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PRE-FEASIBILITY STUDY OF  
MEAT PROCESSING IN THE  
ECONOMIC COMMUNITY OF WEST AFRICAN STATES

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## PREFACE

The objectives of the study as defined by the Agency for International Development (AID) and the Economic Community of West African States (ECOWAS) are relevant and ambitious. Unfortunately, inadequacy of data, logistical difficulties encountered, and the number of countries included in the study in relation to the time and resources available necessitated that the author concentrate on those areas judged to be most critical in reaching an informed judgment on the feasibility of industry development for meat processing, including beef, swine, poultry, and small ruminants.

The almost complete lack of data available in West Africa and logistical problems encountered within the time budgeted, and the requirement that available budgeted time be spent in West Africa precluded the measurement of the detailed feasibility parameters envisioned in the project scope. Development of primary data sources was beyond the scope of the study. This was reported to AID's Africa Bureau in interim report dated March 17, 1982. In view of the difficulties stated above, the author of the report had to rely on observation of existing market and production conditions in West Africa, and experience gained over fifteen years of working in the meat industry in the United States, South America, Australia, New Zealand, Europe and Africa.

The basic prerequisite conditions for the development of a meat processing industry in the ECOWAS sub-region are discussed, constraints to development are identified, and recommendations set forth for ECOWAS as a focus for regional development in West Africa.

The assistance of Mr. Christian Marie Santos of ECOWAS was invaluable to Dr. Michael Steiner in conducting the study. Without his assistance as interpreter and his knowledge of the countries visited, the objective of the study could not have been accomplished. Appreciation is also expressed to the ECOWAS Coordinators in the countries visited for the time and effort spent in arranging interviews and visits.

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## EXECUTIVE SUMMARY

The West African countries that comprise the Economic Community of West African States are in balance deficit producers of meat. Imports of meat products from outside the region have been increasing. This study was formulated to investigate the feasibility of establishing an indigenously based meat processing industry to improve the utilization of meat supplies in surplus producing countries of ECOWAS and reducing the imports of these products.

Livestock production has received considerable study in West African States in recent years. Development and growth of livestock production has been slow and has not kept pace with the increase in demand. A U.N. Food and Agriculture Organization (FAO) study completed in 1980 estimated a deficit of 233,000 metric tons in 1985 and 140,000 metric tons in 1990. These estimates include beef, mutton and goat, pork and chicken. It is quite clear that given existing deficit conditions in meat production and prospective increases in this deficit that economic conditions conducive to development of a meat processing industry do not exist at this time nor in the immediate future.

The production of small ruminants in ECOWAS member countries is problematical. Various interviews and market observations indicate the current production of lamb and goat in traditional methods exceeds official estimates of production. Commercial production of sheep and goats would require imports of cereal grain for feed in addition to requiring additional pasturage in an already fragile environment in the Sahel. The production of hogs in those countries of ECOWAS conducive to their production in terms of climatic as well as social traditions would require the import of grain for feed. Evidence encountered in the survey indicates that hog production is not commercially viable.

Poultry production in ECOWAS member states has increased dramatically over the past few years. However, the deficit of red meat places a very high demand for fresh poultry. At this point and in the future a poultry processing industry would not be able to draw available supplies from the fresh market for poultry. In addition, the necessity to import feed places a restraint on future development of this industry. Poultry will continue to be adequate only for supplying the demand for fresh poultry.

Excess capacity exists in West Africa abattoirs which produce fresh meat in carcass form. Facilities exist for the chilling and freezing of meat in carcass form for export in surplus producing countries. These facilities are not being utilized except on a very sporadic basis. Meat is currently traded intra-regionally from surplus to deficit countries in the form of trekking live animals. The economic loss concurrent with this practice is very high for both producers and consumers. Trade should be developed in meat as opposed to animals.

