.4% prior to three months of age, according to McDowell and Bove (1977).

Disease Syndrome

Cattle breeding in Nigeria, as in many tropical regions, is not entirely free from parasitic infections, and

other infectious diseases such as bovine pneumonia and tuberculosis. However, no one single disease has limited livestock production as sleeping sickness or trypanosomiasis. This limitation is not so much due to occurrence, of which there is no report of spread in epidemic proportions during the past 10 years in any tropical country, but by the fear of risks involved in breeding cattle in the tropical regions where carrier flies live abundantly. According to Adams and Maergraith (1977), the causative agent of the disease *Trypanosoma gambiense* and *T. rhodensiense* are "identical and are the same as *T. brucei* which infects herbivorous animals" (p. 427). However, in spite of this fact that the same parasite has been observed to cause the disease in man and cattle, the human populations in the so-called trypanosomiasis belt have not recorded any significant outbreaks of the disease in recent times. Yet, this phobia is so engrained in the academic circles of Nigerian decision-making that the Niger Delta is still seen as a forest of flies. Adegbola (1975) suggests the use of more trypano-tolerant breeds of cattle like the N'Dama and Muturu, and this only in areas above the 10°N, or the Nigerian middle belt, where as much as "45,980 km² [28,571 square miles] have been claimed from the tse tse fly" (p. 346) using DDT and dieldrin (already banned in the United States). He also suggests that "livestock must be made to adapt to trypanosomiasis in the same way as people are adapting to malaria under similar ecological

conditions" (p. 346). However, Adegbola's study hardly documents a case of a cattle herd hazard that can be significantly linked with trypanosomiasis.

Duckham and Masefield (1970) make their assertions in the traditional manner of reference to the coastal regions when they say that

Livestock are comparatively unimportant in the high rainfall areas of West Africa, as is to be expected both from the tse tse infection of these areas and because of the lack of grassland on which they could be pastured. The typical cattle of these areas are the dwarf shorthorn (*Bos brachyceros*) or 'muturu,' very small animals which are casually kept in small numbers for beef but have a certain survival value because they possess some degree of resistance to local strains of trypanosomiasis. . . . Also to be found here are the slightly larger 'Ndama' cattle, classified as longhorn humpless, which originated in and around Guinea but have been widely introduced elsewhere in West Africa because again of a certain resistance to trypanosomiasis (pp. 377-78).

The Merck Veterinary Journal (1979) acknowledges the impracticality of eliminating trypanosomiasis from much of Africa by the eradication of tse tse fly vectors, and thus suggests the use of drugs such as Diminazene aceturate to which no significant reports of resistance by field strains of trypanosome has been linked. A complete list of drugs commonly in use for treatment of the disease in domestic animals is provided in the manual. The prospect of immunization of cattle using vaccines has been limited because of the antigenic variation of trypanosomes (Merck Veterinary Journal, 1979).

There are other limiting factors to dairying in the Niger Delta, and sleeping sickness should not be the major preoccupation. Gastro-intestinal parasites, such as tapeworms, hookworms, and roundworms persist as in any other region of the world where domestic and wildlife exist, but lice, mites, and ticks greatly hamper growth and performance of livestock in Nigeria. For instance, the bont tick is widely distributed in West Africa as well as eastern, central, and southern Africa. The same pest, *Amblyomona maculatum*, occurs in the United States, while another variety, *Amblyomona cajennense*, is found only in southern Texas, Central and southern Mexico. The importance of these parasites to livestock breeding cannot be overemphasized; however, their control among livestock in the developed economies provides employment for veterinarians, chemical industries, and farm hands alike. These are the challenges that stimulate a nation's economy and prevent stagnation in the flow of currency. They do not prevent the establishment of a viable industry.

Adequate Nutrition

According to the Food and Agriculture Organization (1967),

While there were 65 cattle and 80 sheep and goats for every 100 western Europeans in 1963, there were 20 cattle and 51 sheep and goats to every 100 Nigerians, and if the product of these animals in Nigeria was approximately the same as that of the animals of western Europe, there would be no comparative shortage of animal products in Nigeria (p. 5).

Although these were conservative estimates at the time of the report, there is no reason to believe that cattle numbers kept pace with population increases in Nigeria. In fact, the Sahelian drought of the early seventies reduced cattle numbers significantly. Livestock numbers are therefore limited by what the FAO report describes as "the northward belt . . . limited by water shortage and the southward by the tse tse-infested areas of west Africa" (p. 6). What it does not discuss is the reason for the existing discrepancy in levels of milk and meat yield between Nigerian and western European cattle. But in its concern for existing and impending shortages of livestock products, the FAO report establishes that

there can be no justification for this shortage except for reasons of underdevelopment arising from shortages of technical manpower, low income levels, low capital resources and the consequent inability to develop Nigeria's favorable environmental factors (p. 6).

Some of these factors include an abundance of rivers and waterways, such as exist in the Niger Delta, unmanaged rangelands in the savanna region, and fertile plains in the southern part of the country. Obviously, there is a direct relationship between the level and type of feed a cow receives and the average daily gain, or milk quantity and composition, in the case of dairy cattle. It is not expected that the average cow will receive sufficient nourishment to maximize productivity or yield in a place where the average of the human population is underfed,

and where policy makers have invested very little resources in massive grain and forage production.

Present State of Agricultural and Extension Education in Nigeria

According to Uka (1974), the problems crippling agriculture and other related and non-related industries in Nigeria today are due to shortcomings in the educational system. He therefore urges "schools to provide youth in secondary schools with the educational experiences relevant to their future vocational plans" (p. 42). He asserts that "it is also the responsibility of colleges and universities to give them [students] the requisite professional training for competence in specific occupations" (p. 43).

Taiwo (1974) asserts that

Attempts at pre-vocational and pre-technical education in schools are not new to West Africa. . . . the Nigerian government schools of the first decade [1900s] usually taught some vocational and technical subjects (p. 33).

However, the lack of progress in vocational education, according to Taiwo, developed because

. . . not only were the professions and the administrative and clerical careers which arise from literacy education far better remunerated, they were more highly regarded in society than the vocational and technical careers (pp. 33-34).

Abaoba (1974) states

There is at the moment a glaring gap in the training of intermediate personnel for agricultural engineering in Nigeria. The proposed certificate

and diploma in Agricultural Mechanization at the Ahmadu Bello University appear to be the only programmes in the country for the training of intermediate personnel (p. 57).

It would seem logical to assume that a major problem with agricultural mechanization and all other skills necessary for uplifting agriculture in Nigeria are related to antiquated certificate oriented education. Nduka (1965) established that

. . . so long as Western education was [and is?] thought of primarily as the passport to a salaried job, for instance, so long did the curricula and the teaching methods employed mirror these aims (p. 134).

The Nigerian educational system therefore calls for a complete overhaul which can raise a new generation of learned people with specific goals set to meet the needs of the society. Universities and colleges should thus design curriculum that train intermediate and high level manpower in skills necessary for a mechanized system of the magnitude that can salvage the nation from an imminent food disaster. This must include training of specialized personnel, such as breeders, as well as middle and lower level dairy industry staff in skills like plant machinery maintenance, milking, artificial insemination, etc.

Ojo (1973), in a related study, came to the following conclusions and recommendation:

. . . Nigerian students [must] be made aware that individual characteristics, personal interest; family and environmental influence; encouragement from teachers, the government, and friends, encouragement and reward from competitors; new

developments in agriculture through research, machinery, and equipment; loans; availability of land; positive attitude toward work; and love for country life are some of the factors influencing an Oklahoman to establish and stay established as a farmer. . . . [Therefore the Nigerian] government's plan to use a higher proportion of her revenue 'to improve Nigeria's most permanent asset, agriculture' should be implemented (pp. 68-69).

Other positive factors are:

1. Increased agricultural productivity related to production of feeds and management of grasslands and range will further increase employment opportunities.

2. Availability of cheap labor will make dairying a profitable venture.

3. There will be a ready market for pesticides, herbicides, fertilizers, and other products of the petrochemical industry now being established near Port Harcourt.

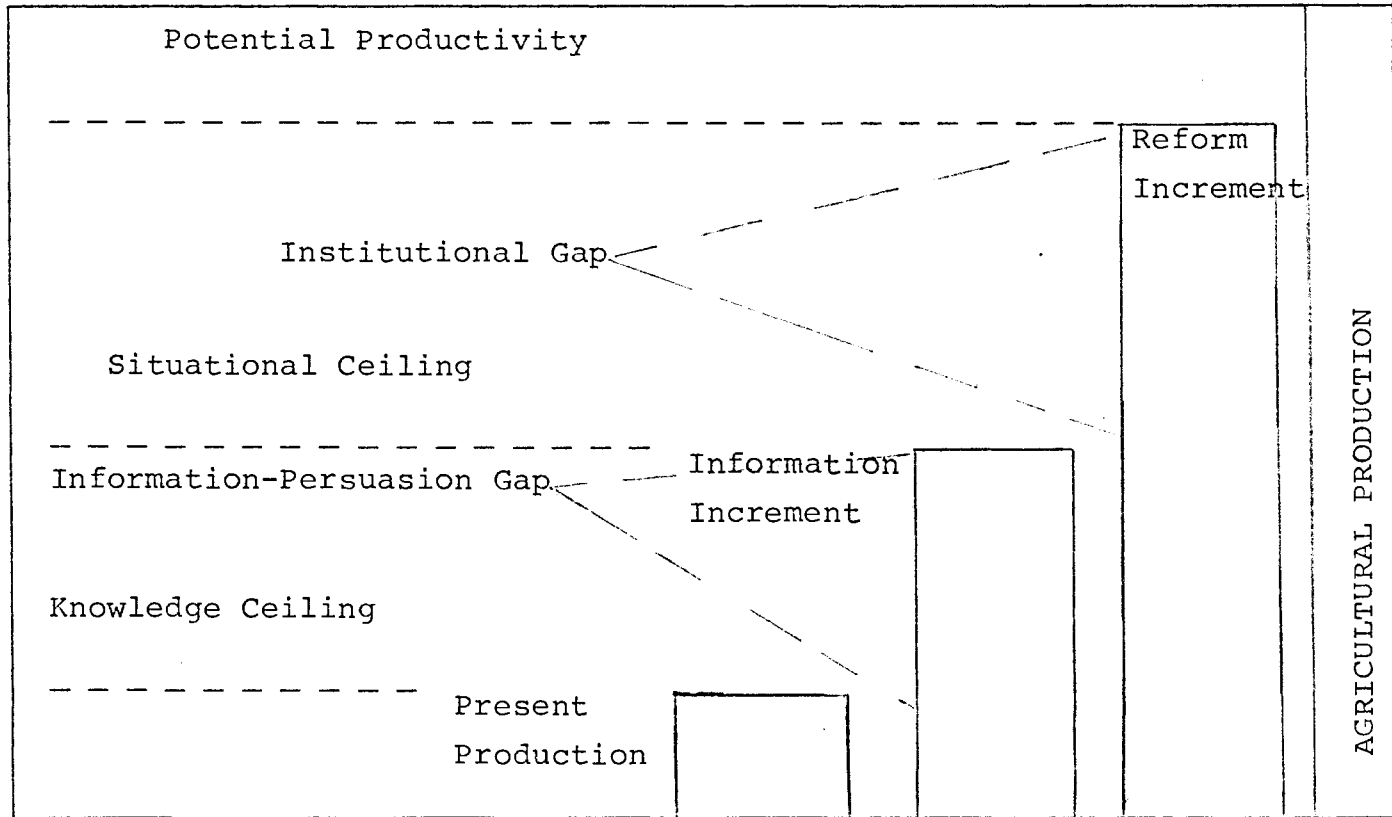
4. Availability of cheap petroleum fuels for an energy intensive agriculture.

