

**CHAPTER V. ASSEMBLY, STORAGE AND TRANSPORT NETWORK**

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A. Assembly

The corn assembly subsystem involves handling, shelling, drying, containerization and transportation which are done mostly by agents, sub-agents, country buyers, commission agents and local wholesalers. The assembly operations are done locally in each region to facilitate the collection of corn produce for shipment to more distant terminal market outlets. Although farmers generally shell and dry their produce, a major portion of assembly operations is done by the local assemblers.

Excluding on-farm sales which comprise 44% and the 6% retained for farm consumption, about 45% of the total production is absorbed by local assemblers, 3.2% by local millers, 1.5% by retailers and 0.3% is channeled directly to consumers.<sup>1/</sup>

A.1 Flow Channels of Corn Production

Most local assemblers control the flow of corn grains from the farm. About 80.5% of the total grains that local assemblers obtain from the farm are channeled to wholesale millers, 12.2% to local millers and 3.4% to wholesale dealers. The rest is channeled directly to retailers and consumers.

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<sup>1/</sup> Marketing of Corn and Corn Products by Selected Provinces, Philippines, Hegino Ma. Orticio, UPLB-CA, 1973, p. 1.

Of the total supply absorbed by local millers, about 54% is retained for the local market and the rest is shipped to main market centers, such as Manila and Cebu.

Wholesaler-millers comprise the largest market outlets of local assemblers and local millers. About 30% of the total corn volume is retained for local markets and 70% goes to outside markets.

The Mindanao wholesale dealers are a bigger source of corn supply to feed millers based in Cebu, Visayan provinces and Manila than the Cebu wholesale millers. Of the total corn materials channeled to Manila feed millers, 82.1% comes from wholesale millers mostly from Mindanao.<sup>2/</sup>

Appendix Figure I presents an estimated percentage distribution flow of corn grains from the farmers to the consumers.

#### A.2 Major Corn Production Areas

As previously discussed, domestic corn production moves from surplus to deficit regions. More than 56% of the total corn supply is from Mindanao. The largest corn flow is from the Southern and Western Visayan regions. About 40% of total Philippine production comes from Southern Mindanao and 9% from Western Mindanao. The rest comes from the Northern and Eastern Mindanao which accounts for 7% of the national production. For this reason, the bulk of corn movements is shipped in the ports of

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<sup>2/</sup> Orticio, op. cit., p. 1.

Davao City and Dadiangas due to their strategic location.

In the Visayan region, the ports of Cebu City, Iloilo, Bacolod City and Tacloban City serve as the corn trade terminals. Cebu City, which is the main corn trade center in the Philippines, may be considered as the busiest port for corn transport.

#### A.3 Production Collection Methods

Most farmers sell their corn produce immediately after harvesting. The collection, handling and preparation of the grains are done mainly by the middlemen and millers. The local assemblers provide the containers and sacks. Grains are collected at the farm level by means of trucks, carts and other vehicles to facilitate collection from various farms.

#### A.4 Corn Packaging Methods and Classification

Shelled and dried corn are stored in jute sacks or polypropylene plastic bags. Jute sacks cost ₱2.70 each while polypropylene plastic bags cost ₱2.45 each. The cost of packaging or bagging corn, by-products and corn grits are passed on to the respective buyers down to the consumers.

The major factors that determine the terms of sale are moisture content, mold, and extent of adulteration. The visual characteristics of the grain being procured are a basic tool used in corn selection and buying activities.<sup>3/</sup> Poor quality corn grain

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<sup>3/</sup> Alunan, J., op. cit., p. 6

and unshelled corn command a lower price than shelled and adequately dried corn.

Based on the estimated corn production of 32.1 million bags in 1973, the packaging industry generated some P55 million from the production of bags and packaging materials for the corn industry. One bag of corn contains 50 kgs grain.

#### B. Storage

Well developed grain storage and marketing facilities warrant an even distribution of corn throughout the year, thereby preventing individuals or companies from manipulating price levels during peak and low levels of corn supply.

To stabilize farm and retail prices of grains the government controls about 15% of the total grain production, which may increase correspondingly as grain production increases.

The government and private grain dealers should cooperate to reduce losses incurred during handling operations. Bulk handling facilities, for instance, can reduce grain losses and handling cost. However, private grain dealers are still reluctant to establish bulk handling facilities due to the following reasons<sup>4/</sup>

- a) Grain production in many areas is still below the minimum economic size

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<sup>4/</sup> Economic and Engineering Feasibility Study on Storage, Handling and Marketing of Selected Crops in the Philippines. Weitz-Hettlesater Engineers, USAID-RCA, 1968, p. 265

- b) Existence of storage facilities, albeit inefficient, is perceived as already serving the purpose
- c) Lack of trained personnel to operate bulk facilities
- d) Uncertain government policies on prices which cause grain dealers to build traditional "bodega" type storage or warehouse facilities. Although less efficient, these warehouses are more flexible in storing many types of commodities in case grain storage and warehousing operations become unprofitable

#### B.1 Existing Storage Capacities for Corn

The existing storage and warehousing facilities in the Philippines may be classified into three categories, namely, those owned by Farmer's Cooperative Marketing Associations (FACOMA), the National Grains Authority (NGA), and privately-owned warehouses.

As of 1973, the Philippines has a total warehouse and storage space for sacked commodities amounting to about 1.8 million metric tons of which about 11.7% is operated by cooperative marketing associations, 1.7% by the National Grains Authority, and 86.6% by private entities.

Northern and Central Luzon account for about 67.9% of the total domestic storage capacity. The Visayan region accounts for 15.1% and the Mindanao region has 17.0% of the total storage facilities in the Philippines.

Of the total warehouses owned by the FACOMA, about 79.0% are located in Luzon, 12.2% in the Visayas and 8.8% in Mindanao. The National Grains Authority has 80.9% of its warehouses in Luzon, 8.5% in Visayas and 10.6% in Mindanao.

The majority of privately-owned warehouses and storage facilities (66.1%) are located in Luzon, 15.7% in the Visayan region and 18.2% in the Mindanao region. The distribution of the warehouses in the Philippines is consumption-oriented rather than production-oriented. In other countries such as the United States, storage facilities are mostly located in grain production belts.

Majority of warehouses and storage facilities in the Philippines are constructed from wood trusses, wood columns, corrugated galvanized iron roofs and walls with concrete flooring. The walls of some warehouses are made of concrete hollow blocks with structural steel frames or a combination of galvanized iron walls and concrete sidings.<sup>5/</sup>

Most warehouses in the Philippines are designed with rigid louver-type ventilators located in the upper and lower portions of the walls and roof sides. Warehouse doors are made of sliding metal sheets with either glass, wood or steel windows.

Existing warehouses are generally in poor condition and require considerable rehabilitation and reconditioning.

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<sup>5/</sup> Weitz-Hettelsater Engineers, op. cit., p. 225

## B.2 Corn Milling Capacity

The Philippines has a total corn milling capacity of 15,200 metric tons per 10-hour day. In terms of aggregate annual capacity, this is equivalent to 4.5 million metric tons per year.

There are 2,670 milling units in the country. About 10.52% of these are in Luzon, 4.98% in Visayas and 84.5% in Mindanao.

Table 9 presents a breakdown of the number of registered corn mills in the Philippines.

There are two types of corn mills in the Philippines: the "kiskisan" and the "cono" mills. The milling recovery of "cono" mills is slightly higher than in the "kiskisan" type. Over the years, the number of "cono" mills has increased faster than the "kiskisan" type because it is easier to obtain government financing for this type of mill.

The milling operation grinds corn grain into grits. The grits are graded on a shaker screen having a number of square openings per lineal inch of 10-12-14-16-18-22. The number of openings per lineal inch of the sieve determines the size of grits to be recovered. Corn grits sieved from the numbers 10-12-14 are sold as first class grits. A recovery of 70% from the "cono" mills can be expected utilizing a number 16 sieve or 65% if the numbers 10, 12 and 14 are used.

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Note: "Kiskisan" stands for grinder type corn mills.  
"Cono" stands for roller type corn mills.

Table 9

Number of Registered Corn Mills by Type and Corresponding Daily Capacity by Region

As of November 30, 1974  
(Capacity in Bags of 50 kgs)

| Region             | Grinder      |                | Rollers    |               | Total        |                |
|--------------------|--------------|----------------|------------|---------------|--------------|----------------|
|                    | Number       | Capacity       | Number     | Capacity      | Number       | Capacity       |
| Philippines        | <u>1,703</u> | <u>255,988</u> | <u>967</u> | <u>48,190</u> | <u>2,670</u> | <u>304,178</u> |
| Manila and suburbs | 5            | 1,750          | 3          | 1,020         | 8            | 2,770          |
| Ilocos Region      | 149          | 4,753          | 2          | 35            | 151          | 4,788          |
| Cagayan Valley     | 240          | 8,002          | 8          | 508           | 248          | 8,510          |
| Central Luzon      | 16           | 660            | 5          | 1,136         | 21           | 1,796          |
| Southern Tagalog   | 61           | 2,063          | 61         | 3,652         | 122          | 5,715          |
| Bicol              | 63           | 2,691          | 93         | 5,681         | 156          | 8,372          |
| Western Visayas    | 67           | 2,755          | 7          | 992           | 74           | 3,747          |
| Central Visayas    | 104          | 5,163          | 52         | 6,263         | 156          | 11,426         |
| Eastern Visayas    | 31           | 931            | 10         | 401           | 41           | 1,332          |
| Western Mindanao   | 71           | 2,467          | 123        | 5,235         | 194          | 7,702          |
| Northern Mindanao  | 370          | 12,461         | 199        | 3,357         | 569          | 15,818         |
| Southern Mindanao  | 526          | 212,292        | 404        | 19,910        | 930          | 232,202        |

Source: Directorate for Grains Business Regulations  
Grains Economics, National Grains Authority, Quezon City

The remaining parts, such as germs, fine grits, and bran, which comprise 20-25% of the grains are sold as animal feed ingredients.

A wastage and loss of 10-15% is generally expected.

The "kiskisan" mill consists of a grinder, blower and sifter.

A number of small units are found in the rural areas. There are 10,738 units of this type throughout the country.

The "cono" mill consists of a corn cleaner, scale, degerminators, roller mills, polishers, aspirators, blowers, cyclone dust collectors, bran drier, grits mixer, sifters, magnetic separators, grader, bucket elevators, screw conveyors, motors, driers and other accessories. It can mill 75 to 100 cavans of corn per hour.

From the 2,670 grinder and roller mills which have a daily capacity of 304,178 cavans of corn, an excess milling capacity of 3.5 million cavans exists. The bulk of this surplus capacity is located in Southern Mindanao. However, in Eastern Visayas, Western Mindanao, Northern Mindanao, Central Luzon and the Southern Tagalog region, an observable deficit in milling capacity exists in these regions. Table 10 shows the surplus and deficit milling areas of the country.

### B.3 Storage Facilities

An analysis of the grain flow in the Philippines shows that the production from the Cagayan Valley moves towards the provinces of Nueva Ecija and Bulacan in Central Luzon. The grains are stored in these areas until milled and transported to wholesalers in the Greater Manila area. Since the Central Luzon area has more storage facilities than Cagayan Valley, this tends to offset the inadequacy of storage facilities in the Cagayan region.

In the Bicol region, drying and storage operations are hampered by a shortage of storage capacity and continuous rains.

Table 10  
Estimated Monthly Mill Capacity and Requirement for  
CY 1974-75

| Region                | Monthly<br>Mill<br>Capacity | Total<br>Production | Market<br>Directed <sup>6/</sup> | Surplus/<br>Deficit <sup>7/</sup> |
|-----------------------|-----------------------------|---------------------|----------------------------------|-----------------------------------|
| Philippines           | <u>9,125,340</u>            | <u>9,955,500</u>    | <u>5,579,500</u>                 | <u>3,545,840</u>                  |
| Manila and<br>suburbs | 83,100                      | -                   | -                                | 83,100                            |
| Ilocos Region         | 143,640                     | 114,200             | 34,600                           | 109,040                           |
| Cagayan Valley        | 255,300                     | 1,222,700           | 197,600                          | 57,700                            |
| Central Luzon         | 53,880                      | 83,700              | 64,400                           | ( 14,520)                         |
| Southern Tagalog      | 171,450                     | 535,300             | 321,500                          | (150,050)                         |
| Bicol                 | 251,160                     | 314,700             | 108,100                          | 143,060                           |
| Western Visayas       | 112,410                     | 231,100             | 86,200                           | 26,210                            |
| Central Visayas       | 342,780                     | 613,500             | 123,400                          | 219,380                           |
| Eastern Visayas       | 39,960                      | 305,400             | 127,200                          | ( 87,240)                         |
| Western Mindanao      | 231,060                     | 693,000             | 253,100                          | ( 22,040)                         |
| Northern Mindanao     | 474,540                     | 3,117,000           | 2,239,300                        | (1,764,760)                       |
| Southern Mindanao     | 6,966,060                   | 2,719,900           | 2,020,100                        | 4,945,960)                        |

<sup>6/</sup> Based on a 12 hour operation of registered mills at 30 days per month

<sup>7/</sup> Computed on Bureau of Ag. Economic's regional disposition of corn harvest as of March, 1974

Computed based on market directed quantity

Source: National Grains Authority

Sun-drying is very unreliable. In Mindanao rapid increases in corn production have incapacitated the storage facilities.

Appendix Tables 20 to 24 shows the existing storage capacity in each region and the amount of storage capacity needed to meet the requirements of each region.

A study conducted in June, 1968 recommended the establishment of an additional total storage capacity of 580,000 metric tons from 1970 to 1975. The recommended capital outlay for grain storage facilities for the Philippines was estimated at \$67.48 million equivalent to ₱263.2 million at that time. The required capital investment to attain the additional 203,000 metric tons was estimated at \$22.67 million (₱88.4 million) while the required balance of 377,000 metric tons in 1975 would amount to \$44.82 million (₱174.80 million). Taking into consideration the increase in costs of machineries and equipment from 1968 to 1974, the establishment of such facilities now would require a larger amount for capital outlay. The project would need an equivalent of ₱473 million at the prevailing peso to dollar exchange rate of ₱7.00 to \$1.00. However, the cost of construction and equipment may have increased by as much as three to four times since the study was conducted.

A summary of the study is presented in Appendix Table 25.

Despite the recommended additional storage capacity for the whole industry, existing data indicate a decrease in total storage capacity from 1963 to 1974. The decrease has been attributed to the phasing out of old warehouse facilities and the destruction of

others during the floods and calamities that occurred from 1968 to 1974.

### C. Transport Network

The most common form of transportation from the farms to the farmer's home consist of carabao-pulled carts, sleds, tricycles, and small motor-powered wheel carts. Grains are transported to local markets and warehouses by means of animal-drawn carts and sleds, jeepneys, buses, trucks, small boats and tricycles. The most common transportation facilities available to most farmers are public utility buses. Larger farm operators use trucks to transport their grain to the warehouses, mills and market centers.

Grain is also transported through interisland ships and trains.

#### C.1 Corn Transport Route System

The land transport system is composed of buses, jeepneys, trucks and railways. The water transport system consists of ships, ferry boats and barges.

The road system continues to dominate the volume of transportation in the country. It accounts for about 60% of total passenger transport and about 30% of total freight movements.

In Luzon where all routes lead to Manila, well developed road networks traverse the main valleys and coastal regions. Visayas and Mindanao also have extensive road systems which can still be improved by providing more feeder roads leading to the villages or

barrios from the main highway.

Because the Philippines is composed of many islands, the ports are equally important in transporting freight and agricultural products. The country has 81 national, 392 municipal, and other undetermined private ports. The shipping operations handle about 40% of total freight movements in the Philippines.

Cebu has one of the most developed road networks and is considered as the main hub of commerce. Being the center of corn trade, Cebu influences the price barometer of the corn industry, as the bulk of production from Mindanao passes through Cebu. Shipments of corn from Mindanao to Cebu are made through inter-island vessels and lighters.

## C.2 Existing Transport Facilities and Capacities

Transport facilities in the Philippines may be divided into three main categories, naemly, shipping lines, trucking and freight, and railway systems. Although the airways system also takes part in freight transport and movement, minimal amounts of grains are transported by this method due to high costs.

### a) Shipping Lines and Inter-Island Traffic

The nature of the Philippine archipelago necessitates the utilization of an extensive water transport system for the shipment of commodities. Although many ports exist

for foreign and domestic shipping operations, a majority are too inadequately equipped to actively handle large freight movements.

The domestic inter-island fleet of the Philippines consists of more than 5,089 vessels with a total gross tonnage of 1.6 million tons and an estimated net carrying capacity of 800,000 metric tons. The domestic inter-island shipping operation ships a total of 16 million metric tons of cargo and freight annually. This is equivalent to about 40 percent of total freight movements within the country and ranks second only to motor vehicle transports.

As of January 25, 1975, the shipping cost of transporting grains from major corn ports in the country may be presented as follows.<sup>8/</sup>

|                         |        |                |
|-------------------------|--------|----------------|
| Davao City to Cebu City | ₱ 2.50 | per 57 kg sack |
| Dadiangas to Cebu       | 2.48   | "              |
| Cotabato to Cebu        | 2.50   | "              |
| Ozamis City to Cebu     | 1.35   | "              |
| Cagayan de Oro to Cebu  | 1.16   | "              |
| Cebu City to Manila     | 2.25   | "              |

The bulk of corn production from the Mindanao area passes through Cebu City since it is the corn trade center of the country. Most inter-island shipping lines also have their base in Cebu and stopover in this city prior to moving grains to other major ports as Manila.