Three principal constraints to future development of the livestock industry were identified. There are:

(1) The pricing structure and demand for fresh meat dictate that a processing plant could not bid raw material away from the fresh market, add processing and marketing costs and sell the resulting product at a competitive price.

(2) Poor breeding stock, prevalence of disease, high calf mortality, and low levels of livestock management impact both directly and indirectly on the development of the meat industry.

(3) Market inefficiency and lack of infrastructure are major barriers to intra-regional trade.

It is recommended that ECOWAS takes steps that can impact on these problems and constraints as follows:

(1) A study of transportation costs and transportation facilities specifically relating to meat and animal transport by truck, rail and air.

(2) A detailed study of prices, pricing mechanisms and market communications should be conducted through the total marketing system for livestock and meat. Abattoir operations should be reviewed for operational efficiency and fee structures.

(3) A detailed feasibility study should be initiated to determine the viability of a processing industry based on imported raw material.

(4) ECOWAS as a regional organization is well suited to serve as a focal point for the coordination of research and information concerning animal health and nutrition. The approach to research in livestock production and marketing should be a regional program.

(5) ECOWAS as a regional organization should initiate a detailed study of production and marketing of poultry and eggs. Particular emphasis should be placed on feed supplies, prices and market infrastructure. Particular attention should be placed on development of a centrally based poultry production and breed improvement program for the region.

## I. INTRODUCTION

The purpose of this report is to review the various factors that are relevant to the economic feasibility of establishing meat processing industry. Meat processing for the purpose of this study is defined as manufacturing processes that transform fresh meat or meat in carcass form to alternative forms such as frozen meat cuts, canned meat, cooked meat combined with other food products such as stews or soups. The countries that are members of ECOWAS are in balance deficit in the production of red meat. Some member states are surplus producers of meat which is exported to member states that are deficit in production. ECOWAS in total is a net importer of meat and meat products. It was felt that through meat processing, the member states of ECOWAS could improve their intra-regional trade in meat and reduce the necessity to import meat and meat products from outside the region. Because of market size, it was further postulated that a regional approach to a meat processing industry would provide maximum benefit and improve the viability of a proposed development effort in industrial meat processing.

### Objectives

The objectives of the study were to conduct a pre-feasibility study of meat processing activities in ten ECOWAS countries. The following factors were considered in furtherance of this objective:

- 1) Identify derivatives of meat that would lend themselves to processing.
- 2) Determine the size of existing and potential demand in West Africa and elsewhere for the various derivatives of each product.
- 3) Specify the actual and potential volume of West African production of the primary products which would serve as raw material.
- 4) Estimate the size and number of production units needed to satisfy the West African market or the identified products.

- 5) Determine the location characteristics and performance of existing units in West African meat processing industries.
- 6) Estimate the magnitude of investment needed to establish new processing plants and improve existing units.
- 7) Assess the need for export markets to support economies of scale for processing operations.
- 8) Review alternative technologies.
- 9) Review the role of ECOWAS and make recommendations on how they can best stimulate regional food processing industries.

#### Methodology and Procedure

Interviews were held with government officials, AID personnel, private companies and individuals where interviews could be obtained. In addition, visits and surveys were made of traditional markets, supermarkets, food stores and livestock markets. Abattoirs in the capital cities were also visited. Development of primary data sources was beyond the scope of the study and the time and resources available. Secondary data sources were extremely limited and non-existent for meat processing itself.

The countries visited during the study were as follows:

- Nigeria
- Senegal
- Ivory Coast
- Liberia
- Niger
- Mauritania
- Sierra Leone
- Ghana
- Mali
- Upper Volta



It is recommended that readers review the following studies in conjunction with this report. The conclusions and recommendations contained in these reports are complementary and additive to this study:

- 1) Traore, Fernand, Livestock Situation in The ECOWAS Sub-Region, Economic Community of West African States. ECOWAS, Lagos, March 1981.
- 2) United Nations Economic Commission for Africa, Joint ECA/FAO Agriculture Division, Co-operation and Trade in Livestock Products in the ECOWAS Sub-Region. ECOWAS, Lagos, 1980.
- 3) Ariza-Nino, and Charles Steedman, Livestock and Meat Marketing in West Africa; Center for Regional Economic Development; University of Michigan, Ann Arbor 1981.