5. Provision of increased potential for the existing colleges of agriculture to be involved in research related to rural life in the area, while they expand to accommodate an increased intake of students learning dairy related subjects.

6. Importation of necessary equipment, concentrate feeds, frozen semen, and live cows will further enhance international trade, as well as provide an increased volume of docking jobs at the new Onne ports in the river states.

It was felt profitable at this point to review an analysis made by Brown (1970, p. 728), in which he describes "the distance between the individual farmer's knowledge ceiling and his situational ceiling--as an information-persuasion gap." The situation in the Niger Delta as regards feasibility of a viable dairy industry or agriculture in general, like Brown's "information-persuasion gap," may be or has been exaggerated to perpetuate the status quo. Perhaps farmers in this area are not as repulsive to change as we have been led to believe. Perhaps, in this age of hydroponics, pesticides, and concentrate feeds, the Niger Delta, with its enormous oil and water resources, can support a viable dairy industry. It may be that the area of weakness, or what Price (1980, personal interview) describes as "the weak link in the chain," is the agricultural information communication media, which is presently controlled by the federal and state government ministries of agriculture, and which, as we have noted earlier, has been incapable of reaching the masses in the rural areas. Brown's model (Figure 4), illustrating the effects of media information on farm technology, further explains this point. According to Brown,

The situational ceiling is set by existing physical, economic, institutional, and technological factors including Mosher's five essentials of agricultural development: markets, technology, inputs, incentives, and transportation. . . . salient findings indicate illiteracy and traditional attitudes as not impenetrable



Source: Brown, Journalism Quarterly, Winter (1970).

Figure 4. Effects of Media on Farm Technology

barriers; receiver personal characteristics may be less important than situational factors in diffusion of technical information (p. 725).

The situation of dairying in the Niger Delta exists wherever the situational ceiling is dictated by an out-dated institutional set up. These institutions are represented here by the ministries of agriculture, and the universities and colleges of agriculture as regards their relationship to public enlightenment in the rural areas of the Niger Delta.

Agricultural Extension Services

Dairy production in the tropical United States serves as a pivotal point for this study. Likewise, it is necessary to point out at this juncture the degree of dependence the entire livestock industry in the United States has on the land grant colleges. If that dependence has lessened in recent times due to massive commercialization of industry, a lot of credit still goes to the agricultural colleges which continue to keep a check and balance on industrial quality of productivity. Presently, Nigeria has a college of agriculture in almost every state of the federation. Most of these colleges are involved in one type of research or another. Most of them train personnel for the ministries of agriculture in the various states. Whether the information and research results are as effectively communicated to society's opinion leaders as

might be desired, or whether the products of these colleges are able to function as effective change agents, is yet to be more precisely determined. Perhaps it is a bit too early to prejudge until more relevant information comes in.

Laogun (1977, p. 114), in a doctoral dissertation, asserts that ". . . farmers need training not only in technical agriculture but also in community development, functional literacy in agriculture, and youth programs."

In December of 1980, the author has the privilege of interviewing Dr. Laogun, who is currently a senior lecturer at the University of Ife in southern Nigeria. The following points were evident at the end of that interview:

1. The Nigerian government is determined to modernize its agricultural industry, and is currently taking steps to effect this in record time.

2. Nigerian universities have been mandated to begin an open university system, by which field staff can study through correspondence, night classes, etc.

3. The University of Ife is currently conducting a research project which involves sample villages in the locality, with the objective of starting joint production through the formation of farmer cooperatives.

4. Private companies are currently raising dairy cattle in and around Oyo State, and milk products are sold to high schools and colleges around the state. (It should be noted that Oyo State is in the same climate zone as the Niger Delta.)

5. Massive grain importation from the United States, coupled with increased local production, ensures that supplemental feed for livestock is available.

Currently, the International Livestock Equipment Company, Incorporated, has engaged in recruiting Nigerian college graduates to staff several large crop, poultry, hog, feed mill, hatchery, and slaughter facility projects near Calabar, Lagos, and Kano (Appendix B). It should be noted that two of the above three cities fall into the same climatic zone as the Niger Delta. It may be emphasized that this venture further illustrates a new trend of American technological involvement in the Nigerian agricultural revolution.

Cooperative Movements in Nigeria

According to Duckham and Masefield (1970, p. 375), "the cooperative movement in the former British territories has been much concerned with marketing. . . ." But efficient marketing is hindered throughout west Africa by a lack of communications, primarily due to a lack of good roads. However, cooperative movements exist in the

Niger Delta today in various other forms than the historical monthly contributions which members receive in turn to help them finance purchases. These include such varied items as motorized vehicles, transistor radios, building materials or plain lending to more needy community members in pledge for land use rights. There is scarcely any existing village, town, or community in the Niger Delta where cooperative movement member participants are not enabled to make compulsory or voluntary deposits on a weekly or monthly basis. These monies are held in trust, deposited in banks, or lent out to people on low interest rates. Some cooperative movements also invest in purchases of minibuses and cars which are run as taxis by drivers with poor record keeping facilities. Many of these investments hardly yield dividends. Certainly, investment in agriculture would have been a more worthwhile venture since many cooperatives often get stuck with lands held in trust, which they could not put into use as an organization. The federal government also took measures to assist small scale farmers in respect of land clearing and preparation, supply of improved seeds and breeds, the provision of fertilizers, portable machinery, and farm implements and guaranteed minimum prices for agricultural products; these measures could help farmer cooperatives realize more profits on their annual investments.

Action was also . . . intensified in the formation of farming cooperatives as well as in the

reorganization of the distribution and marketing of food items through such bodies. In addition, commitments to Operation Feed the Nation (OFN) remained firm as the government strove to achieve self-sufficiency in food production (Central Bank of Nigeria, 1978, pp. 3-4).

The missing link in all these government endeavors is an effective cooperative extension service with dedicated field staff, who can interpret these policies into a language that rural people can benefit from.

Nigerian Agrarian Revolution

After the reconciliation, rehabilitation, and reconstruction period of the early seventies, one area of primary concern to the federal government of Nigeria was the modernization of the agricultural industry. Thousands of herds of cattle had been wantonly destroyed during the civil war and the Sahelian drought significantly reduced cattle numbers in the period immediately following the war. But in spite of declining demand for the many of Nigeria's traditional export crops, such as palm produce and cocoa in the south and hides and skins in the north, many decisions regarding agricultural development were still being based on the outdated models of the cattle belt and tse tse fly zone, etc.

No reliable data can be obtained in respect of livestock population in Nigeria because of evasive tactics employed by cattlemen so as to cut down per head taxation. However, Tables II and III, furnished by the federal

TABLE II
LIVESTOCK POPULATION IN NIGERIA IN
SELECTED YEARS*

Stock	1959-60	1967-68	1968-69	1970-71	1973-74
Cattle	4.8	8.4	9.3	11.8	8.5
Sheep	3.3	7.0	7.2	8.2	8.0
Goats	15.0	23.2	25.1	29.6	22.0
Pigs	0.3	0.8	1.0	1.0	0.5
Poultry	<u>36.5</u>	<u>80.0</u>	<u>83.1</u>	<u>86.1</u>	<u>64.6</u>
Total	59.9	119.4	125.7	136.7	103.6

Source: Federal Department of Agriculture, Federal Office of Statistics and FAO.

* (Numbers in million)

TABLE III
 INDEX NUMBERS OF QUANTITIES OF MAJOR IMPORTS OF
 FOOD INTO NIGERIA, 1960-1975*

Year	All Imports	Wheat and Flour	Milk and Cream	Sugars	Cereals and Preparations	Fish Products	Fruits and Vegetables
1960	105	37	52	69	440	120	92
61	106	38	52	61	442	111	118
62	108	49	63	79	409	121	93
63	98	90	67	53	90	138	98
64	118	67	86	41	96	223	69
65	100	100	100	100	100	100	100
66	132	327	108	60	120	93	102
67	99	225	104	81	89	59	69
68	74	195	100	36	124	19	47
69	115	324	164	70	243	8	56
70	150	478	226	89	224	20	29
71	214	664	283	137	447	13	71
72	204	548	340	130	307	40	62
73	234	718	275	134	389	39	123
74	199	588	295	75	382	44	60
75	271	753	374	114	381	118	85

Source: Computed from data published by the Federal Office of Statistics in the Nigerian Trade Summary.

*(Base: 1965=100)

Department of Agriculture, Federal Office of Statistics, and the FAO, provide an estimate of livestock numbers during specific periods. Index numbers of quantities of major imports of food into Nigeria during 15 years (1960- to 1975) also show how much Nigeria's dependence on imported food has skyrocketed during the period. According to the Central Bank of Nigeria, in its economic and financial review, livestock population nearly doubled in the 1959-60, 1967-68 period, implying an average growth rate of 12.4% per annum. The Central Bank of Nigeria stated:

. . . between 1967-68 and 1973-74, the livestock population actually dropped by about 10 percent, partly reflecting the impact of the Sahelian drought. . . . The rough estimates would therefore indicate that, in the 15 year period under review, the average rate of increase in livestock numbers was about 6.4 percent per annum . . . a declining rate of growth in livestock production was clearly evident (p. 3).

"Operation Feed the Nation," launched in the mid-seventies, was aimed at increased productivity as well as public enlightenment, and it involved all levels of government as well as college and school leavers. Other measures introduced by the federal government to reinforce these incentives and attract foreign investment, as stated by the Central Bank of Nigeria (1978) included:

1. The transfer of integrated Agricultural Production and Processing from Schedule II to Schedule III of the Nigerian Enterprises Promotion Decree, which would enable foreign partners to enjoy 60% ownership in such enterprises and thereby induce greater foreign participation in agricultural projects.