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<sup>8/</sup> Obtained from National Grains Authority Regional Office, Cebu City

Appendix Table 26 presents the size and character of Philippine merchant marine fleet, while Appendix Table 27 shows the number of vessels and tonnage of cargo entered and cleared in domestic ports.

b. Trucking and Freight Operation

There are more than 496,176 vehicles in the country. The majority consists of private passenger cars with only 113,354 freight trucks available for transporting large volumes of cargo. Although jeepneys and taxicabs also abound, most of these vehicles are mainly for passenger transport and not specifically used for agricultural product transport. About 80% of the total freight cargo in the country is transported over land by means of motor vehicles.

There are a total of 2,264 units of trucks with a loading capacity of 290,690 bags of grains and 865 units of jeeps with a loading capacity of 10,508 bags registered with the NGA to transport grains. Taking into consideration the volume of grain transport in the country, this figure can be considered inadequate. (see Appendix Table 28.1 for more details.)

Appendix Table 28.2 shows the number of vehicles registered according to use from 1961 to 1973.

c. Railway System

The products usually shipped through the railway system are rice, sugarcane, copra and forest products. In the past, annual rice and corn shipments via railways averaged about 5,000 - 6,000 metric tons each. Lately, however, corn shipments through the railway system have decreased considerably although rice shipments still average about 5,000 metric tons annually.

Appendix Table 29 shows the freight car shipments of commodities by the Philippine National Railways.

Grain shipments are generally contained in sacks, or bulk shipments similar to sugar may be done by making adjustments in the existing boxcars and facilities. Steel cylindrical containers may also be used with a loading capacity of ten metric tons, although the investment for such facilities would require some regularity in grain shipments.

Railway freight rates for grains and other commodities are computed mainly on a per tonnage basis. The shipper pays for the loading and unloading expenses. This is usually contracted with private firms in the docking points. As of mid-1974, the prevailing transport and loading costs of grains were as follows.

1. Transport cost per metric ton  
per kilometer - (average) ₱0.085

Example:

|   | Corn<br>Less Carload<br>Rate* | Above<br>15 MT Rate | Rice<br>Less Carload<br>Rate | Above<br>15 MT Rate |
|---|-------------------------------|---------------------|------------------------------|---------------------|
| San Fernando, La Union<br>to Manila -- 265.7 km | 31.35                         | 28.90               | 23.12                        | 21.20               |
| Legaspi City, Albay to<br>Manila - 474.0 km     | 44.05                         | 40.65               | 32.52                        | 29.80               |

2. Loading and unloading charges  
per metric ton - (estimate  
based on a loading cost of  
₱0.15 - 0.20 per 57 kg sack  
of corn

₱2.60 - 3.50

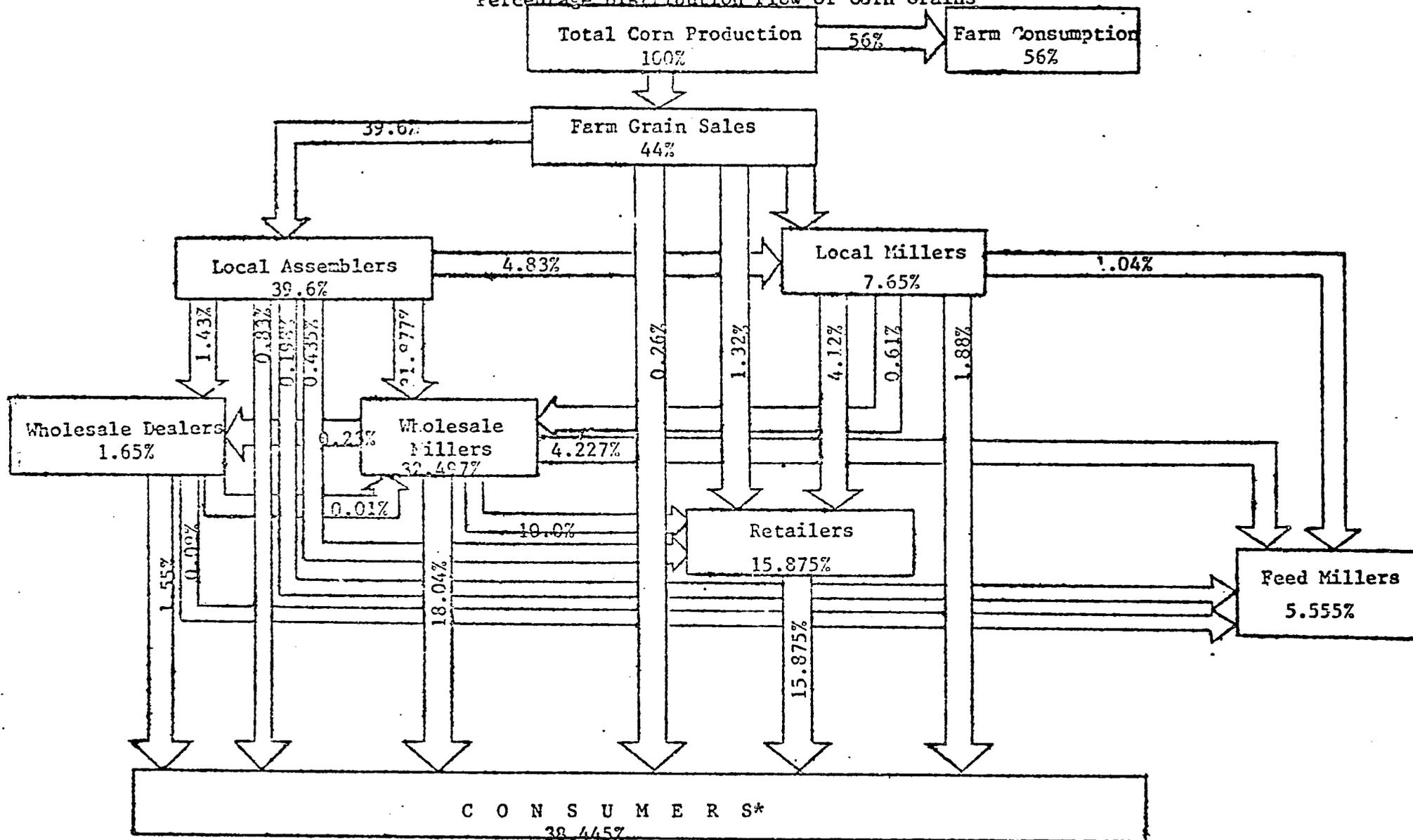
3. Counting and checking charges

0.50

\*Less carload rate means less than 15 MT

Due to increasing freight and passenger requirements, the Philippine National Railways has embarked on an expansion of its facilities. Appendix Table 30 presents the railway infrastructure program. Additional data on amount of roads constructed, programs and expenditure requirements are presented in Appendix Tables 31 to 33.

Appendix Figure I  
Percentage Distribution Flow of Corn Grains



Note: Only 25.2% of Consumers goes to human consumption since 56% is already directly consumed. The Balance is channeled to industrial users and livestock raisers.

Source: Marketing of Corn and Cor Products by Selected Provinces, Hegino Ma. Orticio, (Unpublished Masters Thesis), Department of Ag. Economics, UPLECA, 1973, pp.12-22

Appendix Table 20

Number of Capacity of Registered Corn Warehouses and Corresponding Capitalization by Region

As of November 30, 1974

| Region                | No. of Units |                        | Capacity<br>(In Bags of 50 Kilos) |                        | Capitalization    |                        |
|-----------------------|--------------|------------------------|-----------------------------------|------------------------|-------------------|------------------------|
|                       | Corn         | Palay/Corn<br>Combined | Corn                              | Palay/Corn<br>Combined | Corn              | Palay/Corn<br>Combined |
| Philippines           | <u>-68</u>   | <u>103</u>             | <u>593,683</u>                    | <u>834,145</u>         | <u>18,823,262</u> | <u>3,570,422</u>       |
| Manila and<br>suburbs | 3            | -                      | 250,280                           | -                      | 3,357,327         | -                      |
| Ilocos Region         | -            | -                      | -                                 | -                      | -                 | -                      |
| Cagayan Valley        | -            | -                      | -                                 | -                      | -                 | -                      |
| Central Luzon         | -            | 1                      | 1,000                             | -                      | 10,000            | -                      |
| Southern Tagalog      | -            | -                      | -                                 | -                      | -                 | -                      |
| Bicol                 | -            | -                      | -                                 | -                      | -                 | -                      |
| Western Visayas       | -            | -                      | -                                 | -                      | -                 | -                      |
| Central Visayas       | 16           | 10                     | 33,800                            | 606,200                | 6,158,782         | 735,732                |
| Eastern Visayas       | 2            | 14                     | 4,000                             | 115,100                | 5,000             | 624,900                |
| Western Mindanao      | 1            | 4                      | 2,000                             | 37,605                 | 2,000             | 162,500                |
| Northern Mindanao     | 41           | 72                     | 222,603                           | 93,240                 | 795,153           | 1,547,290              |
| Southern Mindanao     | 5            | 2                      | 80,000                            | 32,000                 | 500,000           | 500,000                |

Source: Directorate for Grains Business Regulations  
National Grains Authority

Appendix Table 21

Existing Bulk Silo Grain Storage Facilities, Philippines, 1974<sup>a/</sup>

| Owner   | Location                        | Capacity                       | Design   |
|---|---------------------------------|--------------------------------|----------|
|   |                                 | (metric tons)                  |          |
| Republic Flour Mills, Inc.                    | Pasig, Rizal                    | 25,000 (wheat)                 | Concrete |
| Wellington Flour Mills, Inc.                  | Pasig, Rizal                    | 15,200 (wheat)                 | Concrete |
| Liberty Flour Mills, Inc.                     | Mandaluyong, Rizal              | 12,500 (wheat)                 | Concrete |
| Philippine Flour Mills                        | Hondagua, Quezon                | 20,000 (wheat)                 | Concrete |
| General Milling Corp.                         | Lapu-Lapu City, Cebu            | 30,000 (wheat)                 | Concrete |
| General Milling Corp.                         | General Santos,<br>Cotabato     | 2,300 (corn)                   | Steel    |
| Pillsbury-Mindanao Flour<br>Milling Co., Inc. | Iligan City, Lanao<br>del Norte | 13,700 (wheat)                 | Concrete |
| Universal Corn Products, Inc.                 | Pasig, Rizal                    | 16,000 (corn and<br>soyabeans) | Concrete |
| NGA Facility                                  | Digos, Davao                    | 5,600 (rice and corn)          | Wood     |
| NGA Facility                                  | Camalaniugan,<br>Cagayan        | 2,200 (rice and corn)          | Wood     |
| ACA Facility                                  | San Jose, Nueva Ecija           | 1,800 (rice)                   | Steel    |
| ACA Facility                                  | Solano, Nueva Vizcaya           | 5,450 (rice)                   | Steel    |

<sup>a/</sup> The storage capacities represent volume for bulk grains and do not include warehouse sack storage.

Appendix Table 22

Estimated Production and Warehousing Requirement by Month  
CY 1974-75

| Month       | Corn<br>Production <sup>1/</sup> | Market<br>Directed <sup>2/</sup> | Surplus/<br>Deficit <sup>3/</sup> |
|-------------|----------------------------------|----------------------------------|-----------------------------------|
| Philippines | <u>46,189,000</u>                | <u>28,637,000</u>                | -                                 |
| July        | 2,694,700                        | 1,670,700                        | ( 192,900)                        |
| August      | 5,079,100                        | 3,149,000                        | (1,671,200)                       |
| September   | 4,380,000                        | 2,715,600                        | (1,237,800)                       |
| October     | 7,635,000                        | 4,733,700                        | (3,255,900)                       |
| November    | 2,935,400                        | 1,319,900                        | ( 342,100)                        |
| December    | 2,703,900                        | 1,676,400                        | ( 198,600)                        |
| January     | 1,690,000                        | 1,047,800                        | ( 430,000)                        |
| February    | 4,986,500                        | 3,091,600                        | (1,613,800)                       |
| March       | 2,703,900                        | 1,676,400                        | ( 198,600)                        |
| April       | 4,912,400                        | 3,045,700                        | (1,567,900)                       |
| May         | 2,597,400                        | 1,610,400                        | ( 132,600)                        |
| June        | 3,870,700                        | 2,399,800                        | ( 922,000)                        |

<sup>1/</sup> Bureau of Ag. Economic's October 1, 1974 forecast for CY 1974-75 of 46.3 million less 111,000 bags of 50 kilos damaged for the month of October, distributed monthly using the 5-year average of monthly percentage distribution of harvest from BAEcon

<sup>2/</sup> Estimated at 62% of total production

<sup>3/</sup> Computed based on 1,477,800 bags of 50 kilos total capacity of the 171 existing corn warehouses for each month

Source: Grains Economics, National Grains Authority

Appendix Table 23

Estimated Production and Warehousing Requirement by Region  
CY 1974-75

| Region             | Peak Corn<br>Production <sup>1/</sup><br>(Sacks of 50 Kilos) | Market<br>Directed <sup>2/</sup> | Capacity<br>(Bags of 50 Kilos) | Surplus<br>Deficit |
|--------------------|--|----------------------------------|--------------------------------|--------------------|
| Philippines        | <u>9,995,500</u>   | <u>5,579,500</u>                 | <u>1,477,800</u>               | <u>4,694,600</u>   |
| Manila and suburbs | -  | -                                | 250,300                        | 250,300            |
| Ilocos Region      | 114,200  | 34,600                           | -                              | 34,600             |
| Cagayan Valley     | 1,222,700  | 197,600                          | -                              | 197,600            |
| Central Luzon      | 88,700   | 68,400                           | 1,000                          | 67,400             |
| Southern Tagalog   | 535,300  | 321,500                          | -                              | 321,500            |
| Bicol              | 314,700  | 108,100                          | -                              | 108,100            |
| Western Visayas    | 231,100  | 86,200                           | -                              | 86,200             |
| Central Visayas    | 613,500  | 123,400                          | 640,000                        | 516,600            |
| Eastern Visayas    | 303,400  | 127,200                          | 119,100                        | 8,100              |
| Northern Mindanao  | 3,117,000  | 2,239,300                        | 315,800                        | 1,923,500          |
| Western Mindanao   | 693,000  | 253,100                          | 39,100                         | 213,500            |
| Southern Mindanao  | 2,719,900  | 2,020,100                        | 112,000                        | 1,908,100          |

<sup>1/</sup> Bureau of Ag. Economics October 1 forecast of 46.3 Million less 111,000 bags of 50 kilos damaged for the month of October. Regional production are those for the peak months

<sup>2/</sup> Estimated based on percentage of market directed quantity for the region

Source: National Grains Authority and Bureau of Ag. Economics

Appendix Table 24

Estimated Construction Cost Per Province Which  
Needs Additional Storage Capacity  
for NGA Stocks

|                                 | Needed Additional*<br>Storage Capacity<br>for NGA Stocks<br>(000 Sacks of Palay/<br>Corn of 50 Kilos Each) | Estimated<br>Warehouse<br>Construction Cost<br>₱ |
|---------------------------------|--|--|
| Region I - Abra                 | 21.392   | ₱ 64,000   |
| Benguet                         | 43.583   | 127,000  |
| Ilocos Norte                    | 39.34  | 115,000  |
| Ilocos Sur                      | 59.716   | 135,000  |
| Region II - Ifugao              | 10   | 30,000   |
| Region III - Tarlac             | 143.48   | 174,000 - 124,000                                |
| Zambales                        | 96.12  | 167,000  |
| Region IV - Batangas            | 9.48   | 30,000   |
| Palawan                         | 31.938   | 92,000   |
| Romblon                         | 14.9   | 45,000   |
| Region V - Camarines Norte      | 3.88   | 20,000   |
| Catanduanes                     | 9.749  | 30,000   |
| Masbate                         | 22.956   | 70,000   |
| Region VII - Cebu               | 154  | 174,000 + 122,000                                |
| Bohol                           | 90   | 157,000  |
| Negros Oriental                 | 65.206   | 146,000  |
| Leyte del Sur                   | 63.12  | 142,000  |
| Eastern Samar                   | 24.979   | 76,000   |
| Western Samar                   | 39   | 112,000  |
| Region VIII- Misamis Occidental | 42.11  | 115,000  |
| Agusan del Sur                  | 19.038   | 58,000   |
| Agusan del Norte                | 41   | 118,000  |
| Surigao del Norte               | 221.472  | 2 x 174,000 + 64,000<br>174,000 + 70,000         |
| Region IX - Zamboanga del Norte | 123.191  | -  |
| Davao del Norte                 | 47.824   | 141,000  |
| Davao del Sur                   | 84   | 163,000  |
| Davao Oriental                  | 2.172  | 21,000   |
| Sulu                            | 54   | 122,000  |
| <b>Total</b>                    |  | <b>₱3,591,000</b>                                |

Appendix Table 25

| Location                         | Additional for 1970-1972 |                   |                    |              |               |                          | Recommended Additions to Grain Storage Capacity 1970-1975 |                   |                    |           |          |                | 1975     |                                       |   | Large Capacity | Bulk | Silos |
|----------------------------------|--------------------------|-------------------|--------------------|--------------|---------------|--------------------------|---|-------------------|--------------------|-----------|----------|----------------|----------|---------------------------------------|---|----------------|------|-------|
|                                  | Recommended Capacity     | Standard Sack No. | Warehouse Capacity | Small No. To | Bulk Capacity | Silos Large To. Capacity | Recommended Capacity                                      | Standard Sack No. | Warehouse Capacity | Small No. | Bulk To. | Silos Capacity | Location |                                       |   |                |      |       |
| I Manila                         | -                        | -                 | -                  | -            | -             | -                        | -   | -                 | -                  | -         | -        | -              | -        | -                                     | - | -              | -    | -     |
| II Iloilo                        | 12,000                   | 4                 | 6,000              | 4            | 6,000         | -                        | 50,000  | 5                 | 25,000             | -         | -        | -              | 25,000   | North Port                            | - | -              | -    |       |
| III Sagayan Valley               | 20,000                   | 3                 | 4,000              | 4            | 6,000         | 10,000                   | 54,000  | 3                 | 3,000              | -         | -        | -              | -        | -                                     | - | -              | -    |       |
| IV Central Luzon                 | 13,000                   | 4                 | 7,000              | 4            | 6,000         | -                        | -   | 3                 | 3,000              | -         | -        | -              | 45,000   | Tuguegarao, Aparri, Santiago, Isabela | - | -              | -    |       |
| V Southern Tagalog               | 36,000                   | 12                | 21,000             | 8            | 12,000        | 3,000                    | 112,000   | 8                 | 14,000             | 12        | 18,000   | 80,000         | -        | -                                     | - | -              | -    |       |
| VI Bicol                         | 35,000                   | 8                 | 15,000             | 8            | 18,000        | 8,000                    | 28,000  | 9                 | 16,000             | 8         | 12,000   | -              | -        | -                                     | - | -              | -    |       |
| VII Western Visayas              | 15,000                   | 5                 | 9,000              | 4            | 6,000         | -                        | 27,000  | 5                 | 10,000             | 6         | 9,000    | 8,000          | -        | -                                     | - | -              | -    |       |
| VIII Eastern Visayas             | 17,000                   | 4                 | 8,000              | 6            | 9,000         | -                        | 15,000  | 5                 | 7,000              | 2         | 3,000    | 5,000          | -        | -                                     | - | -              | -    |       |
| IX Southern and Western Mindanao | 39,000                   | 8                 | 15,000             | 6            | 9,000         | 15,000                   | 20,000  | 2                 | 4,000              | 4         | 6,000    | 10,000         | -        | -                                     | - | -              | -    |       |
| X Northern and Eastern Mindanao  | 16,000                   | 1                 | 2,000              | 6            | 9,000         | 5,000                    | 55,000  | 4                 | 8,000              | 18        | 27,000   | 20,000         | -        | -                                     | - | -              | -    |       |
|                                  |                          |                   |                    |              |               |                          | 13,000  | 4                 | 7,000              | 4         | 6,000    | -              | -        | -                                     | - | -              | -    |       |
| Total                            | 203,000                  | 49                | 87,000             | 50           | 75,000        | 41,000                   | 377,000   | 48                | 97,000             | 58        | 87,000   | 193,000        | -        | -                                     | - | -              | -    |       |

Source: Economics and Engineering Feasibility Study for Storage, Handling and Marketing of Selected Crops in the Republic of the Philippines, Weitz-Hettelsater Engineers, (Under RCA-USAID Contract), Kansas City, Missouri, 1968, pp. 267-268.