## II. RAW MATERIAL SUPPLY

Food processing industries are based on a number of factors, the key ingredient being the supply of raw material to be processed and its value and price in alternative uses. Transformation of fresh meat to processed form is based upon the existence of two alternative economic conditions. In the first case, the supply of meat available is such that it cannot be consumed in the short time period available before the fresh meat becomes inedible. In traditional cultures this takes the form of smoke drying of meat.<sup>1</sup> The second case is where a seasonal surplus of a raw material exists with coincident low value (relative price) or where a particular part of the raw material supply is relatively low in value. It is this second case that is most relevant to industrial meat processing.

The economic process that occurs is one of taking low valued raw material, and changing it to a more desirable form and higher value. Processing of low value meat raw materials changes these raw materials to more consumer-desirable forms and adds value in terms of convenience, such as less cooking time, storability, etc. These processed forms of meat are items such as pate, sausage, smoked and cooked ham, canned corned beef, corned mutton, and meat containing canned and frozen products.

Taking a regional perspective of ECOWAS, although some countries have an exportable surplus of red meat and poultry, in balance, the region is a deficit producer of red meat. In contrast the region is approaching self-sufficiency in poultry production at current market prices and income levels.

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<sup>1</sup> Ariza-Nino, and Charles Steedman, Livestock and Meat Marketing in West Africa; Center for Regional Economic Development; University of Michigan, Ann Arbor 1981. Hereafter referred to as the CRED Study.

FAO, in its study of trade in livestock products in ECOWAS, projected the prospects for production and demand of livestock products as follows:

TABLE 1

Prospects for Production and Demand of Livestock Products  
(1,000 Metric Tons)

Product	1985			1990		
	Production	Demand	(Deficit) Surplus	Production	Demand	(Deficit) Surplus
Beef	452	660	(208)	509	843	(334)
Mutton/Goat	224	363	(139)	234	477	(243)
Pork	103	117	( 14)	126	153	( 27)
Chicken	313	285	28	541	377	164

It is quite clear that the estimates by FAO and the existing deficit in red meat production that currently exists in the ECOWAS region, do not reflect economic conditions conducive to a regional meat processing industry.

Several countries in the ECOWAS region do have an exportable surplus of red meat, particularly beef. These are:

- Mauritania
- Mali
- Upper Volta
- Niger

In each of these countries, although sufficient abattoir capacity and chilling capacity exists to support the export of meat to coastal deficit countries these facilities are not being used. As observed by the author and confirmed in interviews with abattoir managers in these countries, export of meat is in the form of moving live animals by foot over long distances.

This practice is very inefficient from a macro-economic standpoint, both from the view point of the exporting country and from the importing country as well. In the University of Michigan's Center for Regional Economic Development (CRED) studies of red meat in West Africa, it is estimated that an average of 40% of the weight of an animal is lost between point of origin and destination in the process of trekking livestock from the interior surplus producing countries to the point of sale in the coastal consuming states.

The economic inefficiency in trekking of livestock with the subsequent loss in weight per animal is obvious.<sup>1</sup> It is also true that the owners/marketers of these cattle and small ruminants are acting in a rational economic manner. Due to market inefficiencies and the high cost of transporting meat, the owner/marketer of live cattle receives a greater dollar return by trekking his animals to deficient countries even with the high weight loss for the animals. It was pointed out by the CRED study and through personal interviews conducted in the course of this study that marketers in the animal exporting countries cannot buy animals from producers, put these animals in carcass form in local abattoirs and ship the resulting meat by truck, rail or air to consuming markets at a competitive price. It has been pointed out by the three studies on page 6 that imported African meat is more expensive in consuming centers than meat imported from Brazil, Argentina, and Australia. This condition exists despite the fact that the prices received for live animals by producers is extremely low.<sup>2</sup> It is apparent that market inefficiencies and lack of market infrastructure, principally transportation, in the ECOWAS region deter increased meat production.