2. The introduction of an investment allowance of 10%, in addition to the existing capital allowances, in respect of capital expenditures on plant and equipment incurred on agricultural production by individuals or companies.
3. The permission to companies engaged in agriculture to carry forward indefinitely any losses incurred and to write them off against future profits. Hitherto, the period for which such losses could be carried forward was limited to four years after the pioneer period.
4. A tax incentive scheme to lenders to agriculture under which such lenders were to enjoy the following exemptions from taxation in respect of interest received on their lending (Table IV):

TABLE IV
INTEREST RATE INCENTIVES INTRODUCED
BY THE FEDERAL GOVERNMENT TO
ATTRACT FOREIGN INVESTMENT
IN AGRICULTURE

Repayment Period (Including Moratorium)	Grace Period	Tax Exemption Allowed
Above seven years	Not less than two years	100%
Five to seven years	Not less than 18 months	70%
Two to four years	Not less than 12 months	40%
Below two years	None	None

Source: Central Bank of Nigeria (1978).

5. The continuing treatment of agricultural production as a 'favored sector' under monetary policy guidelines, implying perpetual lending rates of interest of 4-6 percent per annum, in respect of loans to agricultural sector.
6. The introduction of capital allowances for equipment leasing in agriculture.
7. The prohibition of re-export of food items (Central Bank of Nigeria, 1978, p. 3).

Other policies designed to enhance agricultural productivity included the Land Use Decree of March, 1978, which vested:

1. Authority over all lands in state territory in the military governor of the state.
2. All lands in rural areas put under local governments.
3. Granting of customary rights by local governments to persons or organizations to the maximum of 500 hectares for agricultural and 5,000 hectares for grazing purposes.
4. The continued holding of land in use for agriculture by any person involved in production for indefinite periods without renewal of lease for projects already started before the decree was promulgated.

The advent of elected officials after October, 1979, further enhanced government commitment to agriculture production. In its policy statement, the National Party of Nigeria (NPN) had promised encouraging small scale farming by raising allocation of funds to agriculture out of government expenditure, both at the central and state government levels. Other steps to be taken included early and regular supply of fertilizers and herbicides, technical

assistance for land clearance, ploughing through tractor hiring units owned by governments, supply of bullocks, ploughs, and seeds on easy credit terms, and encouragement of rural cooperatives in agriculture. The Nigerian president-elect, Alhaji Shehu Shagari has followed his campaign promises of making the country self-sufficient in food production by the 1990s. According to Time magazine (October 6, 1980):

Shagari envisions an extensive 'green revolution' aimed at making Nigeria self-sufficient in food by the 1990s. Says he, 'Agriculture is the priority of this administration.' The plan will require a huge input of U.S. agricultural technology, which the Carter administration is eager to provide . . . to . . . help reduce the American trade deficit with Nigeria (p. 52).

There is absolutely no reason to believe that the federal and state governments of Nigeria recognize the apparent decline in agricultural productivity in the country. The steps so far taken seem to indicate a genuine effort to provide lasting and effective solutions. What seems to be missing in the process is a link between the source of agricultural information and technological resources, and the people on the land where implementation takes place. Overlooking the potential of the Niger Delta for dairy production is therefore one of several missing links in a disjointed system.

Dairying in the United States

Historical Preview

Cows were not native to the territories that were eventually to become the United States. . . . Precisely when the first cow arrived on English territory in the New World is hard to pinpoint (Selitzer, 1973, p. 13).

It is universally accepted, however, that Sir Thomas Dale arrived with a herd of 100 cows along with his men and provisions to Jamestown in May of 1611. If this represents the first introduction of cows into the New England states, which is disputable by the Delaware Report of 1611 that speaks of thriving cows in the pastures (Selitzer, 1973), cows were introduced into the southern states by the Spanish via the Mexican colonies. In this same report, Selitzer contends that the lack of interest in dairying by the Conquistadors who ran the settlements that later became the states of Florida, Georgia, and North and South Carolina, contributed to an overshadowing of the fact that as early as 1525, the Spanish had landed cattle at Vera Cruz, Mexico, and that they had cows in their stables in the southeastern states settlements. Migrants of these Spanish cattle across the Rio Grande produced what was later called "Texas cattle."

Although the mid-seventeenth century saw greater importation of cows from the Netherlands, Sweden, and later England and Denmark into the east coast states, Selitzer

(1973) stated:

Dairying in California developed independently of the East until the great wagon trains brought hordes of gold seekers plus pioneers and their cattle during the great rush West in the mid-1800's (p. 11).

But while the Spanish settlements in California were still struggling to exist, the eastern seaboard was bustling with political and economic activity. Thus, by 1790, exports in butter amounted to about 670,000 pounds, and cheese to 145,000 pounds. The average exports of 1790-1792 were 948,000 pounds of butter and 133,000 pounds of cheese, excluding figures for domestic usage, which Selitzer (1973) says "must have ranged into the millions of pounds" (p. 14). By the early 1800s, trade in dairy products had expanded greatly not only in the export market but through the accessibility of the Hudson, Mississippi, and Ohio waterways, flourishing in New York and as far south as New Orleans.

Importance of Dairying in the South

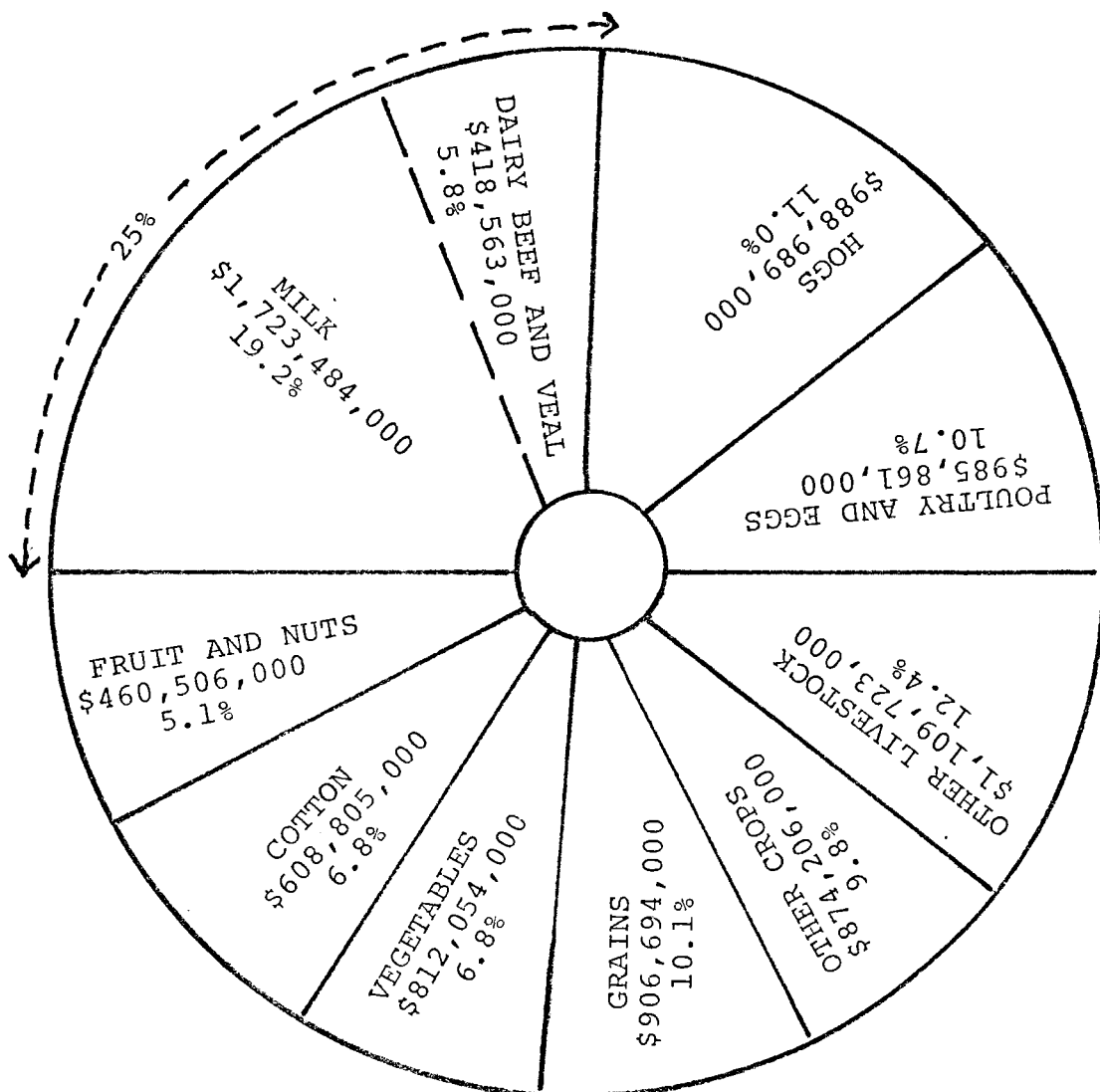
If dairying developed into a major farm industry in the eastern states, ready markets in England for tobacco and cotton and the availability of cheap slave labor made these crops the major farm product of the south. However, Thomas, Reeves, and Pegram (1944) stated

. . . there has been a gradual decline in foreign demand for these two commodities, and the domestic consumption has not increased sufficiently to offset the losses in foreign markets.

. . . statistics show that between 1924-1937, the average annual gross income per capita of farm population in the Eastern Cotton Belt amounted to \$162, while that of the rest of the United States amounted to \$381. During the same period, the farm workers of Iowa, Illinois, and Indiana received annually \$483 per capita (p. 18).

In spite of a marked increase in livestock farming resulting from the decline in demand for tobacco and cotton, Thomas et al. contended only \$20 of the farm income in the south was derived from livestock, dairying, and poultry for each \$100 received from farm crops. By 1939, the picture of the agricultural scene in the entire United States was as depicted in Figure 5.

Statistics on dairying in the south during the thirties and forties is summed up in Tables V and VI. A review of Table V reveals that while the number of farms in the southern states consistently declined in the period between 1935 and 1940, there was a significant rise in the percentage of farms that kept records of milk production. About 10 years later, in 1947, record-keeping had gone beyond the level of farms not reporting milking figures to actual head count of cows and their average productivity. Although the highest average per cow production of 4,300 pounds was far below the estimate of 6,000 pounds per cow projected for that period, the inclination toward better record-keeping seems to have been turned in the right direction. Considering the economic difficulties of the mid-thirties in the United States, the cause of



Source: Thomas, Reeves, and Pegram (1944).

Figure 5. Gross Farm Income in 1939: Total
\$8,961,885,000

TABLE V

TOTAL NUMBER OF FARMS AND THE NUMBER AND
PERCENTAGE NOT PROVIDING MILKING
STATISTICS FOR SPECIFIC YEARS

State	Total Farms		Farms Not Reporting Cows Milked			
	1935 No.	1940 No.	1934	1939	1934 %	1939 %
Alabama	273,445	231,740	66,587	50,167	24.4	21.6
Arkansas	253,013	261,674	65,726	55,904	26.0	25.8
Florida	72,857	62,248	44,339	35,324	60.9	56.7
Georgia	250,544	216,033	71,743	57,537	28.6	26.6
Louisiana	170,216	150,007	64,877	46,407	38.1	30.9
Mississippi	311,683	291,092	106,601	99,185	34.2	34.1
Oklahoma	213,325	179,687	31,199	26,216	14.6	14.6
Texas	501,017	418,002	121,284	79,921	24.2	19.1
South Carolina	165,504	137,558	66,358 (1935)	49,828 (1940)	40.1	36.2
North Carolina	300,967	278,276	106,800	98,200	35.0	35.0
Virginia	197,632	174,887	49,500	42,300	25.0	24.0
Tennessee	273,783	246,617	57,200	52,500	21.0	21.0

Source: Thomas, Reeves, and Pegram (1944).