Appendix Table 26

Cumulative Number and Gross Tonnage of Philippine Vessels: CY 1967-73  
(Gross Tonnage in Thousands)

| Vessels by Gross Tonnage     | 1967           |                | 1968           |                | 1969           |                | 1970           |                | 1971           |                | 1972           |                | 1973           |                |
|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                              | No. of Vessels | Gross Tonnage  |
| <b>OCEAN-GOING VESSELS</b>   |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Less than 5,000 GT           | 40             | 92.7           | 51             | 121.0          | 59             | 140.1          | 77             | 185.7          | 85             | 195.7          | 91             | 216.0          | 99             | 232.5          |
| 5,000 to less than 10,000 GT | 36             | 286.6          | 36             | 286.6          | 37             | 292.8          | 37             | 292.8          | 38             | 302.3          | 41             | 325.8          | 44             | 348.7          |
| 10,000 GT or over            | 7              | 88.9           | 8              | 119.6          | 8              | 119.6          | 10             | 143.1          | 10             | 143.1          | 11             | 159.0          | 11             | 159.0          |
| Total                        | <u>83</u>      | <u>468.2</u>   | <u>95</u>      | <u>527.2</u>   | <u>104</u>     | <u>552.5</u>   | <u>124</u>     | <u>621.6</u>   | <u>133</u>     | <u>641.1</u>   | <u>143</u>     | <u>700.9</u>   | <u>154</u>     | <u>740.2</u>   |
| <b>INTER-ISLAND VESSELS</b>  |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Less than 100 GT             | 1,349          | 35.6           | 1,507          | 40.2           | 1,692          | 46.0           | 1,879          | 51.1           | 2,101          | 57.1           | 2,419          | 65.1           | 2,770          | 73.2           |
| Over 100 to less than 500 GT | 151            | 44.3           | 172            | 47.8           | 206            | 56.0           | 234            | 61.3           | 273            | 70.1           | 307            | 77.6           | 357            | 90.4           |
| 500 less than 1,000 GT       | 81             | 58.0           | 88             | 63.7           | 92             | 66.8           | 96             | 68.9           | 100            | 70.8           | 105            | 73.1           | 128            | 91.1           |
| 1,000 to less than 2,000 GT  | 28             | 41.8           | 33             | 48.5           | 36             | 52.5           | 36             | 52.5           | 37             | 54.4           | 45             | 66.2           | 55             | 79.8           |
| 2,000 to less than 3,000 GT  | 15             | 38.2           | 20             | 51.1           | 23             | 58.7           | 23             | 58.7           | 23             | 58.7           | 23             | 58.7           | 29             | 73.3           |
| 3,000 GT or over             | 21             | 103.3          | 25             | 117.7          | 28             | 131.6          | 29             | 134.9          | 29             | 138.1          | 34             | 163.8          | 38             | 183.8          |
| Total                        | <u>1,645</u>   | <u>321.3</u>   | <u>1,845</u>   | <u>369.1</u>   | <u>2,077</u>   | <u>411.0</u>   | <u>2,297</u>   | <u>427.4</u>   | <u>2,564</u>   | <u>449.2</u>   | <u>2,933</u>   | <u>504.5</u>   | <u>3,377</u>   | <u>591.4</u>   |
| BAY AND RIVER VESSELS        | 702            | 13.9           | 812            | 15.7           | 908            | 18.0           | 1,031          | 19.8           | 1,147          | 21.7           | 1,333          | 23.7           | 1,492          | 25.0           |
| BARGES                       | 936            | 240.1          | 1,118          | 324.7          | 1,181          | 348.5          | 1,218          | 358.5          | 1,271          | 386.3          | 1,353          | 432.4          | 1,408          | 452.7          |
| SAILBOATS                    | 296            | 3.8            | 316            | 4.2            | 333            | 4.6            | 355            | 5.1            | 365            | 5.3            | 400            | 7.6            | 427            | 9.1            |
| PLEASURE YACHTS              | 52             | 0.7            | 72             | 1.0            | 113            | 1.2            | 192            | 2.5            | 277            | 3.2            | 315            | 3.5            | 353            | 4.6            |
| FISHING VESSELS              | 925            | 37.6           | 1,089          | 45.4           | 1,246          | 53.8           | 1,402          | 61.8           | 1,569          | 73.8           | 2,204          | 95.9           | 3,221          | 129.7          |
| GRAND TOTAL                  | <u>4,639</u>   | <u>1,085.6</u> | <u>5,347</u>   | <u>1,287.2</u> | <u>5,962</u>   | <u>1,389.6</u> | <u>6,619</u>   | <u>1,496.7</u> | <u>7,326</u>   | <u>1,580.6</u> | <u>8,681</u>   | <u>1,768.2</u> | <u>10,532</u>  | <u>1,951.7</u> |

Note: Details may not add up to total due to rounding

Source: Research and Development Office, Philippine Coast Guard

Appendix Table 27

Number of Vessels and Tonnage of Cargo Entered and Cleared in Selected Ports, Domestic and International  
 FY 1965-66 to 1972-73  
 (Tonnage in Thousand Tons)

|                   | Domestic Trade |        |        |           |                     | International Trade |                     |       |        |           |                     |                    |
|-------------------|----------------|--------|--------|-----------|---------------------|---------------------|---------------------|-------|--------|-----------|---------------------|--------------------|
|                   | Manila         | Cebu   | Iloilo | Zamboanga | Others <sup>1</sup> | Total <sup>2</sup>  | Manila <sup>3</sup> | Cebu  | Iloilo | Zamboanga | Others <sup>1</sup> | Total <sup>2</sup> |
| 1965-66           |                |        |        |           |                     |                     |                     |       |        |           |                     |                    |
| Number of vessels | 6,710          | 24,512 | 17,250 | 12,612    | 41,560              | 102,644             | 3,959               | 1,109 | 492    | 1,018     | 7,022               | 13,600             |
| Tonnage of cargo  | 1,635          | 2,819  | 1,186  | 299       | 5,267               | 11,206              | 16,447              | 4,317 | 1,877  | 3,436     | 24,566              | 50,643             |
| 1966-67           |                |        |        |           |                     |                     |                     |       |        |           |                     |                    |
| Number of vessels | 6,518          | 26,325 | 17,139 | 13,710    | 40,940              | 104,682             | 14,653              | 1,207 | 634    | 1,005     | 6,719               | 24,218             |
| Tonnage of cargo  | 1,623          | 2,539  | 1,185  | 286       | 6,370               | 12,003              | 19,832              | 4,130 | 2,228  | 3,218     | 22,312              | 51,720             |
| 1967-68           |                |        |        |           |                     |                     |                     |       |        |           |                     |                    |
| Number of vessels | 7,062          | 26,400 | 9,899  | 12,838    | 42,658              | 98,857              | 4,912               | 1,140 | 598    | 1,157     | 8,096               | 15,903             |
| Tonnage of cargo  | 1,296          | 2,748  | 241    | 279       | 9,489               | 14,053              | 10,382              | 3,856 | 2,190  | 3,271     | 26,643              | 56,342             |
| 1968-69           |                |        |        |           |                     |                     |                     |       |        |           |                     |                    |
| Number of vessels | 7,510          | 29,616 | 16,310 | 12,995    | 59,165              | 125,597             | 4,909               | 1,090 | 599    | 1,046     | 8,137               | 15,871             |
| Tonnage of cargo  | 1,429          | 3,443  | 1,047  | 295       | 9,752               | 15,967              | 18,734              | 2,976 | 2,021  | 2,947     | 24,867              | 51,545             |
| 1969-70           |                |        |        |           |                     |                     |                     |       |        |           |                     |                    |
| Number of vessels | 7,574          | 30,192 | 17,245 | 118,325   | 71,530              | 144,866             | 4,742               | 912   | 733    | 839       | 9,003               | 16,229             |
| Tonnage of cargo  | 1,665          | 3,694  | 1,215  | 355       | 23,987              | 30,916              | 18,172              | 3,254 | 2,205  | 2,205     | 27,768              | 53,604             |
| 1970-71           |                |        |        |           |                     |                     |                     |       |        |           |                     |                    |
| Number of vessels | 7,620          | 29,644 | 18,447 | 17,051    | 69,701              | 142,463             | 5,042               | 888   | 772    | 872       | 9,412               | 16,986             |
| Tonnage of cargo  | 1,750          | 2,888  | 1,552  | 436       | 12,824              | 19,450              | 17,959              | 2,685 | 2,334  | 2,158     | 28,039              | 53,175             |
| 1971-72           |                |        |        |           |                     |                     |                     |       |        |           |                     |                    |
| Number of vessels | 7,334          | 29,296 | 18,790 | 11,457    | 68,811              | 135,688             | 4,892               | 966   | 706    | 738       | 7,611               | 14,913             |
| Tonnage of cargo  | 1,666          | 2,484  | 1,511  | 399       | 9,700               | 15,759              | 15,535              | 3,145 | 2,124  | 1,929     | 25,733              | 48,466             |
| 1972-73           |                |        |        |           |                     |                     |                     |       |        |           |                     |                    |
| Number of vessels | 7,750          | 32,103 | 20,225 | 19,922    | 76,563              | 149,563             | 4,516               | 856   | 739    | 753       | 8,258               | 15,122             |
| Tonnage of cargo  | 1,640          | 2,669  | 1,059  | 1,059     | 9,890               | 15,731              | 18,378              | 3,050 | 2,162  | 2,099     | 27,161              | 52,850             |

1/ Include Aparri, Batangas, Cagayan de Oro, Cebu, Limay, Masao, Parang, Davao, Dumaguete, Iligan, Jolo, Jose Panganiban, San Fernando, San Jose, Tabaco, Tacloban

2/ Totals may not tally due to rounding

3/ Include volume of export and import cargo loaded and unloaded at the Manila International Airport

Source: Bureau of Customs

Appendix Table 28.1

Registered Transport Facilities Used in the Grains  
Industry and Corresponding Capacities by  
Region as of December 15, 1974

(Capacity in bags of 50 kgs.)

|                   | Trucks |          | Jeeps |          |
|-------------------|--------|----------|-------|----------|
|                   | Units  | Capacity | Units | Capacity |
| Philippines       | 2,264  | 290,690  | 865   | 10,508   |
| Manila & suburbs  | 228    | 36,040   | 9     | 100      |
| Ilocos Region     | 123    | 11,683   | 4     | 80       |
| Cagayan Valley    | 407    | 46,920   | 23    | 460      |
| Central Luzon     | 778    | 89,205   | 402   | 8,385    |
| Southern Tagalog  | 317    | 54,544   | 220   | 440      |
| Bicol             | 154    | 26,120   | 14    | 280      |
| Western Visayas   | 19     | 2,520    | 1     | -        |
| Central Visayas   | 64     | 7,560    | -     | -        |
| Eastern Visayas   | 30     | 3,600    | 7     | -        |
| Western Mindanao  | 76     | 4,560    | -     | -        |
| Northern Mindanao | 23     | 2,400    | 1     | 20       |
| Southern Mindanao | 45     | 5,538    | 184   | 743      |