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<sup>1</sup> CRED Study.

<sup>2</sup> Interviews with Ministry of Agriculture personnel in Mali, Upper Volta and Senegal.

An interesting development is taking place in some of the meat exporting countries. In Mauritania, at the initiative of the Ministry of Animal Production, the abattoir at Kaedi is being opened to export chilled and frozen beef, goat and lamb carcasses by air to Libya and Algeria. This is being done through a parastatal corporation. According to the general manager of the Bamako abattoir, private traders in Mali are using the facilities of the municipal abattoir in the capital to prepare beef, goat and sheep in carcass form for sale in Algeria. In both cases, the mode of shipment will be by air. It is too early in its development to judge whether these will be economic enterprises. However, if in fact this can be done economically, the implications for supply of meat in deficient coastal states of ECOWAS will be substantial. By shipping substantial quantities of meat from surplus producer states to North Africa the coastal states of ECOWAS would lose their traditional source of meat supply in the form of live animals being trekked from these inland countries.

The livestock exporting countries of ECOWAS have active projects with the objective of increasing the production of livestock and/or meat. It is important to note that there is a substantial difference, both in focus and method between increasing the production of livestock and the production of meat. The production of meat involves three variables. These are numbers of livestock, the weight per animal or weight per carcass, and herd turnover or offtake.<sup>1</sup>

Cattle in ECOWAS are marketed at an average of 5 to 7 years compared with an average of 3 to 5 years in similar arid land pasture systems in

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<sup>1</sup> Traore, Fernand, Livestock Situation in The ECOWAS Sub-Region, Economic Community of West African States. ECOWAS, Lagos, March 1981.

Brazil and Australia.<sup>1</sup> Average carcass weight is 150 kilos per carcass versus a weight of 370 kilos in the United States. Carcass weight is a function of breed of cattle as well as feeding and age. In general, carcass weights and yields from live weight to carcass weight in ECOWAS States are below those experienced in many dryland pasture areas of the world.<sup>2</sup> This author observed that West African beef is extremely lean and low in quality. In terms of offtake, an average of 7% of the cattle herd in the ECOWAS States can be accomplished with stable to small increases in herd size. In arid pasture areas of South America and Australia, comparable offtake is 17% and in the United States, offtake approaches 30% while maintaining a stable to small percentage increase in herd size.<sup>3</sup>

There is considerable evidence cited by other studies that livestock numbers in the Sahel are approaching the limit in terms of pasture and water availability. Forage and water is available in abundance in the coastal countries, but the high incidence of disease including parasites and, principally, tse-tse flies has been a barrier to livestock production. Given these factors, emphasis should be placed on those programs that increase the weight per animal and herd turnover of offtake. This involves nutrition and animal health particularly as it relates to calf mortality. The combination of increasing weight per animal, and decreasing calf mortality presents the best intermediate to long run amelioration of the meat shortage by increasing the amount of meat available on an annual basis from a given stock level or herd size that exists at the current time.

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<sup>1</sup> CRED Study.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

### Small Ruminants

It appears to this author and is supported by livestock and marketing personnel interviewed in the course of the study that the supply of small ruminants, sheep and goats is under estimated. In point of fact, data on small ruminant production is non-existent or extremely suspect. The data that does exist, principally in the form of FAO studies and primary data collected by the CRED study, is based on animals killed at public abattoirs. In fact the majority of small ruminants killed for consumption is done in non-commercial forms. This includes backyard slaughter and slaughter at the point of sale in traditional market places. The traditional raising of small ruminants by families in the backyard, village compounds, etc. is most likely the most efficient and desirable method of production.