TABLE VI
NUMBER OF COWS AND THEIR AVERAGE ANNUAL
PRODUCTION OF MILK IN 1947

State	Number of Milk Cows on Farms	Total lbs. of Milk Produced on Farms	Average Amount of Milk Per Cow (lbs.)
Virginia	442,000	1,901,000,000	4,300
North Carolina	359,000	1,529,000,000	4,260
South Carolina	162,000	593,000,000	3,660
Georgia	360,000	1,202,000,000	3,340
Florida	131,000	498,000,000	3,800
Tennessee	593,000	2,265,000,000	3,820
Alabama	391,000	1,341,000,000	3,430
Mississippi	480,000	1,363,000,000	2,840
Arkansas	420,000	1,306,000,000	3,110
Louisiana	278,000	664,000,000	2,390
Oklahoma	660,000	2,343,000,000	3,550
Texas	1,270,000	3,950,000,000	3,100

Source: Thomas, Reeves, and Pegram (1944).

decline in total numbers of farms in these states can be rationalized. However, the decline in total numbers may have contributed to increased efficiency in production practices, as farmers didn't only think of grazing as detrimental but also considered the soil fertilizing effects of manure from cows (Thomas et al., 1944).

However, what has made the history of dairying in the United States a success may be due primarily to what Pirtle describes as a "sequence of events in the development of dairying" (p. 16), which, according to him, "has been similar in most countries except as to length of time it takes to pass from one era to another" (p. 16).

It took many centuries in Europe and Asia for cattle to become planted or distributed over the various countries, usually followed by a general mixing of cattle, and finally the development of breeds and standards among breeds (p. 16).

In the United States emphasis on pure breeding had produced by the early twenties a total of about 777 cow-testing associations, testing 326,633 cows.

Breeders' Associations

Breeders' Associations include the American Ayrshire Breeders' Association, the Brown-Swiss, Guernsey, the Holstein-Friesian, Jersey, and the dual-purpose Red-polled cattle. By the turn of the century, breeders' associations were keeping records of selectivity in herds, publishing journals, and above all, providing necessary

incentive for improvement through championship contests. Likewise the formation of cooperative dairy bull associations with the primary objective of joint ownership use and exchange of the highest-class purebred dairy bulls complemented the effects of cow herd pure-breeding.

Feeds and Feeding

According to Pirtle (1926),

. . . grass, hay and forage are fundamental to dairy cattle and wherever grass and forage can be raised in abundance, there is a natural region for dairying and the reverse is equally true (p. 60).

The distribution of dairy cattle in the United States is determined by the quantity and kinds of forage and pasturage available and by the location with reference to markets and the suitability of the land for agriculture. By 1919, pasture land in the United States covered 1,055,000,000 acres, being 55 percent of the total land area. In the southern states or cotton belt, 53 percent of the crop land was being devoted to the production of feed for cattle; mostly corn, cowpeas, velvet beans, and peanuts, by the 1920s. Across the country, however, several species of grasses and legumes were being tamed, some of which had to be imported from Africa.

Scientific Research and Dairy Machinery

According to Pirtle (1926), the Thayer hay standards published in Germany about 1810 and the feed (grain)

standards of Growen published in 1859, and the Wolff table of feed standards published in 1864, "were brought to the U.S. by 1874 and published in Armby's Manual of Cattle Feeding" (p. 65). Later, Savage, of the New York experiment station, also produced a table of feed standards. Specialization in dairying was not only encouraged by available facts and figures. An increase in the volume of milk and milk products made it necessary to provide better storage and processing equipment, while demand for finished products such as ice cream, cheese, butter, etc. provided the remunerations needed for improvement. Through the efforts of the Cooperative Extension Services which disseminated research results to the farmers, a young industry came into being--the Dairy Industry of the United States.

Cooperative Extension Contribu-
tion to Dairying in the United
States

The Smith-Lever Act approved by Congress in May of 1914 provided for cooperative agricultural extension work between the agricultural colleges and the farmers in the rural areas, and it is believed to have been primarily inspired by the demonstration work of Dr. Knapp and his agents. The words of Congressman Lever himself further explain the circumstances that brought it about:

We have accumulated in the agricultural colleges and in the Department of Agriculture,

sufficient agricultural information which, if made available to the farmers of this country and used by them, would work a complete and absolute revolution in the social, economic, and financial conditions of our rural population. The great problem we are up against now is to find the machinery by which we can link up the man on the farm with these various sources of information (Martin, 1941, p. 156).

Tremendous strides, unparalleled in the history of man, places the United States in a unique position in world food production today which makes unquestionable the concept that

as people use science with profit they will learn the way of scientific thinking [and] have a way of living which would give opportunity for individual and group realization of the best values inherent within them (Brunner and Young, 1949, p. 1).

The Federal Farm Loan Act passed in 1917 made funds available "to organizations to assume the mortgages which farmers had accumulated as a result of the disastrous price declines of 1919 and 1920" (Sanders, 1966, p. 23). However, it was public acquaintance with this act, due to the work of extension agents, some of whom served as secretaries of the first Farm Loan Associations in the counties, that translated the money provided in the Act into a useful investment for the rural population.

While it is evident that the Morrill Act of 1862, which provided for the establishment in every state of the union of a college to teach agriculture and the mechanic arts, was a landmark in the American agrarian revolution, the Hatch Act of 1887 further brought agriculture closer

to the farmer by establishing agricultural experimental stations associated with the land grant colleges, but it was the cooperative extension services, brought about by the Smith-Lever Act, which brought agricultural education to the level of the farmers of the day. Then it organized 4-H club programs which provided an out of school "learning-by-doing" educational experience for the sons and daughters of farmers, thus maintaining a heritage of farm affiliations. Other amateur organizations, such as the Future farmers of America (FFA) may have come a little bit later, but their impact upon American youth cannot be underestimated. But, Kelsey and Hearne (1955) summed up the objectives of the extension services in this statement of M. C. Burritt, a master farmer and formerly Director of Extension at New York State College of Agriculture:

It is the function of the Extension Service to teach people to determine accurately their own problems, to help them to acquire knowledge and to inspire them to action, but it must be their own action out of their own knowledge and convictions (Kelsey and Hearne, 1955, p. 116).

Uniquely, the United States government helped in designing the machinery that transferred the information from the colleges of agriculture to rural farmers without direct involvement in the production process of agriculture. What resulted was a more respectable and productive farmer, able to feed all his countrymen and a significant fraction of the rest of the world.

Current Situation of the United
States Dairy Industry

Whatever effect the world war of the early forties had on the United States dairy industry, by the end of 1953, at the first World Conference on Milk Utilization, American representatives were able to report as good, the industry's

. . . expansion of artificial insemination program . . . installation of pipe line milkers and milking parlors . . . farm tanks and tank truck collection . . . increasing per cow production . . . good pasture programs (Dairy Industries Society, Int., 1953, p. 208).

The same report also described as bad the

. . . abandonment of many dairy farms . . . lack of success of fly control chemicals . . . water shortages induced by climate not yet remedied by installation of reservoirs and irrigation . . . cost of production remains relatively high . . . difficulty in getting good farm labor (Dairy Industries Society, Int., 1953, p. 208).

In spite of the abandonment of many dairy farms as mentioned in the above report, overall productivity in the dairy industry had skyrocketed too high; the only way to keep farmers in business was to institute government price supports.

Table VII provides a brief overview of net United States' government expenditures on dairy support and related programs during the fiscal years of 1950-75, while Table VIII is a summary of expenditures for dairy products by the USDA, during the fiscal year ending June 30, 1975. Table VIII is a further breakdown of the yearly

TABLE VII
NET GOVERNMENT EXPENDITURES ON DAIRY SUPPORT
AND RELATED PROGRAMS, FISCAL YEARS,
1950-1975

Year Be- ginning July 1	Net Support Purchases 1/	Military Milk 2/	Section 32 3/	Sections 709 & 4 (a) 4/	Export Assist- ance 5/	Total (Excluding Special Milk	Special Milk Program 6/
1949-50	170.5	--	17.6	--	--	188.1	--
1950-51	7/-49.1	--	8/-9.9	--	--	7/-50.0	--
1951-52	1.6	--	7.5	--	--	9.1	--
1952-53	274.9	--	25.1	--	--	300.0	--
1953-54	400.4	--	74.0	--	--	474.4	--
1954-55	228.7	4.3	24.4	--	--	257.4	22.2
1955-56	237.9	7.3	39.0	--	--	284.2	48.2
1956-57	239.1	16.4	75.6	--	--	331.1	61.0
1957-58	205.9	30.4	123.7	--	--	360.0	66.7
1958-59	102.1	23.0	106.2	--	--	231.3	74.4
1959-60	159.5	23.6	35.1	--	--	218.2	81.2
1960-61	173.9	25.3	82.1	--	--	281.3	87.0
1961-62	539.0	25.9	47.1	--	--	612.0	91.7
1962-63	454.0	24.8	--	--	6.7	485.5	93.7
1963-64	311.7	26.5	4.4	--	36.5	379.1	97.1

TABLE VII (Continued)

Year Beginning July 1	Net Support Purchases 1/	Military Milk 2/	Section 32 3/	Sections 709 & 4(a) 4/	Export Assistance 5/	Total (Excluding Special Milk)	Special Milk Program 6/
1964-65	157.2	26.2	105.6	--	44.7	333.7	86.5
1965-66	26.1	--	38.7	--	3.8	68.6	97.0
1966-67	283.9	--	.9	14.2	18.4	317.4	96.1
1967-68	357.1	--	--	--	7.1	364.2	103.1
1968-69	268.8	--	45.4	--	13.1	327.3	101.9
1969-70	168.6	--	107.1	7.8	7.4	290.9	102.9
1970-71	315.4	--	91.6	3.2	11.6	421.8	91.8
1971-72	267.0	--	63.9	--	7.3	338.2	93.6
1972-73	135.8	--	15.4	.1	1.5	152.8	90.8
1973-74	31.4	--	10.8	28.7	--	70.9	50.2
1974-75	485.8	--	6.5	3.8	--	496.1	122.9

Source: U.S. Department of Agriculture, 1980.

- 1/ CCC support purchases and related costs (for processing, packaging, transporting, and storing) of dairy products, less proceeds from sales to commercial buyers for domestic use and for export, U.S. military agencies, foreign government and private welfare agencies, and Section 32 programs.
- 2/ CC reimbursements to U.S. military agencies, Veterans' Administration, and other participants.
- 3/ Expenditures of Section 32 funds to buy dairy products in the market and from CCC for school lunch and welfare uses.