Source: Directorate for Grains Business Regulation  
National Grains Authority

Appendix Table 28.2

Number of Motor Vehicles Registered According to Use: CY 1959-1973

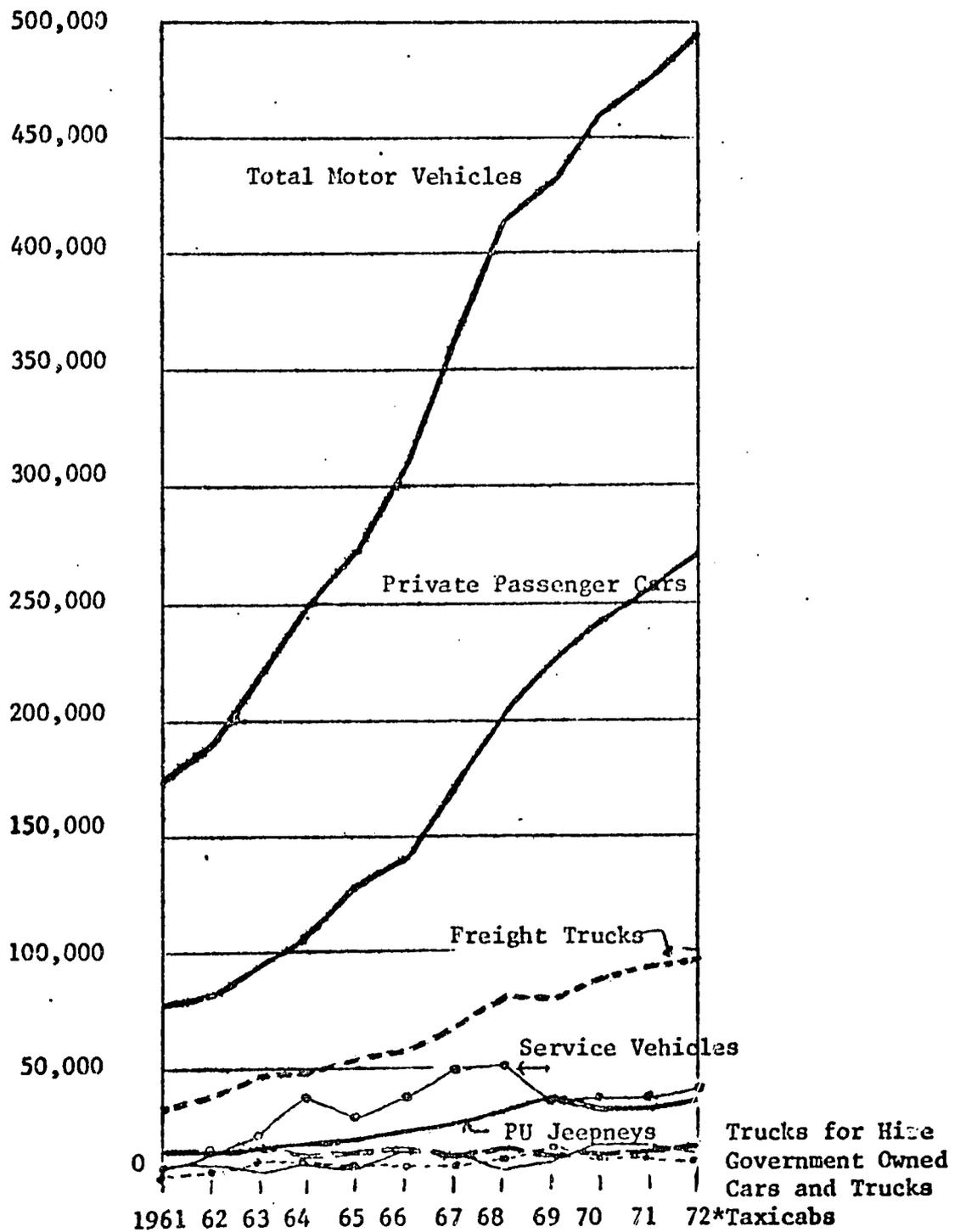
| Type of Vehicle                         | 1959           | 1960           | 1961           | 1962           | 1963           | 1964           | 1965           | 1966           | 1967           | 1968           | 1969           | 1970           | 1971           | 1972           | 1973           |
|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| <b>TOTAL MOTOR VEHICLES</b>             | <b>170,741</b> | <b>172,470</b> | <b>175,436</b> | <b>189,933</b> | <b>220,329</b> | <b>251,864</b> | <b>273,203</b> | <b>310,632</b> | <b>362,040</b> | <b>413,217</b> | <b>445,262</b> | <b>458,287</b> | <b>474,746</b> | <b>516,727</b> | <b>571,347</b> |
| <b>Private Passenger Vehicles</b>       |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Cars                                    | 68,723         | 73,048         | 76,535         | 81,910         | 92,913         | 105,739        | 127,586        | 140,421        | 171,894        | 202,003        | 254,041        | 243,795        | 256,256        | 282,153        | 296,480        |
| Jeeps                                   | 52,523         | 53,615         | 52,556         | 55,693         | 62,624         | 71,262         | 84,217         | 95,146         | 118,729        | 135,672        | 163,442        | 167,125        | 170,159        | 188,856        | 197,784        |
| Jeeps                                   | 16,200         | 17,433         | 25,979         | 25,217         | 20,289         | 34,477         | 43,369         | 45,275         | 53,075         | 66,131         | 70,592         | 78,670         | 86,097         | 93,267         | 93,696         |
| <b>Public Utility Vehicles</b>          | <b>49,959</b>  | <b>43,803</b>  | <b>42,891</b>  | <b>42,016</b>  | <b>49,689</b>  | <b>47,481</b>  | <b>49,861</b>  | <b>54,146</b>  | <b>54,416</b>  | <b>65,235</b>  | <b>75,726</b>  | <b>65,982</b>  | <b>66,154</b>  | <b>70,351</b>  | <b>87,368</b>  |
| Taxicabs                                | 4,811          | 5,719          | 4,466          | 4,065          | 8,459          | 8,678          | 7,233          | 7,238          | 6,818          | 5,795          | 14,426         | 9,685          | 9,600          | 8,565          | 10,856         |
| PU Jeeps <sup>1/</sup>                  | 13,354         | 9,552          | 15,302         | 14,353         | 15,744         | 16,585         | 19,473         | 22,543         | 24,582         | 31,137         | 35,570         | 32,803         | 32,803         | 35,184         | 45,019         |
| AC Jeeps <sup>2/</sup>                  | 7,287          | 6,037          | 6,420          | 8,203          | 8,447          | 8,011          | 9,278          | 9,828          | 10,726         | 11,111         | 11,567         | 10,747         | 10,860         | 10,200         | 13,772         |
| Cars for hire <sup>3/</sup>             | 161            | 517            | 486            | 540            | 2,126          | 565            | 356            | 259            | 262            | 525            | 391            | 471            | 452            | 853            | 824            |
| Buses <sup>4/</sup>                     | 25,156         | 25,778         | 16,217         | 14,055         | 14,903         | 13,542         | 13,511         | 14,218         | 12,028         | 14,327         | 13,662         | 12,548         | 12,439         | 15,549         | 16,537         |
| <b>Service Vehicles</b>                 | <b>44,037</b>  | <b>45,069</b>  | <b>45,555</b>  | <b>57,603</b>  | <b>71,455</b>  | <b>90,248</b>  | <b>89,120</b>  | <b>101,714</b> | <b>122,660</b> | <b>138,715</b> | <b>122,714</b> | <b>132,039</b> | <b>137,337</b> | <b>150,268</b> | <b>176,155</b> |
| Cars <sup>5/</sup>                      | 102            | 38             | -              | 326            | 51             | 10,754         | 1,225          | 9,259          | 22,296         | 21,429         | 3,976          | 2,415          | 2,152          | 1,384          | 4,684          |
| Trucks                                  | 43,935         | 45,001         | 45,555         | 57,277         | 71,404         | 79,494         | 87,895         | 92,455         | 100,564        | 117,286        | 119,738        | 129,624        | 135,185        | 148,884        | 172,071        |
| Freight trucks                          | 34,531         | 34,713         | 33,513         | 38,620         | 46,511         | 48,377         | 53,582         | 57,669         | 65,756         | 79,379         | 79,325         | 87,707         | 92,728         | 101,296        | 120,369        |
| Trucks for hire <sup>6/</sup>           | 3,370          | 3,512          | 6,443          | 7,775          | 4,763          | 5,537          | 7,230          | 6,803          | 7,115          | 8,521          | 8,290          | 8,129          | 7,441          | 7,250          | 9,220          |
| Service vehicles <sup>7/</sup>          | 6,034          | 6,776          | 5,599          | 10,882         | 20,130         | 25,580         | 27,083         | 27,983         | 26,693         | 29,386         | 31,123         | 33,788         | 35,016         | 40,338         | 42,482         |
| <b>Government Owned Cars and Trucks</b> | <b>8,012</b>   | <b>8,750</b>   | <b>8,455</b>   | <b>8,404</b>   | <b>6,272</b>   | <b>8,416</b>   | <b>6,165</b>   | <b>13,991</b>  | <b>12,451</b>  | <b>6,572</b>   | <b>11,791</b>  | <b>14,498</b>  | <b>12,931</b>  | <b>13,746</b>  | <b>9,242</b>   |
| Cars                                    | 3,876          | 4,311          | 4,297          | 4,373          | 4,082          | 5,186          | 4,186          | 7,745          | 7,533          | 4,433          | 6,668          | 10,087         | 7,995          | 8,840          | 4,725          |
| Trucks                                  | 4,136          | 4,439          | 4,158          | 4,031          | 2,190          | 3,230          | 1,979          | 6,246          | 4,918          | 2,139          | 5,103          | 4,411          | 4,936          | 4,906          | 4,517          |
| <b>Others</b>                           |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| Cars <sup>8/</sup>                      | -              | -              | -              | -              | -              | -              | 471            | 360            | 509            | 32             | 1,010          | 1,973          | 2,068          | 209            | 2,162          |
| Trucks <sup>9/</sup>                    | -              | -              | -              | -              | -              | -              | 471            | 360            | 509            | 32             | 1,004          | 1,972          | 2,066          | 141            | 1,492          |
|   |                |                |                |                |                |                |                |                |                |                | 6              | 1              | 2              | 68             | 670            |

- 1/ PU jeeps are those that have definite routes to travel  
 2/ AC jeeps (autocalesa) are those that travel without definite routes  
 3/ Includes cars for public utility and tourist cars  
 4/ Includes tourist, starting 1970  
 5/ Includes garage cars, exempt cars, and agent cars  
 6/ Includes garage trucks and contractors trucks carrying goods outside the customs zone  
 7/ Includes school buses, service trucks, utility trucks, agent trucks and exempt trucks  
 8/ Includes reserved official cars, official cars, diplomats' cars and cars with temporary plates  
 9/ Includes official trucks, RP-US trucks and temporary

Source: Land Transportation Commission and National Census and Statistics Office, Journal of Philippine Statistics

Appendix Figure J

Number of Motor Vehicles Registered According to Use  
1961-1972



\*Refers to Fiscal Year Period - FY 1971-1972.

Appendix Table 29

Freight Car Loading of Commodities by the Philippine National Railways, CY 1946-1973  
(By rail of main line and branches)  
(In metric tons)

| Period      | Total                 | Rice   | Sugar   | Sugar Cane | Copra  | Coconut | Molasses | Hemp  | Tobacco | Livestock and Animal Products |        | Mineral Products | Forest Products | Manufactures         | Miscellaneous |
|-------------|-----------------------|--------|---------|------------|--------|---------|----------|-------|---------|-------------------------------|--------|------------------|-----------------|----------------------|---------------|
|             |                       |        |         |            |        |         |          |       |         | Tons                          | Head   |                  |                 |                      |               |
| 1946        | 524,448               | 11,989 | 4,256   | 66,837     | 11,921 | 229     | 590      | 12    | 286     | 358                           | 9,233  | 133,963          | 35,393          | 255,482              | 7,122         |
| 1947        | 794,918               | 24,398 | 7,395   | 66,467     | 33,834 | 1,728   | 264      | 115   | 717     | 552                           | 24,426 | 63,333           | 111,833         | 468,114              | 16,101        |
| 1948        | 900,963               | 35,967 | 25,803  | 128,652    | 22,130 | 9,312   | 439      | 176   | n.a.    | 7,565                         | 48,396 | 45,861           | 195,500         | 442,395              | 47,064        |
| 1949        | 816,758               | 33,212 | 9,059   | 89,351     | 20,760 | 5,151   | 3,871    | 535   | 85      | 7,893                         | 54,673 | 11,645           | 273,708         | 250,675              | 110,813       |
| 1950        | 787,176               | 61,049 | 31,708  | 97,362     | 22,928 | 6,514   | 36       | 1,109 | 340     | 10,285                        | 41,874 | 4,789            | 222,113         | 217,875              | 111,069       |
| 1951        | 774,327               | 53,018 | 70,534  | 142,285    | 26,474 | 5,098   | 7,220    | 1,057 | 199     | 10,638                        | 28,709 | 8,627            | 157,767         | 186,477              | 104,043       |
| 1952        | 913,410               | 28,995 | 122,323 | 252,066    | 24,240 | 3,648   | 13,701   | 1,239 | 615     | 8,270                         | 28,974 | 8,745            | 147,201         | 205,821              | 96,536        |
| 1953        | 1,009,275             | 32,893 | 97,027  | 321,544    | 19,749 | 3,135   | 6,836    | 1,024 | 133     | 11,453                        | 35,578 | 17,843           | 177,273         | 228,435              | 91,930        |
| 1954        | 1,110,563             | 32,352 | 84,836  | 476,266    | 26,883 | 3,135   | 2,646    | 138   | 27      | 6,631                         | 22,271 | 15,288           | 143,592         | 243,644              | 75,203        |
| 1955        | 1,125,536             | 38,244 | 198,732 | 393,606    | 29,435 | 12,377  | 8,070    | 361   | 536     | 6,042                         | 39,529 | 12,012           | 127,339         | 212,578              | 91,386        |
| 1956        | 1,068,539             | 55,869 | 190,223 | 257,677    | 40,886 | 18,070  | 5,050    | 715   | 42      | 4,147                         | 29,591 | 12,608           | 180,192         | 182,968              | 120,192       |
| 1957        | 1,172,106             | 68,812 | 138,901 | 249,671    | 30,363 | 21,134  | 967      | 1,277 | 464     | 7,884                         | 43,190 | 29,195           | 243,023         | 239,502              | 141,824       |
| 1958        | 1,171,301             | 52,133 | 220,623 | 240,267    | 16,796 | 754     | 4,644    | 1,251 | 195     | 8,530                         | 42,900 | 28,284           | 206,986         | 217,687              | 172,190       |
| 1959        | 1,179,301             | 33,178 | 193,244 | 231,027    | 17,972 | 17      | 1,394    | 2,410 | 1,580   | 6,692                         | 34,510 | 15,081           | 245,527         | 221,548              | 211,419       |
| 1960        | 1,337,072             | 33,959 | 220,119 | 333,451    | 18,111 | 63      | 16,287   | 1,014 | 21      | 10,914                        | 54,570 | 9,440            | 266,784         | 247,909              | 179,000       |
| 1961        | 1,152,076             | 41,574 | 154,552 | 247,135    | 20,633 | 179     | 12,287   | 116   | 43      | 18,606                        | 93,030 | 30,174           | 265,764         | 238,085              | 122,814       |
| 1962        | 1,097,243             | 30,683 | 134,485 | 320,676    | 23,034 | 7,685   | 3,456    | 312   | 699     | 12,150                        | 60,750 | 28,652           | 215,331         | 182,557              | 137,523       |
| 1963        | 1,147,623             | 28,320 | 146,679 | 336,836    | 32,611 | 35      | 13,906   | 258   | 377     | 12,628                        | 52,532 | 25,021           | 200,762         | 208,516              | 141,487       |
| 1964        | 939,995               | 12,671 | 104,276 | 289,915    | 28,485 | 94      | 11,527   | 120   | 49      | 9,458                         | 33,768 | 23,746           | 141,540         | 195,338              | 122,835       |
| 1965        | 837,330               | 8,961  | 87,013  | 323,609    | 17,413 |         | 4,239    | 294   | 74      | 9,973                         | 45,765 | 21,571           | 118,138         | 135,956              | 109,995       |
| 1966        | 809,808               | 8,157  | 55,160  | 251,457    | 52,513 | 601     | 1,615    | 14    | 189     | 6,734                         | 27,010 | 21,952           | 112,142         | 177,102              | 122,172       |
| 1967        | n.a.                  | 9,798  | 49,595  | 236,271    | 36,294 | n.a.    | 393      | n.a.  | 120     | 1,475                         | 3,550  | 25,323           | 161,029         | 161,084              | 122,842       |
| 1968        | 521,434 <sup>1/</sup> | 8,919  | 32,351  | 151,823    | 10,626 | 2,446   | 149      | 115   | 50      | 1,139                         | 140    | 13,824           | 92,286          | 92,575               | 115,131       |
| 1969        | n.a.                  | 9,355  | 38,466  | 96,500     | 4,854  | 287     | 161      | 97    | 117     | 961                           | n.a.   | 15,288           | 84,151          | 120,836              | 187,949       |
| 1970        | 327,876               | 4,348  | 29,398  | 97,033     | 1,447  | 1       | 1,825    | 19    | 119     | 474                           | n.a.   | 8,755            | 20,378          | 36,455               | 77,424        |
| 1971        | 378,750               | 6,835  | 64,304  | 75,050     | 8,433  | 28      | 371      | 319   | 80      | 921                           | n.a.   | 11,354           | 82,249          | 70,869               | 57,937        |
| 1972        | n.a.                  | 4,348  | 52,656  | 43,357     | 10,390 | n.a.    | 78       | n.a.  | n.a.    | 690                           | n.a.   | 5,952            | 35,179          | 32,229               | 27,365        |
| 1973        | n.a.                  | 2,502  | 5,039   | n.a.       | 17,434 | n.a.    | n.a.     | n.a.  | n.a.    | 3,491                         | n.a.   | 8,017            | 1,640           | 51,876 <sup>2/</sup> | n.a.          |
| 1st quarter | n.a.                  | 386    | 436     | 13,423     | 1,764  | n.a.    | n.a.     | n.a.  | n.a.    | 1,252                         | n.a.   | 727              | 12              | 11,739               | n.a.          |
| 2nd quarter | n.a.                  | 83     | 244     | n.a.       | 1,574  | n.a.    | n.a.     | n.a.  | n.a.    | 749                           | n.a.   | 1,448            | n.a.            | 16,907               | n.a.          |
| 3rd quarter | n.a.                  | 500    | 3,822   | n.a.       | 6,172  | n.a.    | n.a.     | n.a.  | 175     | 810                           | n.a.   | 3,147            | 260             | 11,881               | n.a.          |
| 4th quarter | n.a.                  | 1,533  | 536     | 12,883     | 7,924  | n.a.    | n.a.     | n.a.  | 63      | 680                           | n.a.   | 2,695            | 1,368           | 11,349               | n.a.          |

n.a. - Data not available

<sup>1/</sup> Excludes non-revenue commodities as per adjustment of the Philippine National Railways.<sup>2/</sup> Includes miscellaneousSource: Central Bank Statistical Bulletin, December 1972  
Philippine National Railways for 1973

Appendix Table 30  
Infrastructure Program<sup>a/</sup>  
Physical Targets

Railways

| Items of Work  | Physical<br>Targets<br>FY 1973 | Physical<br>Accomplishment<br>Projected<br>FY 1973 | Annual Physical Targets |         |         |         | Total<br>FY 1974-77<br>Targets |
|--|--------------------------------|--|-------------------------|---------|---------|---------|--------------------------------|
|  |                                |  | FY 1974                 | FY 1975 | FY 1976 | FY 1977 |                                |
| <b>A. Rehabilitation</b>                                   |                                |  |                         |         |         |         |                                |
| 1. Motive power  | 12                             | 15   | -                       | -       | -       | -       | -                              |
| 2. Other rolling stock                                     | 92                             | -  | 212                     | 139     | -       | -       | 351                            |
| a) Acquisition   | 32                             | 17   | 23                      | -       | -       | -       | -                              |
| b) Rehabilitation  | 60                             | 52   | 185                     | 132     | -       | -       | 317                            |
| 3. Shops and Sheds   | 1                              | 0  | 4                       | 7       | -       | -       | 11                             |
| 4. Tracks  | 209,630                        | -  | 221,660                 | 173,340 | 150,350 | 150,350 | 695,700                        |
| a) Ballasting  | 140,000                        | 36,000   | 151,000                 | 123,000 | 100,000 | 100,000 | 474,000                        |
| b) Tie replacement   | 69,000                         | 46,000   | 70,000                  | 50,000  | 50,000  | 50,000  | 220,000                        |
| c) Sea walls   | 500                            | 160  | 500                     | 200     | 200     | 200     | 1,100                          |
| d) Roadways Improvement                                    | 100                            | 62   | 100                     | 50      | 50      | 50      | 250                            |
| e) Rail replacement  | 30                             | 0  | 60                      | 90      | 100     | 100     | 350                            |
| 5. Repairs of Bridges                                      | 10                             | 1  | 35                      | 31      | 10      | 10      | 86                             |
| 6. Communication Line<br>including Communi-<br>cation Sets | 200                            | 60   | 500                     | 500     | 200     | 200     | 1,400                          |
| <b>B. Commuter Service</b>                                 |                                |  |                         |         |         |         |                                |
| 1. Railcar units   | -                              | 8  | 25                      | 15      | 10      | -       | 50                             |
| 2. Support facilities<br>(Percent)                         | -                              | 10%  | 30%                     | 30%     | 30%     | 10%     | 100%                           |

<sup>a/</sup> Four-Year Development Plan, FY 1974-1977, National Economic Development Authority