The supply situation for small ruminants (sheep and goats) in the view of many livestock specialists from various Ministries of Agriculture interviewed during this study is substantially understated. Sheep and goats are raised both in rural and urban centers by family units. The majority of these animals are consumed by family units and do not pass through the abattoirs of the commercial marketing system. Because of the high home consumption of these animals, the herd sizes estimated in official statistics probably greatly understate the available supply. It is doubtful that commercial small ruminant production would be a viable economic enterprise. In addition, these animals compete for forage with cattle and are environmentally very destructive particularly in the Sahel with the fragile nature of its pastures.<sup>1</sup>

Increased commercial production of sheep and goats would require import of feed in coastal states and increased concentration of these animals in the

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<sup>1</sup> See Traore.

interior states of the Sahel. This presents a problem in both cases. With limited supplies of feed imports for poultry production which is a much better convertor of feed to meat. Increased concentration of small ruminants in the Sahel would exacerbate environmental problems in that area. Sheep and goats are environmentally very destructive of pasturage. In the opinion of many experts encountered in the course of this study, the Sahel region is currently at the level of livestock numbers including sheep, goats, and cattle that can be sustained without severe environmental damage and loss of existing pasturage.

Poultry production on a commercial basis has developed rapidly. It should be noted, however, that poultry production requires cereals and protein-containing feeds. In many instances these have been in short supply due to lack of foreign exchange in various ECOWAS member states. The production of hogs has been limited due to their requirements for feed which competes with poultry. In addition, pork is not a desirable meat in the marketplace. An example is in the Ivory Coast where a hog feeding enterprise was established but later abandoned as the cost of feed per kilo was more than the price that could be obtained for a kilogram of pork.<sup>1</sup> The competition for cereals for both consumption and poultry production appears to preclude the development of commercial hog production in ECOWAS member states.

### Poultry

It is recommended that a detailed study of poultry production and marketing be considered by ECOWAS in the near future. The marketing system from the point of production through to the consumer is of particular importance.

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<sup>1</sup> Ministry of Agriculture, Ivory Coast.



Emphasis should be placed on marketing costs and returns between slaughter and final sale for consumption.

Due to the limited time for the study and the amount of products to be covered, red meat, poultry and seafood it was not possible to give much emphasis to poultry. The production, supply and marketing of poultry can best be covered by a specific intensive study devoted exclusively to poultry and eggs. The problems of production, supply and marketing of poultry are quite different than cattle, sheep, goat and hogs.

It is clear that poultry as a very efficient convertor of feed and its short production cycle compared with red meat offers the best potential for the alleviation of the annual protein deficit in West Africa. As such, the industry has developed at a rapid rate. Future development of the industry is a function of foreign exchange availability for the importation of cereal grains for feed. This in itself is problematical as much of West Africa is not only deficit in animal protein but also deficit in grain production. The balance in the region between grain for human consumption and animal feed must be addressed as a joint issue which is beyond the scope of this report.

Poultry is a product extremely subject to spoilage without refrigeration and other forms of preservation. The lack of market infrastructure, particularly cold storage and transportation, would suggest that some form of canning or items packaging and storage technology would be appropriate. This should be investigated in the near future. The problem to overcome is the ability of a processing operation to bid away poultry supplies from the fresh market, add processing and packaging costs and provide a competitively priced product to the market place.

### III. EXISTING FACILITIES

The facilities for slaughter of livestock, cattle, horses, camels, and small ruminants in the major population centers in the ECOWAS member states visited are adequate. The abattoirs visited in Dakar, Bamako, Ouagadougou, Niamey and Abidjan, are adequate hygeinically, given the traditional marketing system of selling the meat "hot". From the author's experience, however, they do not meet standards for international trade in meat. In all the abattoirs visited facilities exist for cooling and freezing of meat for export or for the local market. According to some of the abattoir managers, these freezing and cooling facilities are used very infrequently, if at all.