- 4/ Purchases of dairy products at market prices under Section 709 of the Food and Agriculture Act of 1965 and under Section 4(a) of the Agriculture and Consumer Protection Act of 1973, for domestic school lunch and welfare uses.
- 5/ Value of Payment-in-kind certificates issued by CCC on exports of nonfat dry milk, butter, and other high milkfat products, and CCC cost of exports under Title I, P. L. 480 of dairy products not originating in CCC stocks.
- 6/ Expenditures under the program to increase milk consumption by children in schools, child care centers, and similar institutions.
- 7/ Net receipt due to sales exceeding purchases.
- 8/ Receipt due to adjustment.

TABLE VIII

USDA EXPENDITURES FOR DAIRY PRODUCTS,
FISCAL YEAR ENDING JUNE 30, 1975

Item	Value					Quantity		
	Butter & Butter Products	Cheese	Nonfat Dry Milk	Condensed & Evaporated Milk	Total	Butter & Butter Products	Cheese	Nonfat Dry Milk
	Million Dollars					Million Pounds		
<u>CCC Outlays</u>								
Purchases:								
Price support	64.5	90.7	320.6		475.8	94.6	117.0	543.5
Section 4(a)	--	1.3	2.5		3.8	--	1.8	3.6
Total purchases	64.5	92.0	323.1		479.6	94.6	118.8	547.1
Carrying charges:								
Storage, handling	.5	1/	2.4		2.9			
Transportation	1.2	2.3	5.0		8.5			
Processing, packaging	1.3	--	--		1.3			
Total carrying charges	3.0	2.3	7.4		12.7			
Total Outlays	67.5	94.3	330.5		492.3			
<u>Sales Proceeds</u>								
Dollar sales	1.7	--	1/		1.7	2.6	--	.1
P. L. 480, Title II	--	--	60.3		60.3	--	--	97.7
Other receipts	1/	.1	.7		.8	.1	.2	2.2
Total	1.7	.1	61.0		62.8	2.7	.2	100.0
<u>Expenditures</u>								
CCC net expenditures	65.8	94.2	269.5		429.5			
Section 32	--	--	--	2/6.5	6.5			
P. L. 480, Title II	--	--	60.1	--	60.1			
USDA Net Expenditures	65.8	94.2	329.5	6.5	496.1			

Source: Agricultural Stabilization and Conservation Service, USDA (19).

1/ Less than \$50,000.

2/ Includes \$3 million for dry whole milk.

expenditures by the USDA to show the different Public Law titles by which price supports for the United States' dairy industry is instituted and sustained. In 1980, according to the U.S. Department of Agriculture (1980):

. . . drastically weakened commercial sales of dairy products this spring, along with high milk production levels, have resulted in record large purchases of dairy products by the CCC. April-June dairy products totaled 4.4 billion pounds milk equivalent, the largest quarterly total in the history of the price support program (p. 344).

Tables IX, X, and XI show USDA dairy purchases and commercial and government stocks of dairy products for the year 1978, 1979, and 1980 (U.S. Department of Agriculture, 1980). These facts and figures are intended to underscore the fact that the United States' dairy industry, following the pattern of the industry in other countries, has grown tremendously to the point where the Commodity Credit Corporation must keep the balance or the industry would go under.

Summary of Literature

Although figures from most recent head counts are unreliable, the Niger Delta area of Nigeria is densely populated with people who still earn their living primarily on subsistence agriculture. The supply of dairy products to this vast population depends on imports from Western European countries, and these have become so expensive that only the very rich can afford an adequate supply.

TABLE IX
DAIRY PRODUCT STOCKS

Item	June 1 1978	June 1 1979	June 1 1980
	<u>Million Pounds</u>		
<u>Commercial:</u>			
Butter	52.4	48.5	51.8
American cheese	371.6	415.2	418.1
Other cheese	69.3	87.5	108.4
Nonfat dry milk	87.2	110.1	139.8
Milkfat	192.1	209.1	219.9
Solids-non-fat	238.6	280.4	316.8
Milk equivalent	5,454	5,941	6,197
<u>Government:</u>			
Butter	212.3	191.2	223.1
American cheese	37.3	2.3	27.2
Nonfat dry milk	600.9	414.5	367.3
Milkfat	182.9	154.6	188.4
Solids-non-fat	589.6	399.4	361.7
Milk equivalent	4,752	3,971	4,877

TABLE X
USDA DAIRY PURCHASES^{1/}

Item	January-June		Change
	1979	1980	
	<u>Million Pounds</u>		<u>Percent</u>
Butter	59.7	198.0	+231.7
American cheese	3.5	181.0	*
Nonfat dry milk	120.9	345.5	+185.8
Evaporated milk	9.0	7.1	-21.0
Milk equivalent	1,288	5,893	+357.5

1/ Delivery basis. *More than 1,000.

TABLE XI

MILK: PRODUCTION BY PRODUCTION REGIONS,
1968-1972, WITH COMPARISONS

State and Region	1968	1969	1970	1971	1972 ^{1/}	As Percent: of U.S. Total	Change from Year Earlier
Mississippi	1,072	1,061	1,049	1,011	983	.8	-2.8
Arkansas	688	692	685	698	702	.6	.6
Louisiana	1,030	1,078	1,089	1,129	1,132	.9	.3
Delta States	2,790	2,831	2,823	2,838	2,817	2.3	-.7
Oklahoma	1,283	1,257	1,250	1,260	1,235	1.0	-2.0
Texas	2,982	2,987	3,065	3,239	3,381	2.8	4.4
Southern Plains	4,265	4,244	4,315	4,499	4,616	3.8	2.6
United States	117,225	116,108	116,962	118,532	120,278	100.0	1.5

1/ Preliminary

2/ Less than 0.05 percent

The present Nigerian livestock industry is still dominated by Fulani cattlemen and their Hausa middlemen, who have consistently resisted every effort to change their lifestyle.

Attempts at modernizing the livestock industry in Nigeria, to achieve a dairy type breed suitable for the Nigerian environment, date back to the 1940s under the British colonial administration. The advent of nationalist movements and the consequent result of grooming more indigenous personnel for the colonial civil service shifted educational curriculum emphasis from a vocational-cum technical bias to training clerks and secretaries. Nigerian universities, while severally engaged in various research programs, have continued in this trend. As a result, government financed experiment stations provide a forum for university graduates and their subsidiaries from the colleges of agriculture to engage in non-productive struggles over who is what and what not, while their primary responsibility is neglected.

Another area that is subject to much debate is the trypanosomiasis elimination programs. There seems to be ongoing efforts to wipe out this disease by controlling carrier flies--the tse tse fly. There is little evidence of occurrence of this disease in epidemic proportions because the scare tactics have kept away all potential investors in dairying. The human population in this area has no documented report of sleeping sickness epidemics in modern history. Everything suggests, therefore, a lack of

incentive on the part of decision makers to invest in dairy production in the Niger Delta. This lack of incentive may be due to some of several reasons, including a bankrupt agricultural education program and a lack of leadership in agriculture.

The Food and Agriculture Organization, usually regarded as nonpartisan in the politics of international trade, is completely silent in its report on agriculture in Nigeria about livestock production in the Niger Delta. Rather, it makes recommendations for improvement based on the traditional demarcations prevalent in Nigerian academic and policy making circles, which labels a zone as the tse tse fly belt, hence cattle cannot be bred in that area. It is understandable, therefore, why college graduates can settle for the relatively non-challenging and prestigious administrative and clerical jobs offered by government on their graduation from college. What this literature tends to suggest is an acknowledgment of the fact that there are weaknesses in the Nigerian educational system, with particular reference to agricultural staff and personnel training. They also project a bleak future that calls for urgent solutions to the problems confronting food production in general and dairying in particular in the Niger Delta area.

At this juncture, it is necessary to narrow down the scope to the region of the United States most related to our study. According to the milk production statistics in

Table XI, milk production in the delta states of Mississippi, Arkansas, and Louisiana represented 2.3% of United States' total production, while the Southern Plains states of Texas and Oklahoma represented 3.8% of the United States' total production in 1972. While it must be borne in mind that dairy production in the United States is more of a factor of demand, therefore, the highest levels of production are recorded around the population centers of the east and north-east states; these figures represent a significant proportion of the United States' dairy production. Climatic conditions in the Southern Plains states are very similar to the traditional cattle production areas of northern Nigeria while weather conditions in the Delta States is similar to the Niger Delta area of Nigeria. Another point worthy of note at this point is the disease factor. The dairy industry in the United States has regional and universal disease problems. To say that these problems are under absolute control or that some diseases of cattle no longer exist in this country is a naive conclusion. This does not underestimate the invaluable services of the veterinary services readily available to American producers--it is only a statement of fact that no single disease or diseases in general is a limiting factor to dairy or other livestock production in all or any particular region of the United States.

A review of literature related to agricultural production in the southern United States reveals that farmers in

that region once faced the choice of abandoning production of crops such as cotton, whose market demand was declining, and production of livestock feedstuffs like grain sorghum and oats. Farmers in the Niger Delta are faced with this choice today as regards production of palm produce for overseas industries and dairy products for domestic consumption. Another point that studying the late nineteenth and early twentieth century United States' agricultural evolution tends to reveal is the cooperative extension services and the cooperative movement. Farmers were able to get useful information because of the availability of teachers who spoke "their language." This led to a coming together into cooperatives that could take advantage of institutional credit assistance. A review of reports of the Central Bank of Nigeria (1978) reveals a relentless effort by the federal government to remove every niche in the way of potential investors in agriculture, provision of credit, and assistance for organized cooperative movements. The main barrier seems to be the language factor.

CHAPTER IV

AN ANALYSIS OF PROPOUNDED CONSTRAINTS UPON DAIRY PRODUCTION IN THE NIGER DELTA AREA

Introduction

From the literature reviewed in the preceding chapter, it was evident that conclusions made by experts must be considered relative to the Niger Delta area, since no organized documented study of this subject in the area is available. Understandably, all potential investors in the area, since the decline in demand for palm produce, have been prospectors for petroleum deposits. The discovery of "sweet crude" petroleum in the area pumped more money into an area where agricultural production was already on the decline. As a result, people who could no longer sustain their dependents in the fallen export market of cash crops migrated to the cities to participate in the "oil boom." And as long as crude petroleum was pumped off the shores of the Niger Delta, enough cash to purchase imported foods was circled back into the system.

It is necessary to have a background knowledge of this situation to appreciate the author's attempt to present an analytical view of alleged and propounded constraints on

dairying in an area where the basic laws of supply and demand do not work consistently with government policy of allocation of funds to develop the natural resources, hence providing a better life for the inhabitants. The following propounded constraints are therefore evident in the literature reviewed, and thus must be critically examined in the light of total lack of organized study directly related to this subject and area.