Appendix Table 31

Public Roads: National, Provincial, Municipal and City  
by Type of Surface Materials Used  
FY 1960-61 to FY 1972-73

| Fiscal Year     | All Types | Earth     | Macadam   | Low Type Bituminous | High Type Bituminous | Concrete | Miscellaneous |
|-----------------|-----------|-----------|-----------|---------------------|----------------------|----------|---------------|
| <u>Total</u>    |           |           |           |                     |                      |          |               |
| 1960-61         | 49,504.51 | 10,272.25 | 31,192.80 | 4,558.00            | 2,006.28             | 946.02   | 29.16         |
| 1961-62         | 54,591.40 | 12,037.98 | 34,030.99 | 5,360.79            | 2,085.83             | 1,044.03 | 31.78         |
| 1962-63         | 55,298.97 | 11,890.81 | 33,642.63 | 5,369.99            | 2,256.43             | 1,121.16 | 17.89         |
| 1963-64         | 55,379.43 | 11,594.73 | 34,488.08 | 5,605.05            | 2,368.66             | 1,306.07 | 16.84         |
| 1964-65         | 55,777.95 | 11,738.21 | 34,314.60 | 5,745.05            | 2,465.05             | 1,461.97 | 52.67         |
| 1965-66         | 57,888.42 | 12,065.89 | 35,357.21 | 5,976.44            | 2,749.48             | 1,608.50 | 130.90        |
| 1966-67         | 58,602.38 | 12,748.90 | 35,032.12 | 6,173.53            | 2,812.99             | 1,762.78 | 72.07         |
| 1967-68         | 60,525.49 | 13,985.69 | 35,505.59 | 6,106.47            | 2,790.14             | 2,014.05 | 123.55        |
| 1968-69         | 63,594.97 | 14,543.00 | 36,678.38 | 6,675.20            | 3,104.08             | 2,399.19 | 116.64        |
| 1969-70         | 68,025.50 | 16,327.54 | 37,711.81 | 6,828.56            | 3,625.64             | 3,047.35 | 484.60        |
| 1970-71         | 73,531.56 | 19,699.80 | 38,254.50 | 7,206.36            | 3,740.69             | 3,353.43 | 1,276.78      |
| 1971-72         | 74,768.53 | 20,445.21 | 38,354.23 | 7,278.18            | 3,741.20             | 3,565.04 | 1,384.67      |
| 1972-73         | 78,354.85 | 22,293.25 | 38,960.33 | 7,394.62            | 3,604.52             | 4,475.72 | 1,626.41      |
| <u>National</u> |           |           |           |                     |                      |          |               |
| 1960-61         | 15,143.09 | 645.71    | 9,838.58  | 2,481.46            | 1,265.46             | 849.97   | 11.48         |
| 1961-62         | 15,223.24 | 509.70    | 9,858.62  | 2,663.73            | 1,300.41             | 877.69   | 13.09         |
| 1962-63         | 15,456.86 | 532.26    | 9,845.83  | 2,801.02            | 1,321.70             | 897.24   | 8.81          |
| 1963-64         | 15,678.02 | 534.53    | 9,940.67  | 2,861.47            | 1,340.27             | 942.95   | 8.13          |
| 1964-65         | 15,921.54 | 608.36    | 9,911.11  | 2,930.18            | 1,372.62             | 995.47   | 23.78         |
| 1965-66         | 16,189.35 | 657.26    | 10,006.24 | 3,067.06            | 1,354.59             | 1,082.36 | 21.84         |
| 1966-67         | 16,615.96 | 802.12    | 9,967.52  | 3,199.17            | 1,398.97             | 1,224.47 | 23.64         |
| 1967-68         | 17,434.01 | 1,291.26  | 10,094.66 | 3,221.54            | 1,318.86             | 1,450.97 | 56.72         |
| 1968-69         | 18,096.59 | 1,192.13  | 10,084.62 | 3,377.54            | 1,598.97             | 1,836.11 | 57.22         |
| 1969-70         | 19,698.40 | 1,411.00  | 10,806.85 | 3,276.91            | 1,847.91             | 2,268.63 | 88.01         |
| 1970-71         | 20,066.08 | 1,648.70  | 10,865.49 | 3,147.75            | 1,855.94             | 2,331.11 | 217.09        |
| 1971-72         | 21,315.38 | 1,604.07  | 11,342.22 | 3,220.72            | 2,341.70             | 2,542.26 | 264.41        |
| 1972-73         | 21,643.28 | 2,018.67  | 11,202.87 | 3,321.03            | 1,838.43             | 2,731.69 | 530.59        |

Appendix Table 31 (continued)

Local

|         |           |           |           |          |          |          |          |
|---------|-----------|-----------|-----------|----------|----------|----------|----------|
| 1960-61 | 34,461.42 | 10,226.54 | 21,304.22 | 2,076.11 | 740.82   | 96.05    | 17.68    |
| 1961-62 | 39,368.16 | 11,528.28 | 24,172.37 | 2,697.06 | 785.42   | 166.34   | 18.69    |
| 1962-63 | 33,842.11 | 11,308.61 | 23,796.80 | 2,568.97 | 934.73   | 223.92   | 9.08     |
| 1963-64 | 39,842.11 | 11,010.20 | 24,547.41 | 2,743.58 | 1,028.39 | 363.12   | 8.71     |
| 1964-65 | 39,856.41 | 11,049.83 | 24,403.49 | 2,814.87 | 1,092.83 | 466.50   | 28.99    |
| 1965-66 | 41,699.07 | 11,408.63 | 25,350.97 | 2,909.38 | 1,394.89 | 526.14   | 109.06   |
| 1966-67 | 41,986.42 | 11,946.71 | 25,064.60 | 2,974.36 | 1,414.02 | 538.31   | 48.43    |
| 1967-68 | 43,091.48 | 12,694.43 | 25,410.93 | 2,884.93 | 1,471.28 | 563.08   | 66.23    |
| 1968-69 | 45,498.38 | 13,350.87 | 26,593.76 | 3,297.75 | 1,505.11 | 591.47   | 59.42    |
| 1969-70 | 48,327.10 | 14,916.54 | 26,904.96 | 3,552.56 | 1,777.73 | 778.72   | 396.59   |
| 1970-71 | 53,465.48 | 18,051.10 | 27,339.01 | 4,058.61 | 1,884.75 | 1,022.32 | 1,059.69 |
| 1971-72 | 53,453.15 | 18,841.14 | 27,012.01 | 4,057.46 | 1,399.50 | 1,022.78 | 1,120.26 |
| 1972-73 | 56,711.57 | 20,274.58 | 27,757.46 | 4,073.59 | 1,766.09 | 1,744.03 | 1,095.23 |

Source: Department of Public Highways

## Appendix Table 32

## Expenditures on Infrastructure Program

FY 1966-67 to 1973-74<sup>1/</sup>

|   | 1966-67 | 1967-68 | 1968-69 | 1969-70 | 1970-71 | 1971-72 | 1972-73 | 1973-74 <sup>2/</sup> |
|---|---------|---------|---------|---------|---------|---------|---------|-----------------------|
| Total Cash Releases <sup>3/</sup><br>(in million pesos) |         |         |         |         |         |         |         |                       |
| Highways  | 178.9   | 260.3   | 229.7   | 216.9   | 243.2   | 359.7   | 647.8   | 379.3                 |
| Irrigation  | 24.8    | 32.8    | 45.4    | 53.7    | 116.2   | 108.1   | 197.5   | 153.7                 |
| Airport and air navigation                              | 9.7     | 11.4    | 33.3    | 48.5    | 33.4    | 65.8    | 56.5    | 62.0                  |
| Port works  | 29.4    | 34.6    | 22.3    | 5.1     | 35.7    | 15.9    | 42.7    | 60.9                  |
| Telecommunications                                      | 15.7    | 17.8    | 21.8    | 45.6    | 0.5     | 3.2     | 14.6    | n.a.                  |
| Schools   | 27.2    | 78.6    | 90.7    | 42.5    | 26.8    | 37.7    | 81.7    | 21.4                  |
| Waterworks  | 63.1    | 63.2    | 84.2    | 21.4    | 35.1    | 18.3    | 13.1    | 10.0                  |
| Flood control   | 0.8     | 2.9     | 11.2    | 21.3    | 8.3     | 5.6     | 60.7    | 70.0                  |
| National buildings                                      | 5.0     | 9.0     | 13.2    | 53.0    | 11.4    | 23.3    | 25.9    | 18.5                  |
| Power   | 59.6    | 60.1    | 36.7    | 17.9    | 83.9    | 58.9    | 44.3    | 25.3                  |
| Community projects                                      | 4.7     | 7.0     | 5.9     | 162.9   | n.a.    | n.a.    | n.a.    | n.a.                  |
| Preliminary engineering                                 | 1.3     | 3.0     | 2.0     | 2.1     | 6.5     | 6.3     | 10.4    | 12.2                  |
| Rural electrification                                   | n.a.    | n.a.    | n.a.    | 0.3     | 8.5     | 14.9    | 37.4    | 135.7                 |
| Shore protection  | n.a.    | n.a.    | n.a.    | n.a.    | 2.1     | 1.3     | 3.0     | 10.3                  |
| Miscellaneous public works                              | n.a.    | n.a.    | n.a.    | n.a.    | 41.5    | 21.5    | 12.4    | 18.5                  |
| Railroads   | n.a.    | n.a.    | n.a.    | n.a.    | n.a.    | 13.1    | 27.6    | 33.5                  |
| Total   | 420.2   | 580.7   | 596.4   | 691.2   | 653.1   | 758.6   | 1,275.6 | 970.9                 |

1/ Cash releases represent replenishment of the common fund account or issuance treasury warrants either as direct payment to the creditor or for deposit in the account of a disbursing officer of the implementing agency. Disbursement of cash expenditure represents actual payment to the creditor and is made from either or both the common account and treasury warrants. Cash releases may be carried over from one fiscal year to the next before disbursement is made and hence is not exactly the same as actual expenditure during the fiscal year. However, because of some balancing effect of disbursement made against cash releases during previous years and because year end balances of undisbursed funds do not vary much in size, cash releases are approximately equal to actual expenditure.

2/ As of July 1, 1973 to December 31, 1973 only

3/ Converted at same exchange rates as used by the Infrastructure Operations Center; FY 1966-67 to 1969-70; ₱4.0 = US\$1; FY 1970-71; ₱6.0 = US\$1; FY 1972-73; ₱6.7 = US\$1

Source: Infrastructure Operations Center, Implementation of the Infrastructure Program, various years

Appendix Table 33

Implementation Schedule of the Transport (Highways) Program

| P R O J E C T S                      | Construction Cost Estimates |        | IMPLEMENTATION SCHEDULE (Fiscal Years)  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|--------------------------------------|-----------------------------|--------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                      | ₱ M                         | \$ M   | '69   | '70 | '71 | '72 | '73 | '74 | '75 | '76 | '77 | '78 | '79 | '80 | '81 | '82 | '83 | '84 | '85 | '86 |
| TRANSPORT Highways                   |                             |        |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 1. Pan Philippine Highway Project    | 578,415                     | 30,000 |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 2. San Juanico Bridge                | 86,000                      | -      |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 3. Iligan-Cagayan de Oro Butuan Road | 101,000                     | 22,250 |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 4. Digos-Cotabato Road               | 24,000                      | 3,300  |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 5. Cotabato Ge. Santos Road          | 61,000                      | 10,600 |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 6. Tarlac-Sta. Rosa Road             | 15,080                      | 1,600  |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 7. 2nd IBRD Road Package             | 842,800                     | 50,000 |   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|                                      |                             |        | <p>Legend:</p> <p>▨ Feasibility Study</p> <p>▨ Detailed Engineering</p> <p>▨ Construction</p> |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |



**CHAPTER VI. INDUSTRIAL PROCESSING**

## CHAPTER VI. INDUSTRIAL PROCESSING

The corn kernel is enclosed in a hard fibrous covering called the hull and bran. This fraction represents about 5.5% of the kernel and is one of the main components of animal feed. Inside the hull is a mixture of gluten starch and a small amount of oil. The outer central portion of the kernel consists mostly of starch although some portions also contain traces of oil. The germ or embryo, which is about 11.5% of the kernel contains most of the oil plus some protein and particles of starch. The endosperm, which consists largely of starch and gluten, is the largest (82%) and most important part of the kernel. The remaining 1% consists of the tip cap, the smallest portion of the kernel, Figure C. Corn is processed either as animal feed or human food.

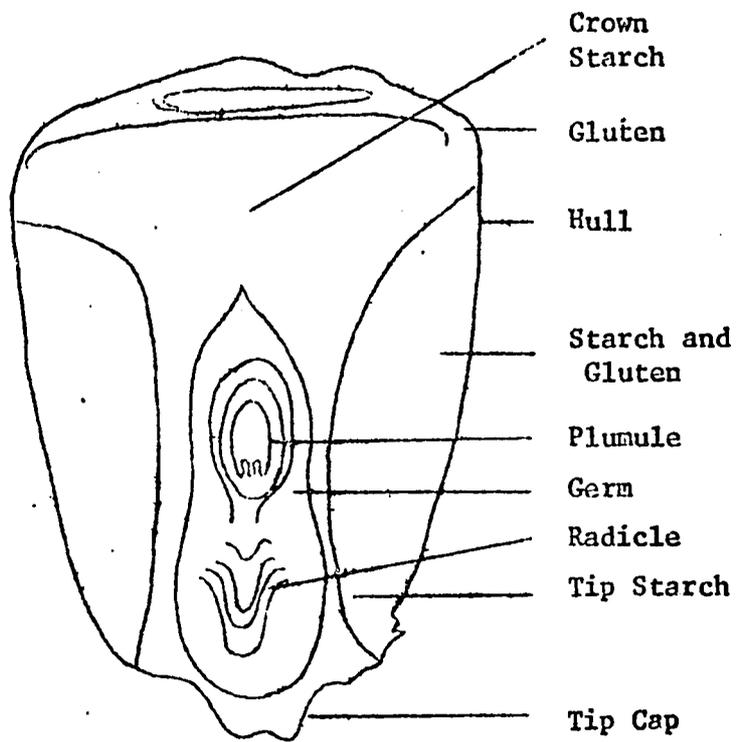
The industrial sector which processes corn for human, animal and industrial use utilizes an average of 67,000 metric tons of corn annually. Corn utilization for industrial purposes has increased from 45,773 metric tons in 1965 to 65,265 metric tons in 1972. A decrease in industrial corn utilization came about in 1971 to 1972 due to national shortage in corn supply caused by floods and typhoons.

### A. Food Processing

As a staple food, corn is either milled into corn grits, consumed as whole grain, or eaten as fresh corn on the cob. The human consumption of corn has been increasing at an average rate of 5.5% from 1965 to 1972.

Figure C

Corn Kernel Structure



Components Parts of the Corn Kernel

|                   |       |
|-------------------|-------|
| Hull - - - - -    | 5.5%  |
| Germ - - - - -    | 11.5% |
| Embryo - - - - -  | 32.0% |
| Tip Cap - - - - - | 1.0%  |

From a total human corn consumption of 1.08 million metric tons in 1965, consumption has increased to 1.69 million metric tons in 1972.

Corn is processed into starch, corn gluten, corn germ and corn oil. No other grain product compares to corn in its range of usefulness.

#### Corn Starch

Corn starch is chemically described as a white granular material, insoluble in alcohol but dispersible in hot water, which forms into a viscuous sol or gel when heated. Although there are other sources of starch such as sorghum, roots, potatoes, cassava, arrowroot and the sago palm, corn still predominates as the main source of starch in the Philippines.

Corn starch is used for making pharmaceutical products, plywood and other industrial processes and household items. It is an important ingredient in food manufacture to improve the texture, consistency and shelf life of processed food products. The meat processing industry uses corn starch extensively for canned and frozen products, and in the manufacture of baby food. It is also used in manufacturing textiles, explosives and adhesives.

In the canning industry, corn starch improves product consistency, flavor and stability of canned products under varied storage conditions.

In meat processing, it is used for meat loaf preparations, and due to its water absorbing capacities, it serves as binder and stabilizer for meat preparations.

Salad dressing is prepared with corn starch to attain the desired consistency for various food preparations.

The beer brewing and manufacturing industry uses corn starch in the form of brewer's refined grits. The corn starch is initially converted into malt and fermented. The gelatinized corn produces a clear brew in contrast to roll dried starch which produces cloudy beer when chilled. The low protein and low fat content of corn starch promotes the keeping quality of beer.

#### Syrups and Solids

Corn syrup is used for preserving fruits and is a main ingredient for sweeteners and food seasoning. It is a plasticizing agent for glassine paper manufacture, a carrier for active ingredients in pharmaceuticals and textile finishing agent. It is also used in the leather tanning industry.

Corn syrup and corn sugars are also used in baking, jam making, ice cream and canned products.

Commercial glucose is converted from corn starch by hydrolysis, using either sulfuric acid or hydrochloric acid solution. Commercial glucose, which is a mixture of dextrin, maltose and glucose is used as a sweetening agent and syrup.

After neutralization and filtration, the product is solidified by evaporation in two stages. The syrup from the first stage is called "corn syrup unmixed." This is used in candy making, baking, ice cream

making and preserving fruits and vegetables. With the addition of cane sugar syrup, it becomes a table syrup.

The concentrated sugar liquor is solidified, cut into slabs, and chipped into smaller sugar pieces for packaging.

#### Dextrose and Dextrins

Dextrose and dextrins are used for soft drinks and ice cream manufacture, biscuit and bread making and frozen or preserved fruits. They are also used in pharmaceutical and human intravenous feeding preparations.