There is substantial excess capacity of slaughtering facilities in ECOWAS member states. The most heavily used abattoir encountered was in Dakar, operating four days per week. Other abattoirs reported operating two to three days per week on less than eight hour shifts.

These abattoirs are operated as a municipal service or as a parastatal enterprise. Animals are brought to the abattoirs by their owners, slaughtered for a fee and the resulting carcasses given back to the owners who dispatch the meat to the market. Some of the abattoirs provide transport service to the local markets for a fee.<sup>1</sup>

The abattoir services are priced extremely high. With the exception of the abattoir in Bamako, charges are based per kilo of live weight. The costs of running an abattoir, however, are related to the number of head slaughtered as opposed to the weight of animals slaughtered. In the author's industrial experience, it costs the same to slaughter a 300-kilo animal as it does to slaughter a 500-kilo animal. Charging fees based on weight tends to encourage slaughter of lightweight cattle. Charges for abattoir services run from 50%

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1 CRED Study.

to 100% of the cost of the live animal. This compares with an average of 25% in the United States. In Brazil and Australia the costs of slaughter would be lower as a percentage of live animal cost.<sup>1</sup>

The high costs of abattoir services can be attributed to two factors. The first is very low labor productivity, the number of head slaughtered per hour per worker. The second is the very low utilization of the abattoirs themselves. In particular, the cost and efficiency of existing abattoirs, in the author's opinion, could be greatly improved with very small expenditures for equipment and technology. Labor utilization observed in the plants is very low. Organization of existing labor and reduction of surplus labor could improve productivity in most of the plants visited.

Commercial processing facilities for meat from ECOWAS countries exist for canned corned beef in Ghana and Guinea. In both instances, these plants are not operating. The corned beef plant in Ghana was originally planned to process meat from cattle trekked to northern Ghana from Upper Volta. This proved not feasible because of the high price of African-origin meat. The plant when it was operating, used imported meat from Brazil. The plant in Guinea is reported not operating at this time due to a lack of raw material for processing.<sup>2</sup>

Commercial facilities for processed meat in forms other than corned beef were not encountered. Small kitchen-type operations for sausage making using simple meat grinders and sausage stuffers exist to a very limited extent in the Francophone countries and one was encountered in Lagos. These

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<sup>1</sup> CRED Study. Also based on author's personal experience and knowledge of U.S. plants and specific plants visited in Brazil and Australia.

<sup>2</sup> Interview with Guinean consultant to ECOWAS.

small French "charcuterie" shops produce small quantities of specialty sausage and pate meat products. These products are high-priced specialty items with very limited distribution, principally to the expatriate community in the capital cities. These products were not observed by the author in the numerous traditional markets visited.

#### IV. DEMAND FOR PROCESSED MEAT PRODUCTS

The demand for processed meat products within the traditional market place which services 90% of the population of ECOWAS member countries is virtually non-existent with the exception of canned corned beef. The shortage of red meat and protein in general places fresh meat at a premium in the market place. The economic conditions to store or preserve meat do not exist. Fresh meat is consumed immediately by the population when it is available in the market place. Inexpensive imported corned beef of French, Brazilian and Argentine origin is available in the traditional market place when foreign exchange conditions permit its importation. It is used as a substitute for fresh meat. Consumer preference is clearly for fresh meat.<sup>1</sup>

Processed meat and meat containing processed food products are available on a limited basis in almost all ECOWAS countries. These are very high priced imports which are sold in supermarkets/food stores catering to the expatriate and very high income segment of the population. These products include stews, soups, sausage, beans and sausage, Ravioli, Beef Bourguignonne, Charcoute, etc. These products are in canned form and are of European origin, principally French. Familiar French food processing brand names encountered were Sauvrin, Fleur Michon, Olid Caby, Fanvil, Elven and Bovril. In Anglophone countries, English and U.S. brand names encountered were Armour,

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<sup>1</sup> CRED Study.