Prevalence of Trypanosomiasis in the Niger Delta Area

Trypanosomiasis affects both man and livestock, most commonly in the form of "sleeping sickness," whereas cattle and other livestock serve as hosts to other varieties of trypanosoma. In spite of the fact that domestic animals and wildlife are often infected or serve as carriers of the various forms of this protozoon, there is no known case of a trypano-related epidemic among the human or cattle populations that migrate annually from the north to the southern population centers of Nigeria. No documented cases similar to the malaria epidemics can be documented among the resident population in the so-called tropical rain forest zone of southern Nigeria. In actual fact, prevalence of tse tse flies alone does not justify any argument against dairy breeding, since these flies abound in other livestock producing areas of the world, including India and Central America, and some of these species are

known to be disease causing too. In the author's view, trypanosomiasis syndrome, and any other tropical disease that has feathered the argument for non-breeding of diary cattle in the south of Nigeria, is an intellectual phobia that fosters a policy of continued economic dependence on the former colonial masters. This may partially explain why the Nigerian Institute for Trypanosomiasis research is located in Zaria, in the sub-sahelian zone and north of the rain forest area, and not in Port Harcourt in the heart of the Atlantic forest zone.

Lack of Proper Feedstuffs for Dairy Cattle

It is evident that feeding of protein and carbohydrate supplements greatly enhance performance of most livestock. However, we must not lose sight of the fact that cattle are ruminants, and nature designed their system to convert grass and forages into meat and milk. Grasses and legumes grow wild in the cultivated areas of the Niger Delta. There is also an abundance of uncultivated forests and rangelands with the potential to sustain any herd if developed by modern standards. Corn thrives abundantly in the Niger Delta and surrounding areas. Unfortunately, enough cannot be produced presently to meet the needs of the human population. The potential exists, however, not only for corn sorghum, and peanut production, but introduction of hybrid seeds will increase this

potential to remove any competition that may result from increased livestock demand.

Another view of this issue is the relationship between malnutrition and susceptibility to infection. Hunger and reduced resistance to infection go hand in hand. Perhaps this will explain why many diseases are easily identifiable in the tropical regions, including the Niger Delta.

Climate Not Conducive to Good

Animal Health

Like man, cattle are subject to the effects of climatic changes and extremes. But we all adjust and adapt to our new situations. This explains why over four centuries ago the Conquistadors brought cattle from temperate climatic conditions in Europe, and they were able to adjust to the tropical conditions in Central America. They multiplied and spread across the Rio Grande and are ancestors of the Texas Longhorn cattle. The tropics never get too extreme in cold or heat; at least not in the area of our study. However, the rainy season may be long and intense, resulting in puddy conditions which cause foot rot and other related problems for range cattle. Such problems are common anywhere there is poor drainage, be it feedlot or dairy barn. It is conceivable, therefore, that dairy cattle can be provided rain shelters if breeding is done

on a large scale and commercial basis, while the cattle adapt themselves to the humid conditions of the region.

Low Rate of Literacy Among Potential Producers

More than half the population of the Niger Delta farm for subsistence. Over ninety percent of people designated as farmers cannot utilize information of a technical nature available only through literature. In fact, the less than 10 percent who can read and write are only involved in cash crop production, and they lack the skill to manipulate their market, because stock market forecasts and business publications are not only beyond their reach, they are beyond their comprehension and utilization.

It is not surprising, therefore, that agricultural improvement facts are available to the ministry of agriculture from institutions such as:

1. The universities
2. The colleges of agricultural research
3. The Institute of Tropical Agriculture
4. The International Livestock Centre for Africa

These institutions hardly improve the lot of rural citizens in this area. Radio and television programming, a potentially useful media, have produced little or no changes in farmer attitudes because of this weak link.

Agricultural Extension Service's
Ineffectiveness in Moti-
vating Farmers

Agricultural extension service is provided by the ministry of agriculture in various ways, including regional demonstration projects, veterinary clinical services, and forestry and fisheries assistance. However, these services have not been effectively utilized because of a combined effect of lack of skilled and committed field staff, inability to translate government financial policy, grants and aid to farmers into badly needed cash and credit. The universities and colleges of agriculture produce graduates which staff the various organs of the agricultural department, but their impact on agricultural production is hardly noticeable. This situation is comparable to that in the United States before the Smith-Lever Act of 1914, where it can be said that cooperative extension helped translate agricultural information into the language spoken by country people.

The relationship between Nigerian farmers and the universities is not that of the battleground and the skilled soldier that it should be. The university is a place he aspires to send his son, so he could qualify for a good government job. The colleges of agriculture are the same but in a subordinate position to the universities. The college graduate brings home canned milk to his parents

during weekends away from the city. They use it and like it. They have known nothing else; to them, milk is from cans not cows.

Meager Percentage of Rural Youth
Attending Agricultural Insti-
tutions of Higher
Education

Historically, higher education in Nigeria was paced by the degree of association with the colonial administration. This trend may have changed because most parents now understand that education is the "big key" to a brighter future for their children. However, parents still insist that their sons and daughters must train to be doctors and lawyers. As a result of this pursuit, fewer country boys and girls look up to education that will eventually return them to the country and the ancestral land. In fact, many of these aspirations hardly get fulfilled, and many prospective young people end up with disappointing careers. The educational system is faulty in that it is not production oriented. On the average, the Nigerian college graduate still regards his diploma as a license to a good paying and secure job in a governmental department. Under this circumstance, boys and girls with little country attachment, because their parents have lived and worked in the city all of their lives, use their "connections" to gain more places in agricultural colleges than children

with a strong country connection. The result is that decision making positions are held in government by people who have little or no vision for improved living standards in rural areas; many of these leaders would never work in rural areas themselves.

No Viable Agricultural Youth Organi-
zation Among Secondary
School Students

Secondary schools' extracurricular activities include membership and participation in activities organized by societies and clubs, including but not limited to, debating, historical, geographical, photographic, and science societies, etc. Many of these societies helped broaden the horizons of their members through field trips and excursions, lectures, and other programs of enlightenment.

The lack of emphasis in agricultural production may be the reason why this vital organ was never exploited to develop agriculture oriented youth at a tender age. Few institutions, if any, ever had or still have viable agricultural societies. On the American scene, the historical value of the 4-H clubs and FFA Chapters cannot be overestimated; neither can their impact on change in rural communities be precisely measured. But, without doubt, these organizations produced a new breed of Americans who appreciated the country, and, more than that, their linkage to the land was further reinforced by a sense of belonging.

Belonging to the Future Farmers of America did not only help students choose agro-related careers in college, it provided post college employment opportunities in farm related industries.

Cooperative Movements

Upgrading rural Nigerian cooperative movements to the level where they can significantly improve on traditional agricultural practices (dairying specifically) is a function of the level of awareness to government credit institutions and aid programs aimed at revolutionizing the food industry of the nation. This, in turn, depends on the effectiveness of communication between the different agencies and the participants in these programs.

Nigerian Agrarian Revolution

Documents reviewed suggested a genuine effort during the late 1970s to reduce national dependence on foreign food imports by extending credit to local producers, as well as attracting foreign investment and technological development of the nation's food industry. These include the operation Feed the Nation, followed by the Green Revolution, in which the federal and state governments created new agencies, voted money into programs, and enacted land reform edicts to help revolutionize agri-business, as well as to improve rural food production. However, the degree of success of these programs can be measured scientifically,

except that they significantly aroused public interest in food production as a career, and it indirectly propped up the declining interest in rural lifestyles. Why these programs did not exceed cannot be entirely divulged from what has been earlier described as the weak link between the colleges of agriculture and universities, and the communities they reside in.

Feasibility Factors

Duckham and Masefield (1970) list nine major factors, a comprehensive discussion of which exceeds the scope of this study. The author has designed a summary sheet of major items in that list as they relate presently to dairying in the Niger Delta, the degree of difficulty in overcoming them, and a recommendation of where emphasis should be placed. The items include:

1. Climatic conditions.
2. Moisture control and soil stability.
3. Land.
4. Predators and pests.
5. Technological adaptation.
6. Economic infrastructure.
7. Installation of dairy processing plants.
8. Livestock importation.
9. Nutrition

Analytical Basis for Conclusions and Recommendations

In Chapter II, the author made a comprehensive list of subject areas for review which confined this study within its limits. We cannot advise nature to change weather patterns or climatic conditions. But we can initiate action or furnish recommendations which, if implemented, can provide better living conditions in our natural environment. Institutions that can effect such changes in this case include:

1. Farmers (rural).
2. Governments (federal, state, and local).
3. Colleges and universities.
4. Foreign interests (investors and philanthropists).

These are the primary establishments whose decisions affect the history, human and animal health, nutrition, educational advancement, and other associational changes which bring progress into any human society. Making recommendations for dairying in the Niger Delta, in light of the United States' dairy success story, can be better understood if they are projected from the above point of view.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Purpose and Objectives

Primarily, this study was undertaken to provide answers for the many questions surrounding a total absence of dairying in the Niger Delta area of Nigeria. It was an attempt to find out why dietary milk and other dairy products for this densely populated area can only be supplied by foreign exporters. Any facts established could then provide the basis for recommendations to governments and other interests involved in the economic life of the area.

Procedure

Limitations resulting from poor communication with Nigeria confined the information source to the following:

1. An extensive review of related literature, including textbooks on the subject of agriculture.
2. Central Bank of Nigeria reports.
3. Personal experience drawn from several years of working in a State Ministry of Agriculture in the Niger Delta area.

4. Journal and magazine articles.
5. United Nation documents.
6. USDA reports and publications.

Other sources of information included a personal interview with Dr. Laogun, a senior lecturer at the University of Ife in southern Nigeria, who has a profound interest in the educational aspect of Nigerian agriculture. The interview was conducted with the assistance of Dr. R. R. Price, Professor Emeritus at Oklahoma State University, Department of Agricultural Education.

Another source of dependable evidence was the author's personal experience as a meat inspector and staff member of the Ministry of Agriculture in the Rivers State of Nigeria from 1970 to 1977.

Findings

Literature Review. Most of the literature reviewed stuck to a common theme of describing the northern region of Nigeria as the cattle belt, while the southern region falls within what is called the trypanosomiasis belt. It is not surprising, therefore, that there was no available documentation of attempts to breed livestock in the Niger Delta area. As a result, there were no studies related to development of rangelands or pastures; neither is there any mention of the potential for irrigation of cropland from the Niger River and its numerous tributaries. This apparent lack of interest or information that could provide the

stimuli for potential investors in dairying can be explained by:

1. Lack of trained personnel and institutional facilities that could have made such studies possible.
2. The conclusion by so-called experts in tropical agriculture that livestock production was indeed impracticable in the southern regions of Nigeria.
3. Vulnerability of the establishment to the trypanosomiasis syndrome.