The pharmaceutical industry uses dextrose and dextrins for the manufacture of Polyol, Sorbitol and Mannitol. In the case of Sorbitol, it is used in surfactant production and synthetic vitamin C preparations. Furthermore, dextrose and corn sugars may be used in alcohol production through the catalytic hydrogenation of dextrose.

#### Corn Oil Meal

A by-product of the oil extraction process, corn oil meal is utilized as animal feed. Corn oil meal and gluten contain 50% protein and it is used for making special kinds of bread. Unaltered gluten is used for food concentrates. It is usually de-starched by acid or enzyme hydrolysis. When gluten is completely hydrolyzed, it yields monosodium glutamate for food seasoning. Gluten is also processed into Zein, a pure protein which has many commercial uses. Zein is used

for coarings, cork binders and printing ink. When zein is mixed with granulated cork, the resulting product has many uses such as gasket materials, bottle cap liners and shoe fillers.

#### Refined Corn Oil

The dark reddish oil obtained from the germ oil is utilized for many food preparations. Corn oil is deodorized to remove the strong taste and color of the unrefined product. The odor is further removed through refining and the oil is mostly marketed as salad oil and cooking oil. It is also used as a carrier for vitamins and other medicinal preparations in capsule form. The lower grade oil is used in soap-making and manufacturing rubber substitutes, paints and varnishes.

#### Steepwater

The steepwater, a by-product from the initial grain soaking or steeping process, is concentrated for mold nutrient preparations used in penicillin manufacture and also as a source of high quality animal feed.<sup>1/</sup>

#### Existing Corn Processing Enterprises

There are five major corn starch processing companies in the

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<sup>1/</sup> Matz, Samuel A., op.cit., pp. 373 and 380

Philippines registered with the Board of Investments (BOI) which utilize the "wet milling" process for starch production. These five companies have a combined registered starch production capacity of 163,390 MT per annum. Although there are only five registered companies utilizing this process, there are 87 corn processors in the country, Appendix Table 34. The majority of these use the dry milling process in corn starch production. Appendix Figure M.1 and M.2 shows the wet milling and dry milling process diagram and a discussion of these two types of milling operations. Two of the registered corn starch processors using the wet milling process are located in Cotabato, two in Cebu City and one in Mandaluyong; Rizal, Table 11.

Table 11  
Wet Milling  
Starch Processing Enterprises<sup>2/</sup>

| Firm                              | Location         | BOI Registered<br>Capacity Per<br>Annum (MT) | % of<br>Total |
|-----------------------------------|------------------|--|---------------|
| Universal Corn<br>Products, Inc.  | Pasig, Rizal     | 40,000                                       | 24.5          |
| Lamsan Trading, Inc.              | Nuling, Cotabato | 29,250                                       | 17.9          |
| Philippine Trade<br>Center, Inc.  | Nuling, Cotabato | 29,700                                       | 18.2          |
| Philippine Corn<br>Products, Inc. | Cebu             | 44,640                                       | 27.3          |
| General Milling<br>Corporation    | Mactan, Cebu     | <u>19,800</u>                                | <u>12.1</u>   |
| Total                             |                  | 163,390                                      | 100.0         |

<sup>2/</sup> Projects registered by the Board of Investments under R.A. 5186, July 1968 - December 1973, Board of Investments, Rizal, Philippines

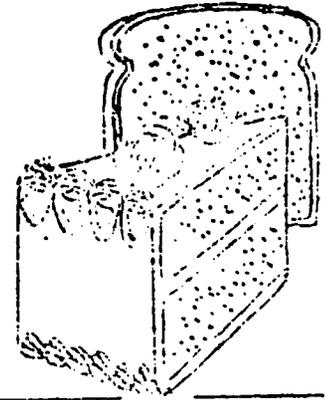
# FOOD PROCESSING



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| APPLICATION       | DESCRIPTION  |
|-------------------|--|
| Fruit             | <ul style="list-style-type: none"><li>- Corn syrup. A component in cover syrups, provides sweetness and keeps fruit firm.</li><li>Dextrose - for use in cover syrups, provides sweetness and keeps fruit firm.</li></ul> |
| Vegetables        | <ul style="list-style-type: none"><li>- Dextrose - a sweetener which enhances flavor.</li><li>Starch - acid stable.</li></ul>  |
| Soups, Baby Foods | <ul style="list-style-type: none"><li>- Starch - acid stable.</li></ul>  |
| Breading          | <ul style="list-style-type: none"><li>- Corn starch - very good adhesion.</li></ul>  |
| Gravy Mixes       | <ul style="list-style-type: none"><li>- Corn Starch - a thickener.</li><li>Starch - a stable thickener.</li></ul>  |
| Butter Sauces     | <ul style="list-style-type: none"><li>- Starch - freeze/thaw durable.</li></ul>  |

# BAKING



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| APPLICATION          | DESCRIPTION   |
|----------------------|---|
| Bread                | - Corn syrup - highly fermentable.<br>Dextrose - 100% fermentable.  |
| Pie Fillings         | - Corn syrup - Retains moisture and prevents crystallization.<br>Corn syrup with excellent color stability.<br>Corn syrup - a sweeter syrup.<br>Corn starch - thickens pie fillings.<br>Starch. Acid stable thickener with excellent clarity.<br>Starch. Thickening agent which is freeze/thaw durable. |
| Icings               | - Corn syrup. Retains moisture and prevents crystallization.<br>Corn syrup with excellent color stability.<br>Corn syrup - a sweeter syrup.<br>Hydrolyzed cereal solids - reduces moisture pickup.<br>Dextrose with small particle size (pulverized)  |
| Cookies, Pies, Cakes | - Dextrose - a sweetener.   |

**Dusting**

- Dextrose - small particle size  
(pulverized).

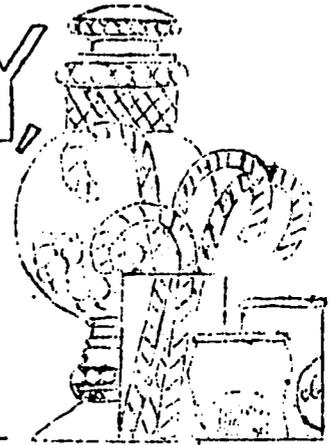
Corn starch - prevents caking.

**Prepared Mixes**

- Dextrose with small particle size  
(pulverized).

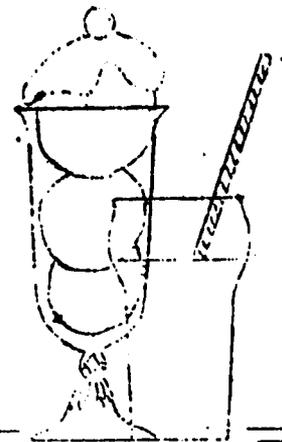
Anhydrous dextrose - very low  
moisture content.

# CONFECTIONERY, JAMS, DESSERTS



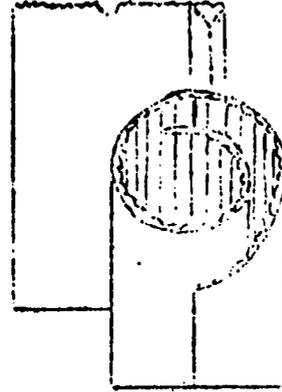
| APPLICATION     | DESCRIPTION   |
|-----------------|---|
| Chewing Gum     | - Corn syrup - good moisture retention.   |
| Hard Candy      | - Corn syrup - good color stability.<br><br>Corn syrup - low moisture pickup, excellent corn stability.<br><br>Hydrolyzed cereal solids, increases moisture content but also reduces moisture pickup. |
| Candy           | - Dextrose for tableting.   |
| Chocolate       | - Anhydrous dextrose - a sweetener with a very low moisture content.  |
| Gum Confections | - Corn syrup - a sweeter syrup.<br><br>Hydrolyzed cereal solids - reduces setting time.<br><br>Corn starch - good gel properties, easily dispersable.   |
| James & Jellies | - Corn syrup - prevents crystallization, aids moisture retention.<br><br>Corn syrup - excellent color, flavor.<br><br>Dextrose - a sweetener - enhances flavors.                                      |
| Dessert Powders | - Dextrose for sweetness.<br><br>Corn starch - good thickener.  |
| Puddings.       | - Starch. Has good textural properties and is freeze/thaw durable.  |

# OTHER FOOD APPLICATIONS



| APPLICATION                       | DESCRIPTION  |
|-----------------------------------|--|
| Breakfast Cereals and Snack Foods | - Dextrose - sweetener and browning agent.   |
| Catsup                            | - Dextrose - a sweetener, enhances flavors.  |
| Coffee Lighteners                 | - Corn syrup - low moisture pickup, fast drying rates.<br><br>Hydrolyzed cereal solids. A bland bulking agent with low moisture pickup, fast drying.                   |
| Flavors                           | - Hydrolyzed cereal solids. For encapsulation - very low moisture pickup.  |
| Ice Cream                         | - Corn syrup - improves heat shock stability, adds smoothness.<br><br>Corn syrup. For softer ice cream, better crystallization control.<br><br>Dextrose - a sweetener. |
| Imitation Milk                    | - Hydrolyzed cereal solids. A bland carbohydrate source.   |
| Salad Dressings                   | - Starch. An acid stable thickener, good textural properties.  |
| Soft Drinks                       | - Dextrose - sweetener, flavor enhancer.   |
| Spices                            | - Hydrolyzed cereal solids. Carrier for spice oleoresins, bulking agent for dry spices.<br><br>Dextrose - carrier for spices.  |
| Wines, Brandy                     | - Dextrose - 100% fermentable sweetener.   |

# PAPER

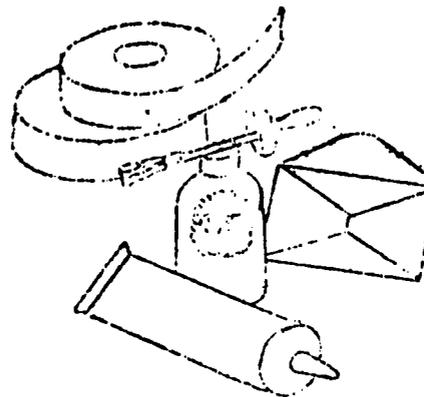


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| APPLICATION          | DESCRIPTION   |
|----------------------|---|
| Wet End Additives    | <ul style="list-style-type: none"><li>- Unmodified corn starch - the industry standard.</li><li>Thermal - chemical cooker converting starch.</li><li>Cationic corn starch - for maximum strength development.</li><li>Cationic potato starch - for maximum retention properties.</li></ul>                |
| Coating & Sizing     | <ul style="list-style-type: none"><li>- Enzyme converting corn starch.</li><li>Enzyme converting milo starch.</li><li>Corn starch - acid modified for low solids sizing.</li><li>Corn starch - oxidized for normal coating and sizing.</li><li>Corn starch - ethylated for high solids coating.</li></ul> |
| Currugating          |   |
| * carrier portion    | <ul style="list-style-type: none"><li>- Unmodified corn starch - the industry standard.</li><li>Unmodified milo starch.</li><li>low fluidity corn starch - provides greater viscosity stability.</li></ul>  |
| * raw starch portion | <ul style="list-style-type: none"><li>- Unmodified corn starch - the industry standard.</li><li>Unmodified milo starch.</li></ul>   |

- Bag Manufacture
  - Thick boiling corn starch - for bag bottoms.
  - Thin boiling corn starch - for bag seams.
  - Low soluble white dextrin - for bag seams.
- Case Sealing
  - Canary dextrin - fast tacking; stable when borated.
- Tube Winding
  - Borated white dextrin - fast tacking at 40% solids.
  - PVOH based adhesive - water resistant, displays good wet-tack; allows for high machine speeds.
- Gummed Tape
  - Modified white milo starch. Excellent quick tack and open time in finished tape.
- Laminating
  - White dextrin - fast tacking stable adhesive.
  - PVOH based adhesive - water resistant, tackified. For difficult board combinations.

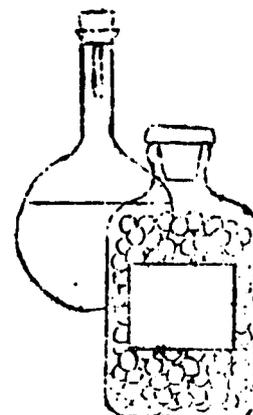
# ADHESIVES



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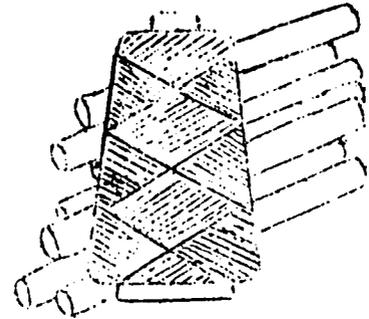
| APPLICATION                          | DESCRIPTION  |
|--------------------------------------|--|
| General Formulating                  | - Thick boiling corn starch.   |
| General Sealing                      | - Thin boiling corn starch.<br>Low soluble white dextrin.<br>High soluble white dextrin. |
| Envelope Seal                        | High soluble yellow dextrin - stable<br>readily remoistenable.                           |
| Library Paste and<br>Special Sealing | - Pregelatinized modified corn starch  |
| Bottle Label                         | - Modified white milo starch.  |
| Plasticizer                          | - Regular D. E. corn syrup.<br>Dextrose.   |
| Solids Builder                       | - Carbohydrate polymer - offers low<br>viscosity and cold water solubility.              |
| Water-Resistant<br>Adhesives         | - High viscosity fully hydrolyzed<br>polyvinyl alcohol.                                  |

# CHEMICALS, DRUGS & MEDICINES



| APPLICATION                          | DESCRIPTION  |
|--------------------------------------|--|
| Fermentation                         | <ul style="list-style-type: none"><li>- Dextrose - 100% fermentable carbohydrate; many screen grades also available.</li><li>Corn Steepwater, Source of carbon, protein and other fermentation nutrients.</li></ul>  |
| Chemical Alteration                  | <ul style="list-style-type: none"><li>- Brand dextrose.</li></ul>  |
| Medicinal Preparations, Formulations | <ul style="list-style-type: none"><li>- Corn syrup, Regular D.E. - clear viscous carbohydrate liquid.</li><li>Hydrate dextrose - U.S.P.</li><li>Anhydrous dextrose.</li><li>Anhydrous dextrose - U.S.P. for intravenous preparations.</li></ul>  |
| Tableting                            | <ul style="list-style-type: none"><li>- Hydrolyzed cereal solids - a low D.E., extra-white filler.</li><li>Dextrose - granulated to improve tableting properties.</li><li>Powdered corn starch - excellent flow and dusting properties.</li><li>U.S.P. powdered corn starch.</li><li>Pregelld corn starch - for cold water solubility.</li></ul> |

# OTHER NON-FOOD APPLICATIONS



| TRADE                 | APPLICATION           | DESCRIPTION   |
|-----------------------|-----------------------|---|
| Textiles              | Warp Sizing           | - Corn starch - the industry standard.                            |
|                       |                       | Acid modified corn starch.  |
|                       |                       | Cross-linked corn starch.<br>Offers the advantage of less add-on. |
|                       |                       | Partially hydrolyzed polyvinyl alcohol.                           |
| Building Materials    | Gypsum Board          | - Thin binding corn starch.                                       |
|                       | Ceiling Tile          | - Thick binding corn starch.                                      |
| Mine & Ore Treatment  | Aluminum Ore Refining | - Milo starch.  |
| Explosives            | Explosive Powder      | - Low moisture corn starch.                                       |
| Tanners               | Chrome Reduction      | - 3 star regular D. E. corn syrup.                                |
| Tobacco Manufacturers | Humectant             | - Light corn syrup.   |
|                       |                       | Dark corn syrup.  |
|                       | Paper Adhesive        | - Corn starch.  |

**Briquetters**      **Binder**

- Unmodified corn starch.

Canary dextrin.

Cereal binder H.

**Laundry  
Starch**              **Instant**

- Instant starch - for cold  
water solubility.

- Oxidized starch - base for  
laundry starch.

# FEED MANUFACTURING



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| APPLICATION                    | DESCRIPTION   |
|--------------------------------|---|
| Poultry, Swine,<br>Dairy Feeds | - 21% Corn Gluten Feed, pellets. Widely used ingredient for many formulations. Shipped in bulk. Profat 23%, minimum. Fiber 10%, maximum.  |
|                                | 21% Milo Gluten Feed, pellets. Economical in many kinds of feeds. Shipped in bulk. Profat 23%, minimum. Fiber 9%, maximum.  |
|                                | 41% Milo Gluten Meal, pellets. Valuable ingredient for feeds of all kinds. 41% Protein, minimum. Fiber 5%, maximum.   |
|                                | 58% Milo Gluten Meal. An ingredient very high in protein. Protein 58%, minimum. Fiber 3.5%, maximum.  |
|                                | 60% Corn Gluten Meal. High in protein, energy, methionine, xanthophylls. Primarily an ingredient for broiler feeds when yellow pigmentation is required. Protein 60%, minimum. Fiber 2.5%, maximum. |
|                                |   |

These enterprises have well organized procurement operations which encompass Cebu and Southern Mindanao. Most of these companies have sufficient storage and warehousing facilities and have integrated operations ranging from corn processing, food production, and livestock production. Although some of these companies are not as integrated as the others, they have affiliate companies which utilize products and by-products.

The bulk of total Philippine corn starch production and its by-products is geared for domestic consumption. About 133,690 MT of locally-produced corn starch is consumed locally, while some 29,700 MT is channeled to the export market.

#### B. Feed Processing

Corn grain is considered as the most important source of protein and energy ingredient for poultry and livestock feeds. As an animal feed, corn consumption amounted to 303,362 metric tons in 1971 and 287,935 metric tons in 1972 or 14.2% of the total corn supply, including corn importations.

The bulk of feed consumers consists of poultry and swine raisers who utilize commercial or ready-mixed feeds for animal feeding.