Chef Boy-Ar-Dee, Libby, Heinz and Cross & Blackwell, as well as South American brand names for corned beef and stewed steak. Prices of corned beef range from a low of US 90¢ per 12 oz. can for very low quality French corned beef in the Ivory Coast to a high of \$3.96 per 12 oz. can for U.S. brand South American corned beef in Nigeria.

Prices of fresh meat in each of the countries of ECOWAS is extremely variable. Prices of beef were observed which ranged from \$1.50/kilo in Bamako and Niamey to \$2.40 per kilo in the Abidjan and Dakar. These prices were observed in the traditional native market place. These prices at the retail level compare with very low prices for cattle. Live cattle prices range from US 30¢ per kilo to 70¢ per kilo depending upon the country.

It has been pointed out by the CRED study and by Traore that a major problem exists in ECOWAS countries whereby imported meat is cheaper than African-produced meat. International meat traders in London interviewed for this study stated that currently the CIF price of South American boneless beef landed in West African ports is 70¢ to 80¢ per kilo. EEC beef from intervention stock sold with a subsidy will run 60¢ to 70¢. This difference in price between imported meat and African-produced meat is not a function of the cost of producing the animal, but is a result of market inefficiency and lack of infrastructure, particularly high slaughter costs and internal transportation costs. This conclusion is based on the food industry experience of the author that the cost of converting imported meat into corned beef and other canned meat products at current world price levels for boneless beef in West African facilities would be competitive with current market prices observed for the manufactured products now being imported.

## V. ALTERNATIVE TECHNOLOGIES

Available technologies for meat processing relate to preservation and increased shelf life for meat. These technologies, with the exception of freezing, all involve changing the form of fresh meat in a manufacturing process. Products manufactured include sausage type products, dried products, cooked and canned products. Combining of meat with other food products is a further form of processing.

Since meat is a highly perishable product under normal living conditions, with the exception of sub-freezing temperatures, the following technologies are used:

1. freezing
2. drying
3. cooking and placing the resulting product in a form of air impermeable packaging

The third method of preservation has particular relevance to the ECOWAS sub-region. Freezing is not a viable alternative except for storage at centrally located abattoirs. The marketing system in ECOWAS countries and the consuming public do not have adequate refrigerated facilities.

Drying of meat as a traditional form of meat preservation exists in West Africa but is inefficient in terms of weight loss of the product in the process and the short storage time (shelf life) before the product deteriorates.

Cooking and canning of meat products provide long shelf life in everyday conditions without refrigeration. The traditional process of retorting at high temperatures for long periods of time necessary for sterilization of the product is costly, and has high energy requirements. In addition, the resulting product is bulky and has a high unit weight to product value ratio due to the tin cans in which the product is packaged.

An alternative form of packaging and processing, the retortable aluminum pouch, has been introduced in Canada and in Europe. It has several characteristics that appear to be applicable to potential West African food processing ventures, including meat. The advantages are the light weight of the resulting product and the decreased time and temperature required in processing. The decreased time and temperature required in processing reduce the energy required to produce a given volume of product. The advantage of decreased energy requirements and the reduced weight for a given amount of edible product appears to the author as being advantageous to West Africa, particularly in view of the lack of transportation infrastructure. Intra-regional transportation of food products consists principally of air travel or by foot. Further information on the retortable pouch technology can be obtained through Food Technology departments in U.S. universities. To the author's knowledge no U.S. private firms currently are using this technology. Several European food processors, however, are using this technology. These would include Olid Caby in France and Cross and Blackwell in Great Britain.

## VI. CONSTRAINTS TO DEVELOPMENT

Numerous constraints to the development of a processed meat industry in ECOWAS member states exist. They vary in degree of intensity and in potential ease of solution. These constraints are enumerated below in order of magnitude of the constraint.