What was apparently lacking in these related studies is the fact that adaptation to adverse environments is not only possible with man; other animals (dairy cattle included) can adapt to changes in their environment as well as levels of nutrition. What was lacking among the experts is a spirit of "crusaders," unafraid of venturing into the unknown to sidetrack the well-beaten paths of common and easy conclusions--tse tse flies abound in the tropical rainforest, therefore breeding cattle in any region within that climatic zone is not possible.

Interview and Personal Experience. Dr. E. A. Laogun, currently involved in agricultural extension work at the University of Ife (in the same climatic belt as the Niger Delta), revealed that dairying is not only feasible, but is currently being practiced on a commercial basis in Oyo, Ogun, and Ondo areas. There are commercial dairy industries in Lagos also. He further revealed that the University of Ife is becoming increasingly involved in grain production in the villages through its cooperative extension services. A summary of the views of the author,

based on these findings, along with recommended action appropriate to the existing circumstances, are listed in Table XII.

People

The masses of the people of the Niger Delta still live in rural areas. They cultivate their own crops and/or fish for subsistence, although more and more people are increasingly migrating to the urban areas because of the lure of quick and easy money, while rural lifestyles no longer provide needed security and satisfaction. Most of the people are uneducated, and most of the literate among them provide misguided leadership. The population is rapidly increasing, while cost of living increases have fast outpaced real earnings. As a result, milk eggs, beef, and many other vital components of the diet have become luxuries for a few well-to-do. The restlessness resulting from this situation is not only apparent through a high rate of infant mortality; youths are beginning to ask questions in respect to the revenue from oil.

Educational Institutions

Until recently, there was no university in the Niger Delta area. Currently, there are two universities and a college of agriculture in the Rivers State. The universities of Benin and Calabar are accessible to this area, and it is possible that they can train the much desired

skilled personnel, capable of revolutionizing agriculture in the Niger Delta. These institutions can also provide the forum for technological development and research into the limitations of the dairy industry in the Niger Delta area.

Government

Federal and state governments are genuinely concerned with agricultural production in the Niger Delta, hence the establishment of the Niger Basin Development Authority. However, the lack of effective communication of government objectives, financial assistance, and valuable information to the farmers, may have resulted in the present situation where opportunists misdirect such bonuses into wrong hands, thus defeating the aims and objectives of the government.

Table XII is an attempt to summarize alleged constraints to dairying or any agricultural program in a developing economy, especially as they relate to the peculiarities of the Niger Delta area. The author attempts to rate on a scale of 1-5 the degree to which these items constitute a valid constraint, and the degree of difficulty in overcoming such constraints. Recommendation is also made indicating what areas emphasis needs to be placed. These include: financial, educational, governmental action, and private sector participation. Brief explanations are provided at the end of this list to

TABLE XII
SUMMARY RATING OF ALLEGED CONSTRAINTS

	Degree to Which Item Constitutes a Valid Constraint ^{1/}	Degree of Difficulty for Overcoming Constraining Factor ^{1/}	Recommendation: Emphasis should be placed on: ^{2/}			
			Financial	Educational	Governmental Action	Private Sector Participation
1. Climatic Conditions:						
a. Rainfall & humidity	2	1	x	x	xx	--
b. Sunshine & aridity	0	0	0	x	x	--
2. Moisture Control & Soil Stability:						
a. Irrigation	1	2	x	xx	xx	xx
b. Erosion	1	1	0	x	x	x
c. Adaptation for crops to support dairying	4	2	xx	xxx	xx	xx
3. Land:						
a. Tenureship restrictions	3	3	xx	xx	xxx	x
4. Predators & Pests:						
a. Tse tse fly & trypanosome	2	2	x	x	xx	x
b. Ticks, fleas, mites, etc.	2	1	xx	xx	xx	x
c. Other diseases	3	3	x	xx	xx	x

TABLE XII (Continued)

	Degree to Which Item Constitutes a Valid Constraint ^{1/}	Degree of Difficulty for Overcoming Constraining Factor ^{1/}	Recommendation: Emphasis should be placed on: ^{2/}			
			Financial	Educational	Governmental Action	Private Sector Participation
5. Technological Adaptation:						
a. Labor intensive	0	0	x	xx	x	x
b. Energy intensive	0	0	0	0	xxx	xx
6. Economic Infrastructure:						
a. Market for dairy products	-	-	-	-	x	x
b. Production credit available	4	3	xx	xxx	xx	xx
c. Foreign trade influence	4	4	0	xxx	xxx	xxx
d. Cooperatives	5	3	xx	xxx	xx	xxx
e. Transportation, storage, etc.	2	2	x	x	xx	x
7. Installation of Dairy Processing Plants:						
a. Milking equipment	5	3	x	xx	xx	xx
b. Dairy processing plants	5	3	x	xx	xx	xx
c. Storage & sales equipment	4	2	x	x	x	x

TABLE XII (Continued)

	Degree of Which Item Constitutes a Valid Con- straint ^{1/}	Degree of Difficulty for Over- coming Con- straining Factor ^{1/}	Recommendation: Emphasis should be placed on: ^{2/}			
			Financial	Educational	Governmental Action	Private Sec- tor Partici- pation
8. Livestock Importation:						
a. Dairy cows	4	2	x	xx	xx	x
b. Frozen semen	4	2	x	xx	xx	x
9. Nutrition:						
a. Local grain prod.	4	3	x	xx	xx	x
b. Imported supple.	2	1	xx	--	xx	x

1/ 1-5: Ascending order of magnitude of constraint or difficulty in overcoming it.

2/ x: Degree of emphasis on recommended action.

reduce any ambiguity or limitations arising from this unscientific measuring technique.

Climatic Conditions

The view of experts tends to suggest that heavy rain-falls and a relatively high humidity can be a severe setback to dairy breeding in the subtropical regions of the world. However, the question of adaptation by livestock to changing environments was not emphasized.

Moisture Control and Soil Stability

Although some reports indicated that erosion may become a major problem if mechanized agriculture is practiced in the Niger Delta, it was observed also that much of the Delta area is mostly flat forestland with elevations less than 200 feet. Natural waters empty most of the excessive rainfall into the Atlantic, and a mechanized agricultural project could also include irrigation ditches to use the rainwater for cropping and herbigation in fields. Leaching, often associated with tropical soils, could also be taken care of by fertilizer use and garbage recycling.

Land

1. Much of the land has supported subsistence agriculture for generations.

2. Much of the arable land can be made available to potential investors through a special act of the federal government.

3. There is a significant fraction of potentially arable land which mechanization can help to retrieve.

Predators and Pests

1. The tse tse fly and trypanosomiasis seemed to be the major preoccupation of experts when considering feasibility constraints.

2. There is no evidence of substantiated incident of actual herd wipeouts by tse tse fly infestations.

3. The Nigerian government has set up a trypanosomiasis research center at Zaria, which would have better served its purpose if situated in the heart of the rainforest zone.

4. Other predators, pests, and livestock diseases exist in the area, but not unlike other livestock producing areas of the world.

5. An educated use of presently available veterinary services would go a long way to improve breeding environments for livestock in the area.

Technological Adaptation

1. Much of the agricultural production had been by manual labor, but alternative sources of income through city jobs have led to a decline in labor investment in food products.

2. Presently available equipment and methods make farming very unattractive to the young.

3. Much of the potentially arable land can only be put into use through clearing with heavy equipment.

4. Cheap labor is still available to supplement mechanization of agriculture.

Economic Infrastructure

1. Demand for dairy products has led to increased importation costs, which can be saved by domestic production.

2. The Nigerian government, through its agricultural credit banks, is making available the low interest loans needed for investment in agriculture.

3. Formation of agricultural cooperatives will be made possible soon, as the universities are becoming more involved in food production in their surrounding communities.

4. The construction of interstate highways coupled with better storage and transport facilities will further enhance dairy marketing.

Installation of Dairy Processing Plants

1. Production of milk from cattle will need milking equipment, processing plants, and storage and sales facilities.

2. Mobile sales units will facilitate transportation and safe delivery of dairy products to consumers outside the production area.

3. Such facilities are not available at present and must be made available for commercial dairy production.

Importation of Dairy Cows

1. High producing cows are not available at present in the area.

2. Importation of dairy cows, bulls, or frozen semen must be coupled with expertise in artificial insemination and management experts for the take-off stage.

3. Provision of fly-proof shades, etc. may be necessary, especially at the preliminary stages in which exotic cows are introduced.

Nutrition

Facts available from reviewed literature tend to suggest that with the application of technological advancements currently being practiced in the Western agricultural industries, such as the grain and forage industries in the U.S., much of the nutrition needs of dairy cattle can be produced locally in the Niger Delta. It must also be emphasized that well-fed cows are less susceptible to fatal disease infections, neither will infections have such drastic effects as will be the case in a herd of undernourished cows. Adequate nutrition for dairy cows in the form of forages, concentrates, and supplements can be seen as a major limitation on dairying in the Niger Delta, where the average of the human population is still underfed.

Foreign imports of supplements from countries like the U.S. provide an alternative source, especially at the preliminary stages of raising a herd of dairy cows in developing areas like the Niger Delta.

Lack of Processing and Preservation

Facilities May Hinder Milk and

Dairy Products Production

There is presently no dairy processing plant in any of the states of the Niger Delta area, because there are no dairy producers in the area to furnish the raw milk. However, milk spoilage accounts for annual losses in the thousands of dollars, and this occurs in the form of blown or rusty cans. Minor losses at the household level is associated with the lack of refrigeration in most homes.

Dairy production in the Niger Delta will therefore take into account these shortcomings by:

1. Training of personnel able to produce various forms of dairy products such as the cheeses, ice cream, and other milk-based products.
2. Acquiring skill and technology for manufacturing paper cartons and processing milk in the form that keeps in these cartons on shelves for indefinite periods of time (such processing is currently going on in commercial quantities in Jamaica by the Cornwall Dairy Industry at Monntpellier).
3. Establishment of a dairy processing plant close to the milk producers will reduce losses incurred in transit.

Conclusions

Facts available so far tend to suggest the following:

1. Climatic conditions pose major constraints to dairying in the tropics as well as other climatic zones of the world. However, livestock adapts to new environments just as humans adapt to changes in their natural or new environments.

2. Moisture control in the form of irrigation channels is essential, especially in poorly developed soils such as those found in the humid tropics. Perennial and heavy rain showers further compound this problem of susceptibility to flooding and erosion. On the other hand, the numerous tributaries in the Niger Delta can be harnessed for grain and pasture production, to support a dairy industry, as well as a good source of drinking water for humans and livestock alike.

3. Much of the land of the delta is in small family holdings to which individuals attach much importance. This might create problems for cooperative farming because these lands are not symmetrically divided among families in a way that non-participants in a joint agricultural scheme can be left out without their land holdings being violated. The decision by the federal government which enacted special legislation making all arable land available for qualified investors in agricultural projects can be seen as a first step in the right direction. The

feasibility of large scale grain and forage production for a dairy industry therefore exists where all restrictions on land use are lifted by government.