##### B.1 Trends in Feed Milling

The feed milling industry produces cattle concentrates, poultry laying mash, starter mash, growing mash, hog mash, pigeon pellets,

and other special feed mixes. Its growth and development came about with the advancement of the poultry and livestock industries and their growing dependence on commercial feeds. From an initial farm backyard mixing operation performed by small livestock and poultry raisers, the feed milling industry evolved into its present sophisticated and modern industrial status. Among the large participants to the industry are B-Meg Feeds, Vitarich Feed Mills, AIA Feed Mills and Universal Corn Products which control a major portion of the animal feed market.

In 1974, 66 feed mills were recorded in the Philippines. However, the Bureau of Animal Industry considers only 51 of these as regular feed millers. Of 51 feed millers, 38 produce for their own and the market needs, while the rest operate only for their own feed requirements. Of the 38 commercial feed millers, 9 are members of the Philippine Association of Feedmillers, Inc. (PAFMI). Members of the association control about 85% of the commercial feed market of the country.

Thirty-four feed mills are located in Luzon, thirty in Visayas, and two in Mindanao.

Appendix Table 34 shows the number of commercial feed millers by region in the Philippines.

## B.2 Production Capacity of Existing Feed Mills

The eight PAFMI members produce a total of 19.37 million bags of feed per year at an average daily production of 64,576

bags per eight hours at one shift operation. A breakdown of the production capacity of the major feed manufacturers is shown in Table 12.

One company alone produces about 35.6% of the total feed output of the industry. The members of the association control a major portion of the market and enjoy a preferential advantage in obtaining domestic and imported corn for feed manufacture.

Feed processing technology and operations consist of raw material procurement, receipt, drying and cleaning, storage, grinding, blending, mixing, pelleting, bagging, quality control and storage. Appendix 35 shows a discussion of the various stages in feed processing.

### B.3 Corn Requirements and Procurement Operations

About 97% of the total corn requirements of feed millers are procured in bulk or in container sacks through middlemen. The rest is bought directly from the farmers. Bulk purchases of feed millers through large wholesalers and middlemen are more common to assure capacity utilization. Direct corn purchase from small farmers is uneconomical because one has to deal with several farmers to obtain the desired quantity.

Feed millers in Manila buy white corn from Mindanao and yellow corn from Isabela, Cagayan, Central Luzon, Batangas and the Bicol provinces. Some feed millers provide cash advances

Table 12

Feed Mill Production Capacity, 1974

| Company                                 | Daily Feed Production<br>(Bags) | Annual Feed Production<br>(000 Bags) | Annual Maximum Rated Production<br>24 Hrs. at 30<br>(000 Bags) | % Capacity<br>ys Operation* |
|---|---------------------------------|--------------------------------------|--|-----------------------------|
| <b>A. PAFMI Members</b>                 |                                 |                                      |  |                             |
| 1. B-Meg Feeds, Inc.                    | 22,996                          | 6,899                                | 10,800   | 64                          |
| 2. Sarmiento Agricultural<br>Dev. Corp. | 14,000                          | 4,200                                | 5,400  | 77                          |
| 3. Universal Robina Corp.               | 15,660                          | 4,698                                | 5,400  | 87                          |
| 4. RFM Corporation                      | 4,320                           | 1,296                                | 1,350  | 96                          |
| 5. Champion Feed Mills, Inc.            | 900                             | 270                                  | 900  | 30                          |
| 6. General Milling Corp.                | 3,600                           | 1,080                                | 1,200  | 90                          |
| 7. Far East Agricultural                | 1,200                           | 360                                  | 900  | 40                          |
| 8. Phil. Feed Milling Co.               | 1,300                           | 390                                  | 900  | 40                          |
| 9. Superior Feed Mills, Inc.            | 600                             | 180                                  | 900  | 20                          |
| Total Bags                              | 64,576                          | 19,373                               | 27,750   | 68.8 (Ave.)                 |
| Total Metric Tons                       | 2,583                           | 774,920                              | 1,110,000  |                             |
| <b>B. Non-PAFMI Members</b>             |                                 |                                      |  |                             |
| 1. APO Feeds                            |                                 |                                      |  |                             |
| 2. BRACOMA Feeds                        |                                 |                                      |  |                             |
| 3. Far East Agricultural Supply         |                                 |                                      |  |                             |
| 4. Lizan Sure Egg                       |                                 |                                      |  |                             |
| 5. Navotas Feed Milling                 |                                 |                                      |  |                             |
| 6. Republic Feeds                       |                                 |                                      |  |                             |
| 7. Reliance Feeds                       |                                 |                                      |  |                             |
| 8. Santa Clara Feeds                    |                                 | 5,500                                | 1,650  |                             |
| 9. Tropical Feed Mills                  |                                 | (220 MT)                             | (66,000 MT)  |                             |
| 10. United Poultry Supply               |                                 |                                      |  |                             |
| 11. Vigofeed Milling                    |                                 |                                      |  |                             |
| 12. UPCOM                               |                                 |                                      |  |                             |
| 13. Pacific Poultry Supply              |                                 |                                      |  |                             |
| 14. Virginia, Inc.                      |                                 |                                      |  |                             |
| 15. Yangtze                             |                                 |                                      |  |                             |
| 16. Sunnydale                           |                                 |                                      |  |                             |
| 17. Grace Park Poultry                  |                                 |                                      |  |                             |
| Total                                   | 70,076                          | 21,023*                              | -  | -                           |

\*Excluding backyard poultry and hog feed mixers producing an additional 24.0 million bags of feeds

Source: Philippine Association of Feed Millers, Inc., and BOI

prior to the corn planting season to guarantee captive supply.

Ancillary costs incurred in corn procurement such as transportation, containers, and handling are borne by the feed millers. The feed millers employ purchasing agents and price canvassers who also negotiate for corn purchases through middlemen and wholesalers.

The animal feed industry uses an average of 300,000 metric tons of corn annually. About 30% is used for poultry feed and 25% for hog feed. The rest is fed directly to livestock as whole corn grain or grits.

The utilization of corn for livestock feeding has continuously increased over the past years, except in 1972 when there was a rice shortage and corn was used as a rice substitute and additive.

Other raw material requirements used by feed millers such as rice bran, copra meal, ipil-ipil, molasses, soybean and fish meal are acquired locally. The rest of the other ingredients, such as meat and bone meal, vitamins and antibiotics are imported.

Appendix Table 36 presents the inventory of feeds and raw material requirements of selected animal feed producers.

#### B.4 Feed Marketing Policies and Practices

Of the total feed production in 1973, about 26% were sold directly to livestock and poultry raisers, 41% to retailers, 4% to wholesalers, and about 29% went temporarily to warehouses.

From the warehouses, mixed feeds flow through wholesalers and retailers before finally reaching the livestock raisers, Appendix Figure M.

In the Bicol region, the most common flow of feed production is from the feed miller to the retailer and ultimately to the livestock raisers. On the other hand, other places such as Davao, Cotabato and the Central Luzon area channel their feed production through warehouses before being delivered to the final end-users.

Most feed millers have a network of salesmen assigned to certain provinces and regions. These salesmen undertake feed delivery operations to livestock end-users and retailers about twice a week. Feed millers also provide free technical assistance to their customers and aid beginning livestock raisers through lectures on livestock farm operations.

Purchases made by livestock raisers, retailers, and wholesalers are either paid in cash or on credit, with variable discounts depending on the total volume purchased.

Pricing policies adopted by the feed milling industry are set in accordance with the prevailing cost structure. In the case of the PAFMI members who control 85% of the total mixed feed market, they follow a "socialized" pricing scheme which allows them to be competitive as well as provides reasonable returns on their investments.

### B.5 Cost Structure of Feed Manufacturing

The cost structure of feed manufacturing may be divided into four categories. These costs consist of raw material costs, container sacks, direct labor and fixed manufacturing overhead, and general and administrative costs. Raw materials account for an average of 84%; containers, 5.6%; direct labor and fixed manufacturing overhead, 5.8%; general and administrative costs, 4.4%, Appendix Table 37.

### B.6 Government Policies and Incentives to Feed Processors

The government, through the Bureau of Animal Industry, safeguards the livestock producers by establishing a standard quality requirement for mixed feed manufacture which the feed millers have to follow. Since the feed millers have their own individual processes for feed mixing aside from varying feed formulas, the BAI undertakes a random inspection of various feed products at various retail points in the country to check on their nutrient contents. The BAI has established grades, feed control services, and sample studies to determine the presence of any toxic substances on feeds produced. It also approves the registration of feed formulations to be used by the feed millers.

The government also gives incentives to feed millers who register with the Board of Investment (BOI) for the establishment of feed milling plants in priority areas outside of the Luzon and Greater Manila area. The BOI offers various tax incentives.

for the importation of needed equipment, machineries, and raw materials.

The feed millers are also given protection by the Anti-Dumping Law which regulates the importation or entry of finished and mixed feeds which compete with the existing products of the industry.

Another incentive to the industry is its priority status in corn importation.

Appendix Table 34

Number of Registered Processors/Manufacturers of Feeds and Other  
Corn Products by Region and Corresponding Capitalization

(As of December 15, 1974)

| Region             | Feeds     | Capitalization   | Other<br>Corn<br>Products | Capitalization    |
|--------------------|-----------|------------------|---------------------------|-------------------|
| Philippines        | <u>66</u> | <u>6,646,639</u> | <u>87</u>                 | <u>28,141,366</u> |
| Manila and suburbs | 13        | 4,652,404        | 9                         | 132,685           |
| Ilocos Region      | 2         | 255,160          | 16                        | 91,800            |
| Cagayan Valley     | 5         | 5,000            | 5                         | 2,800             |
| Central Luzon      | 6         | 350,950          | 20                        | 960,008           |
| Southern Tagalog   | 7         | 322,900          | 1                         | 50,000            |
| Bicol              | 1         | 55,815           | 3                         | 4,500             |
| Western Visayas    | 6         | 275,000          | 9                         | 15,500            |
| Central Visayas    | 24        | 720,000*         | 18                        | 26,876,073        |
| Eastern Visayas    | -         | -                | 3                         | 5,000             |
| Western Mindanao   | 2         | 10,310           | -                         | -                 |
| Northern Mindanao  | -         | -                | 3                         | -                 |
| Southern Mindanao  | -         | -                | 3                         | 3,000             |

\*Estimated at ₱30,000 per unit investment

Source: Directorate for Grains Business Regulation  
National Grains Authority

Appendix L.1

Wet Milling Process

The process commences with the cleaning of the corn grain in huge vertical tanks to remove cob particles, dirt, metal and other unwanted substances. The cleaning section utilizes air blowers, sifters and magnets to attract metal objects which may have contaminated the shelled corn grains during transport to the refining plant.

Once cleaned, the corn grain is soaked or "steeped" for about 40 hours in warm water slightly acidified with sulfur dioxide to prevent bacterial fermentation. The solution softens the hull of the grain and loosens the starch components. This facilitates the separation and extraction of soluble matter from the corn. After the steeping process is completed, the steep water is drawn off. The softened kernels, in a stream of water, are run through a degerminating or attrition mill which tears the kernels apart. This frees the germ portion of the grain and loosens the hull. The resulting wet mass of macerated kernels, with the germs separated, are washed in tanks called germ separators. The germs, being lighter and immersed with oil, floats on the surface while the heavier particles of the corn grain settle at the bottom. The germs on the surface are skimmed off while the remaining mixture consisting of starch, gluten, and hulls are milled more finely.

The finely-ground mash is washed through a series of shakers to further remove hull particles. These shakers consist of rectangular vibrating sieves of nylon bolting cloth. Hull particles and fibers remain on the sieve while the starch and gluten slurry passes through the sieve.

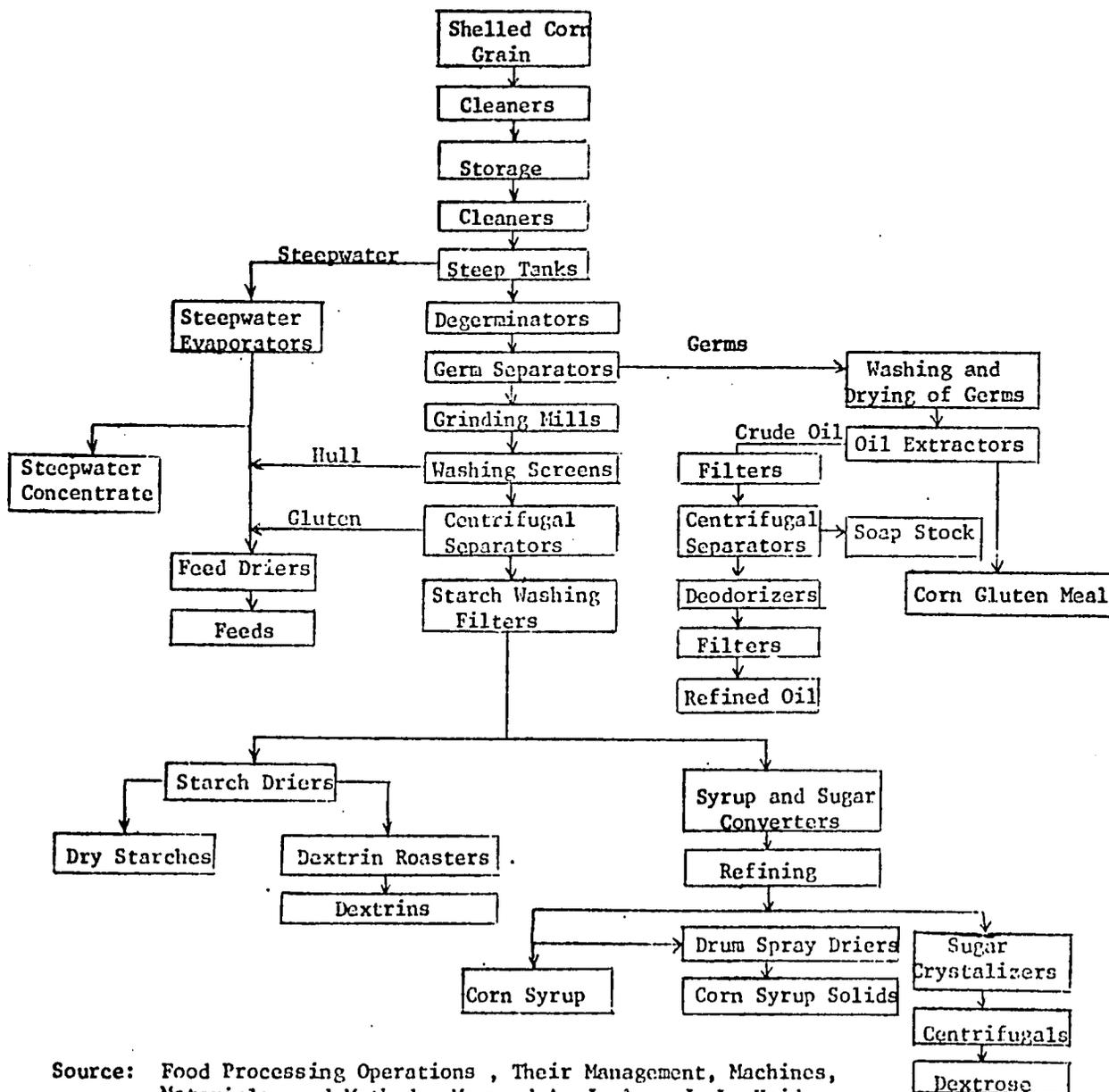
The remaining starch and gluten are separated by flowing the slurry over "starch tables" or shallow troughs which are about 2 feet wide and 100 feet long and sloping gradually. The slurry is introduced at the upper end and made to flow down the table. Starch particles sink to the bottom while the lighter gluten flows off the lower end.

The new method of separating the gluten and starch makes use of centrifugal machines which operate similar to cream separators. The lighter gluten particles remain in the center of the revolving mass and flows off the center while the heavier starch particles remain in the periphery. The separated gluten and starch slurry are washed several times to remove non-starch material traces, and then dried and packaged for the market.

Corn starch coming directly from the refining process without further treatment is known as regular, untreated, or unmodified starch. It is also referred to oftentimes as pearl starch when untreated, and as powdered starch when pulverized.

Appendix Figure L.1

Flow Diagram of Wet Milling Process for Corn



Source: Food Processing Operations , Their Management, Machines, Materials, and Methods, Maynard A. Joslyn, J. L. Heid, Volume 3, Westport, Connecticut: The Avi Publishing Company, Inc., 1964, p. 148

## Appendix L.2

### Dry Milling Process

In the dry milling process, the corn kernels are initially conditioned in steeping tanks to about 21% moisture. Thereafter, the steeped kernels are passed between special rotating cones to loosen the germ and the hull from the endosperm. The resulting mixture is dried to about 15% moisture and passed through roller mills and sieves. The hulls are removed by using jets of air. The endosperm are passed once more through roller mills to flatten the germs and crush the endosperm recovered as coarse grits or corn meal. The endosperm may be further processed by passing it through finer rollers and reduced into fine corn flour after the final rollers and reduced into fine corn flour after the final drying process.<sup>1/</sup>

The objective of corn dry milling is to attain a clean separation of endosperm, bran and germ. The processing operation tries to minimize the contamination of the corn grains from foreign materials through the cleaning process. The grain is also tamped in water to toughen the bran and germ, while making the endosperm more friable.