(1) ECOWAS member states as a region are deficit producers of red meat and will continue to be deficit producers through 1980. The growth in demand for red meat will increase at a faster rate than production has increased in the past or projected to increase in the future. It is doubtful that a processed meat industry could bid a substantial enough quantity of raw material for processing away from the market for fresh meat at prices that would permit them to add processing costs and marketing costs and sell the resulting products at a competitive price.

(2) The various production systems, nomadic and sedentary, that exist in the ECOWAS member states are essential constraints to production of meat and subsequently impede the development of a processed meat industry. Poor breeding stock, prevalence of disease, high calf mortality and low levels of livestock management impact both directly and indirectly on the potential for development of the meat as well as the processing industry.<sup>1</sup>

(3) Market inefficiency and infrastructure constitute a secondary impediment to the development of the meat industry in ECOWAS member states. Intra-regional trade in meat among ECOWAS member states will not develop until economic slaughter costs and, more importantly, transportation facilities and transportation costs are greatly improved. The economically

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<sup>1</sup> See Traore.



inefficient method of trekking cattle from surplus producing countries to deficit countries will continue. This practice is an economic loss to both exporting and importing countries. The economic loss is one of opportunity cost and the erosion of value (weight of the animal) on total meat supply from a given stock of animals.

## VII. CONCLUSIONS AND RECOMMENDATIONS

It is not feasible at this time nor in the foreseeable future to develop a meat processing industry in West Africa. The production of raw material that could be used for processing is not sufficient at this time and the deficit is expected to increase in the future. Given this situation, available meat supplies will be channeled into the market place as fresh meat.

The recommendations set forth below refer principally to activities that will ameliorate the constraints to increased supplies of meat in general and are not directed at processed meats.

Through the common market approach of ECOWAS, the barriers to trade that exist between surplus producing countries and deficit producing countries can be minimized.

(1) The most pressing issue facing intra-regional trade in meat are transportation costs and transportation facilities. It is clear that surplus producing countries should be trading meat and not exporting animals by foot. Facilities for slaughter, cooling and storage exist, and are adequate. It is recommended that ECOWAS within its structure fund a research study to document and recommend the steps needed to reduce costs and provide facilities for the transport of meat on an intra-regional basis. This should include an analysis of all forms of transportation including truck, rail and air.

(2) ECOWAS as a regional organization is very well suited to serve as a focal point for the purpose of coordinating research and information concerning animal health and nutrition. It appears that ECOWAS member states each have their own research and development programs. With the limited resources available in terms of funding and trained personnel, regionally coordinated programs would provide a more efficient utilization of these resources.

(3) A detailed study of prices, the pricing mechanism, and market communication in reference to animals and meat should be initiated by ECOWAS. Price differentials and levels between countries and world market prices need to be examined. All levels of the marketing system need to be reviewed. Prices of animals and prices of meat observed in the process of this study indicate a great deal of market inefficiency that itself is a hindrance to trade and increased production.

(4) A detailed feasibility study should be initiated by ECOWAS to determine the viability of a regionally-based meat processing facility based on imported raw material to be processed. Boneless meat in the world market is relatively low priced and substantially lower in price than meat of African origin. Discounting duties applied to imported meat, it is very probable that an enterprise which imported raw material and added form and value on a local level could be developed. The author of this study has observed two examples of this type of operation in Canada and in Great Britain.

In Canada, meat was imported from Australia and New Zealand and processed into various canned meat and meat containing items such as beef stew, chili, corned beef hash, etc. This was done in an under-utilized tomato canning plant.

In Great Britain, baked beans in tomato sauce were produced in a canning plant. Beans were imported from the United States, tomato paste from Italy and cans from West Germany. In both cases, the resulting products were competitive with similar imported and domestic products. In fact they were cheaper to produce than the same products produced with raw materials obtained from domestic sources.