4. Predators and pests are constraints to dairying in the Niger Delta to the degree that fear created by "speculators" and ill-advised political interests become a major stumbling block to potential investors. Predators and pests exist in various forms and degrees in the major livestock producing areas of the world. The problems they create for man and his livestock provide employment for the physicians, human and veterinary alike. Other paramedics get their employment from providing treatment and control for the various diseases and pests that pester the livestock industry. If dairying should be practiced in the Niger Delta, it is possible that many of the veterinarians who are currently stuck in government administrative jobs will choose private practice which, in the long run, is a more rewarding experience.

5. Technology is seen by many experts as a threat to the labor force in densely populated areas of the world. On the other hand, technology is essential for mining and drilling ventures. Without technology, it will be almost impossible to explore and exploit many resources which now provide much of the revenue for the Nigerian economic development. It is impossible to ensure an even spread of this wealth if better investment of such revenue is not treated as a priority. Building

of irrigation canals, dams, lakes, and the development of forests into grasslands will not only provide employment for the population; these resources will enhance agricultural production and further cut down the cost of importation. This will provide a more healthy environment for the mining and other industries to prosper without threat of domestic insurgency. Technological adaptation will thus enhance dairy production by developing the basic infrastructure necessary to sustain such an industry locally.

6. The present economic infrastructure encourages migration from rural to urban areas, as well as emphasize importation of certain basic commodities. It can be imagined that if the money being currently spent on dairy imports was spent on importation of live cattle and breeding expertise, the Niger Delta would be a thriving dairy production area by the 1990s. On the contrary, an economic system in which only the rich get richer while the poor only increase in number has a potential for breeding anarchy in the future.

7. Milk production requires sophisticated machinery for milking and processing. However, this necessity only arises after the establishment of lactating cows in the region. Considering that the period from calf to a lactating cow is about 30-36 months, it is necessary to construct such milking sheds and dairy processing plants simultaneously with the establishment of dairy cows in the area.

8. Livestock importation is necessary as a source of exotic breeds, and this can take the form of live cows, frozen semen, or embryos where breeding specialists and skilled technicians are also imported. There is currently a University of Science and Technology establishing a College of Agricultural Research in Port Harcourt. This could provide the nucleus for dairy breeding programs in the Niger Delta, since an institution of that level is likely to attract expertise from abroad. Such experts can enhance the process and procedure of exotic cattle importation into the Niger Delta to upgrade the local dwarf N'dama cows. Philanthropic organizations can also participate in this process.

9. While level of nutrition is not directly proportional to milk yield, there is a minimum level below which productivity is limited by quantity and quality of nutrients for dairy cattle. In an area where the average of the population is under-nourished, it is not expected that unless special attention is given to the source of cattle feed, this can be the single most important constraint to dairying. Susceptibility to infection is known to be aggravated by inadequate nutrition. "Dairying is possible wherever grass grows" is a phrase used by some experts; grass grows wild in the Niger Delta.

Recommendations

In the light of the preceding conclusions, these

recommendations are considered necessary for a prospective dairy industry in the Niger Delta area:

1. It is necessary to involve the colleges and universities in a more sophisticated weather data collection and prediction of changes in the climate. Such information needs to be effectively communicated to crop producers in the rural areas by means of a more purposeful cooperative extension service. Agricultural extension services can also advise potential dairymen on the correct design of shelters from adverse weather for livestock as well as silos and barns.

2. Federal and state governments can foster agricultural production by construction of dams, lakes, spillways, as well as irrigation canals to harness the untapped water resources of the Niger Delta, for crop production as well as energy needed to electrify the rural areas.

3. Federal, state, and local governments must work harder to relax all land titleships which hinder progressive agricultural policies and cooperative agricultural ventures. Development of virgin forests must also be undertaken by these institutions to enhance forage and grain production.

4. Programs aimed at control of pests and predators must emphasize biological, not chemical, methods. Furthermore, research and expansion in veterinary services are necessary. As more people recognize the potential of dairying and other livestock related industries, veterinarians

can be encouraged to enter private practice and not depend on government for less challenging employment.

5. Government tractor hire services provided for in the "Operation Feed the Nation" program can be given on a trial basis to private entrepreneurs to run on a commercial basis. Technology is very essential to accommodate all the necessary development programs; therefore, only specialists motivated by profit or special interests should have controlling shares in machinery hire, sales, or rental services.

6. Unless the economic infrastructure of Nigeria makes room for the individual to control his financial resources, the "national cake" concept will continue to persist, and government will continue to subsidize dairy and other import costs. The agricultural credit banks must be more objective in granting loans to ensure that only real investors are given loans, and only viable projects are subsidized. Farmers must be encouraged to grow more crops, and prices should reflect the labor input of farm hands.

7. A pilot dairy project can be established by the university, state or federal government, or business community for demonstration as well as providing calves and heifers for beginning dairy men. At the university level, this could be part of a research project. (Such projects have been very successful in the U.S. land grant colleges.)

8. Heifers and calves, as well as service bulls, can be purchased from the Shiker research project in

Zaria and several similar projects around Nigeria. They can also be imported by government and sold to local farmers from the foreign countries currently exporting finished products into Nigeria. However, church organizations and international aid agencies can furnish expertise needed for hand mating programs, where frozen semen and/or ova are used.

9. Since the Niger is far from providing the food requirements of its human population, any effort toward dairy nutrition must involve all the different aspects of society, including the people in rural and urban areas, the governments at all levels, the institutions of higher learning, and foreign interests and investors.

Efforts must emphasize:

- a. Increased grain production.
- b. Pasture development and rangeland management.
- c. Feed processing and storage.
- d. Supplementary import of livestock feeds as well as hybrid seeds and fertilizers.

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APPENDIXES

APPENDIX A

MAP SHOWING ALTITUDE AND MAIN RIVERS
OF NIGERIA

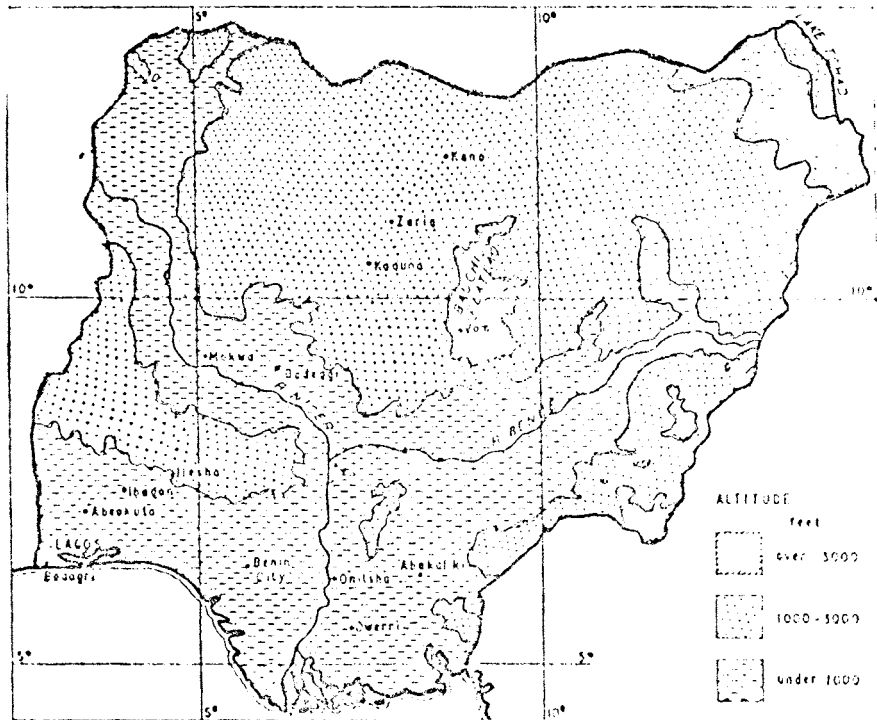
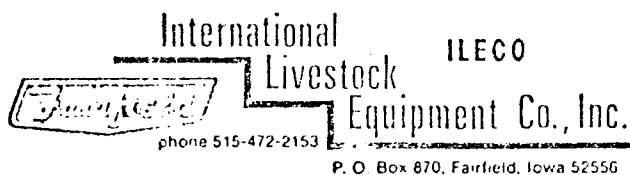


Figure 6. Altitude and Main Rivers of Nigeria

APPENDIX B

CORRESPONDENCE



November 6, 1980

Oklahoma State University
Director of Student Placement
Stillwater, Oklahoma 74074

Dear Sir:

We are deeply involved in several large crop, poultry, hog, feed mill, hatchery, and slaughter facility projects in Nigeria which are in need of United States college graduates trained in these areas of agriculture.

The projects are near Calabar, Lagos, and Kano. Naturally, Nigerians from these areas are the first choice for careers. Graduates with a United States farm background are desirable for a two or three year period of training and work.

The projects should begin in the summer of 1981 and continue for approximately ten years.

Please make this information available to recent graduates and those who plan to graduate soon, and ask them to forward their resumes to this office.

Sincerely,

ILECO


Harry Cannon

HC:ec

VITA

Moses T. Yorama

Candidate for the Degree of
Master of Science

Thesis: THE FEASIBILITY OF DAIRYING IN THE NIGER DELTA
AREA OF NIGERIA

Major Field: Agricultural Education

Biographical:

Personal Data: Born in Deeyor, Gokana, in the Bori
Division of the Rivers State of Nigeria, on
July 14, 1948, to Dukori, Nelson, and Kobaa,
Sarah, Yorama.

Education: Graduated from Kibagha Methodist School
in December, 1961; received the University of
London General Certificate of Education in Jan-
uary, 1972; graduated first class and student
of the year in June, 1975 from the Leather Re-
search Institute of Nigeria in Samanu, Zaria,
with the Higher National Certificate, and later
specialized in meat products inspection after a
short course in 1976 at the College of Animal
Science at Mando in Kaduna State of Nigeria;
received Bachelor of Science degree in Animal
Science from Oklahoma State University in Decem-
ber, 1979; completed requirements for the Master
of Science degree at Oklahoma State University
in May, 1981.

Professional Experience: Meat inspector, Rivers
State Ministry of Agriculture, 1970-77.

Awards: Overall best student of L.E.R.I.N. Zaria,
1975 graduating class; Academic Achievement
Award from Oklahoma State University Minority
Students' Programs in 1979; Certificate of Ap-
preciation from the Oklahoma State University

Nigerian Students' Union for Outstanding Contributions in 1979; Dean's Honor Roll, 1977-79, College of Agriculture, Oklahoma State University.

Leadership Activities: President, Deeyer Progressive Union, Port Harcourt Branch, 1975-76; President, Deeyer Students' Union, 1973-75; Nigerian Representative and Senator, Afro-American Society, Oklahoma State University, 1979-80; Vice-President, Nigerian Students' Union, Oklahoma State University; 1980-81; Secretary, African Students' Christian Fellowship, Oklahoma State University, 1980-81.