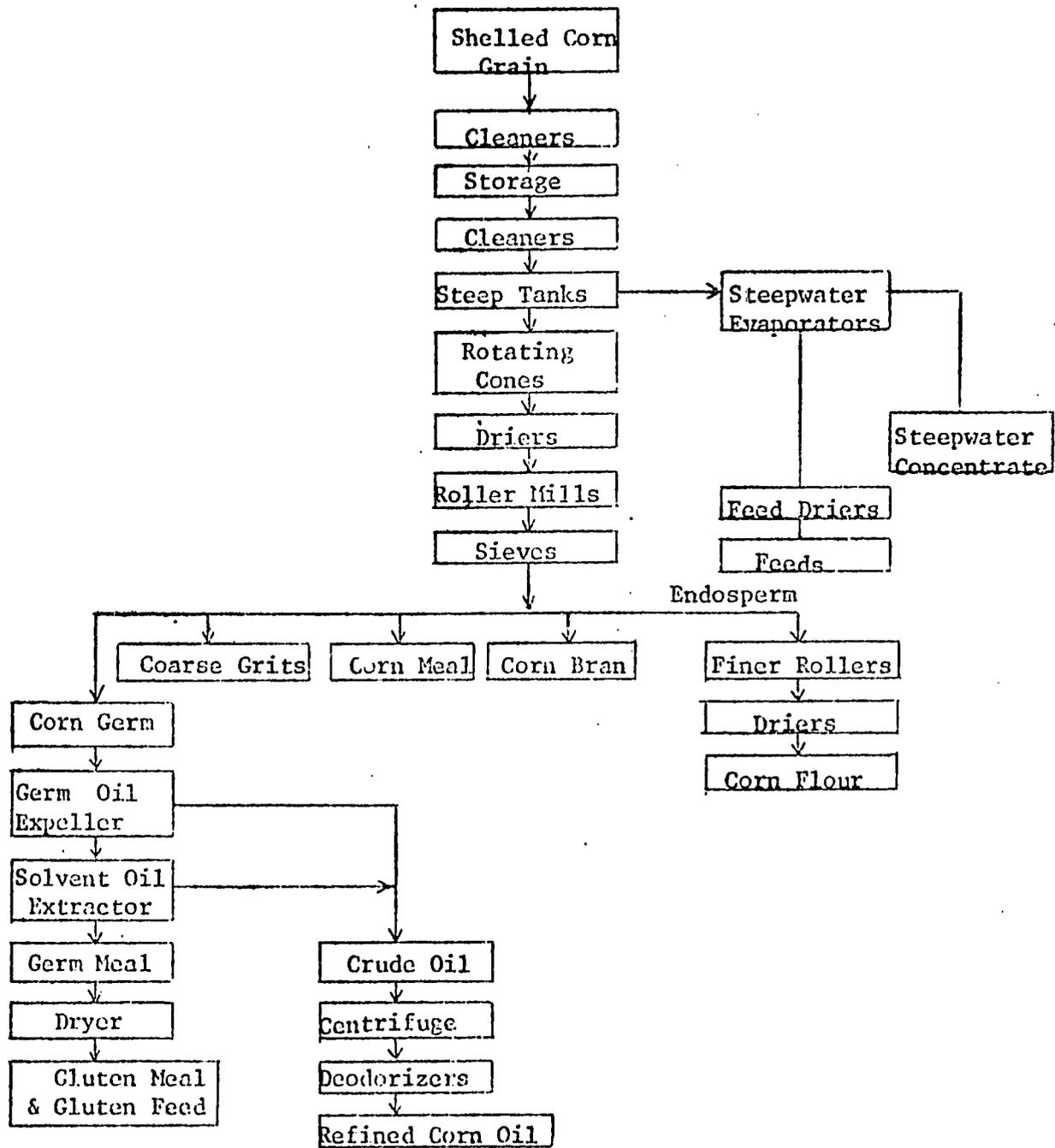
The products of corn dry milling are endosperm materials, bran, germ, and shorts. The bran, defatted germ, and shorts are combined and sold for animal feeding purposes.

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<sup>1/</sup> Food Science, Norman N. Potter, The Avi Publishing Company, Inc., Westport, Connecticut, 1968, p. 450

Appendix Figure L.2

Flow Diagram of the Dry Milling Process for Corn



Appendix 35

Feed Processing Technology

The Feed manufacturing process is composed of the following stages:

1. Receipt. Corn and other raw materials usually arrive at the factory site in sacks or in bulk trucks which are conveyed mechanically or manually into the warehouse. More technologically-advanced feed millers utilize conveyors, forklifts and pallets for grain handling operations.
2. Drying and Cleaning. Cleaning of corn grain and other raw materials is usually performed and further drying undertaken to ensure proper moisture contents. Contamination, dirt and molds are minimized through proper drying and storage techniques.
3. Storage. Raw materials are stored as much as possible under dry conditions and free from insect pests and rodents. Proper warehouse construction and the use of poly-propylene bags prevent the entry of rodents and pests and minimize dampness through flooding.

Among the larger feed millers such as General Milling Corporation, AIA Feed Mills, B-Meg and Universal Corn

Products, raw materials are stored in warehouses and bulk storage silos made of concrete or steel bins. Although the initial costs for bulk storage equipment are generally higher than conventional warehouses, they could be cheaper to operate in the long run. At least, there is no need for sacks which comprise about 4.7% of the value of a bag of corn.

4. Grinding. The grinding operation is usually done with hammermills or impact grinders. Other types are disc and roller grinders. However, hammermills are currently deemed to be suitable for feed compounding and mixing operations.

Raw materials such as cereals, grains, oilseed cakes and others need grinding to ensure uniform blending and mixing. The materials enter a chamber in which a set of beaters revolve with the aid of an electric motor. The materials are broken and the ground materials pass through a sieve to attain uniform crushed grains. After the sieving operation, ground materials are blown through a pipe towards a cyclone collector which collects the ingredients.

Air and dust mixtures are often explosive especially if sparks accidentally occur. For this reason, grinders are often contained in special structures and placed above

or below the ground to minimize the possibility of explosions.

5. Blending: The blending operation involves the assembling and measuring of the required quantities of raw materials. The raw materials and other ingredients are brought manually from the warehouse or storage bins to the blenders and weighed out in batches. Ingredients which need grinding are placed in the grinder bin, while the other materials which are ready for mixing go to the mixer. The weight of each material in any batch and the number of batches in each formulation are predetermined. After a batch of materials is completed, it is conveyed into the mixing section. Additives such as vitamins, minerals, protein and other trace supplements are pre-weighed and added manually into the batch.
6. Mixing. To mix the raw materials, horizontal or vertical mixers are used by most companies. The mixers are equipped with mixing paddles or screw-type mixing apparatus. An even mix is produced within 15-45 minutes depending on the capacity of the mixer and the amount of ingredients being mixed. After mixing is completed, the mix falls from one outlet to an elevator which feeds a pelleter bin or channeled to a second outlet which fills container sacks directly.

7. Pelleting. The pelleting of hog feeds and poultry feeds has its advantages and disadvantages. Most often, the cost involved in pelleting animal feeds outweigh any consequent benefits which may be derived from the process. The process commences when the mixed meal is conveyed into the pelleting bin. Thereafter, the mixed meal is channeled and conveyed into the conditioner by a vibrator which regulates the flow according to the capacity load of the pelleter motor. In the conditioner, steam and molasses are continuously mixed with the meal. Molasses act as a pellet binder which is metered into the conditioner by a variable speed pump and recorded on a gauge. The conditioned meal falls into the pelleter and is extruded through a die.

The pellets emerge at the bottom of the pelleter and are cooled by means of a blower. Thereafter, they are sifted to remove dusts and undersized pellets. Afterwards, they are placed in a bin with outlet provisions for bagging purposes.

8. Bagging. Mixed feeds are distributed in sacks to livestock producers. The bagging process for mixed feeds and pelleted feeds is done manually or automatically. The required weight falls from the bin into the sacks which are then sealed by a sewing machine.

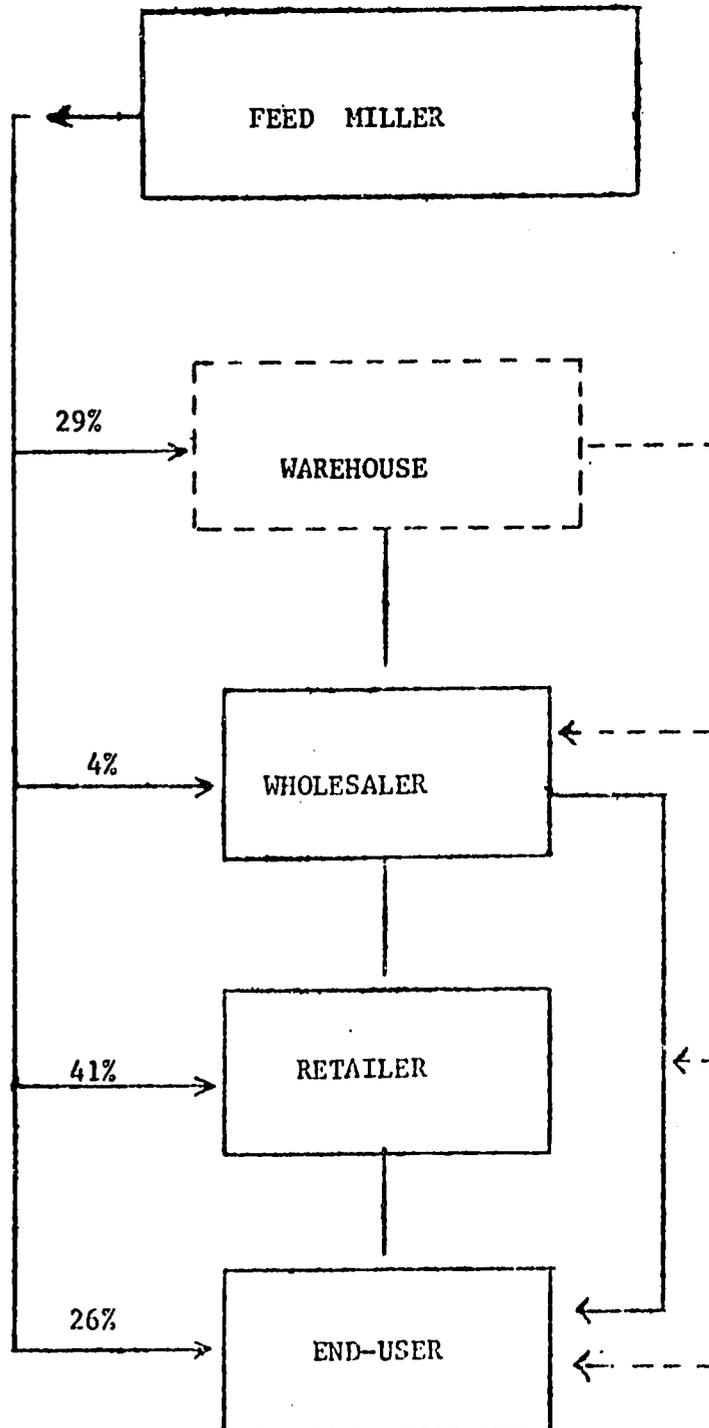
9. Quality Control. The larger feed manufacturers with adequate facilities follow rigid quality control measures on their raw materials and finished products. Samples from mixed feeds are taken randomly and analysed in their laboratories. Other feed millers such as the AIA Feed Mills, B-Meg Feeds, Universal Corn Products and General Milling have their own experimental animals on the farm on which mixed formulations are tested.

Routine testing is an important aspect considered by feed millers to protect the brand-image of their products and to comply with legal requirements promulgated by the Bureau of Animal Industry (BAI). The usual tests done for bulk materials such as cereals, cereal by-products, fish meal, meat and bone meal are made to determine the levels of crude protein, crude fiber, moisture content, ash content, and toxic contaminants.

10. Storage. The compounded feeds are usually not stored for long periods. Insect damage, molds, and rodent pests decrease the quality and feeding value of the product. Most feed mills deliver the bagged feeds to dealers and livestock producers as soon as they can.

Appendix Figure M

Flow Channels of Ready Mixed Feeds in the Philippines



Source: Marketing Operations of Feed Mills in the Philippines, Julio A. Alunan, et. al., Staff Paper Report, National Food and Agricultural Council, Philippines, 1971

Appendix Table 36

## TOTAL ENDING INVENTORY OF FEEDS

(In 40 kg. bags)

| Months  | R A W M A T E R I A L S |                  |                  |                  |                  |                    |                   |                  | F I N I S H E D F E E D S  |   |                |                              |           |
|---|-------------------------|------------------|------------------|------------------|------------------|--------------------|-------------------|------------------|----------------------------|---|----------------|------------------------------|-----------|
|   | Pollard                 | Corn<br>(Yellow) | Corn<br>(White)  | Corn<br>Bran     | Rice<br>Bran     | Congrits<br>Yellow | Congrits<br>White | Others           | Wheat<br>Bran &<br>Pollard | Combined<br>Corn Poultry<br>Starch &<br>Hog | House<br>Feeds | No. of<br>Reporting<br>Firms |           |
| May 15/73   | 150,408                 | 1,872,604        | -                | 857,948          | 35,920           | 508,194            | 72,420            | 316,300          | 2,744,996                  | 263,870                                     | 126,640        | -                            | 7         |
| June  | 271,776                 | 1,127,487        | -                | 123,449          | 376,843          | 86,006             | 54,524            | 101,901          | 59,156                     | -   | 320,905        | 53,264                       | 9         |
| July  | 289,830                 | 6,939,973        | 2,253,240        | 93,909           | 7,600            | 39,940             | 54,524            | 60,410           | 1,722,505                  | 11,475                                      | 268,187        | 23,180                       | 10        |
| August  | 1,255,315               | 20,591,452       | 884,623          | 2,143,266        | 544,257          | 706,263            | 525,440           | 356,364          | 2,995,280                  | 7,650                                       | 2,678,720      | 50,654                       | 16        |
| September   | 1,435,674               | 8,946,402        | 4,238,424        | 2,617,483        | 679,377          | 1,340,677          | 228,997           | 43,495           | 2,226,826                  | 9,315                                       | 1,835,805      | 38,836                       | 15        |
| October   | 1,238,084               | 8,258,992        | 7,860,615        | 1,734,783        | 328,116          | 379,290            | 240,949           | 9,200            | 2,131,289                  | 32,985                                      | 1,480,468      | 46,063                       | 16        |
| November  | 1,198,080               | 4,389,463        | 18,686,397       | 1,931,671        | 477,144          | 1,176,090          | 99,133            | 6,975            | 4,158,220                  | 46,935                                      | 1,550,722      | 14,440                       | 14        |
| December  | 2,287,468               | 3,286,325        | 34,772,726       | 2,383,657        | 1,071,472        | 2,244,152          | 2,080,829         | 41,000           | 9,737,169                  | 40,320                                      | 1,825,629      | 56,848                       | 17        |
| January/74  | 1,587,286               | 324,096          | 12,114,468       | 993,710          | 441,867          | 832,510            | 1,925,508         | 8,250            | 12,435,569                 | 36,450                                      | 1,035,080      | 39,748                       | 11        |
| February  | 1,273,521               | 1,406,643        | 15,454,441       | 4,597,138        | 592,359          | 2,390,526          | 45,928            | 111,623          | 7,999,498                  | 134,685                                     | 274,500        | 48,222                       | 12        |
| March   | 393,906                 | 2,188,560        | 11,062,210       | 16,776,395       | 1,005,376        | 2,328,249          | 396,545           | 576,789          | 5,017,277                  | 9,745,466                                   | 704,027        | -                            | 20        |
| April   | <u>3,820,719</u>        | <u>5,898,854</u> | <u>6,299,926</u> | <u>5,911,048</u> | <u>1,327,280</u> | <u>1,856,363</u>   | <u>779,441</u>    | <u>2,595,297</u> | <u>2,283,256</u>           | <u>6,566,254</u>                            | <u>790,531</u> | <u>-</u>                     | <u>13</u> |
| Total   | 15,202,067              | 65,230,851       | 11,362,706       | 40,164,457       | 6,887,711        | 13,888,260         | 6,504,238         | 4,227,604        | 53,511,041                 | 16,895,405                                  | 12,891,214     | 371,245                      | 160       |
| Average<br>Monthly<br>Inventory                       | 1,266,838               | 5,435,904        | 946,892          | 3,347,038        | 573,975          | 1,157,355          | 542,019           | 352,300          | 4,459,253                  | 1,407,950                                   | 1,074,267      | 30,937                       | 13        |
| Average<br>Monthly<br>Inventory<br>Per Feed<br>Miller | 97,449                  | 418,146          | 72,837           | 257,464          | 44,152           | 89,027             | 41,693            | 27,100           | 343,019                    | 108,304                                     | 82,635         | 2,380                        | 1         |

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Source: National Grains Authority - June 20, 1974

Appendix Table 37

## COST OF PRODUCTION OF FEEDS

| Unit Cost<br>Per Kilo                            | P O U L T R Y F E E D |                |             |                |            |                |              |                | H O G F E E D |                |          |                |
|--|-----------------------|----------------|-------------|----------------|------------|----------------|--------------|----------------|---------------|----------------|----------|----------------|
|  | Starter Mash          |                | Grower Mash |                | Layer Mash |                | Broiler Mash |                | Creep Mash    |                | Fattener | Finisher       |
|  | %                     | Cost           | %           | Cost           | %          | Cost           | %            | Cost           | %             | Cost           | %        | Cost           |
| Corn   | 26.0                  | 13.52          | 28.0        | 14.56          | 25.8       | 13.42          | 34.0         | 17.68          | 20.0          | 10.40          | 15.0     | 7.80           |
| Corn Grits                                       | 10.0                  | 3.28           | 7.6         | 2.49           | 15.2       | 4.99           | 8.8          | 2.89           | 12.0          | 3.94           | 20.0     | 6.56           |
| Copra Meal                                       | 12.0                  | 2.50           | 10.0        | 2.08           | -          | -              | 15.0         | 3.12           | 15.0          | 3.12           | 15.0     | 3.12           |
| Rice Bran  | -                     | -              | -           | -              | -          | -              | -            | -              | -             | -              | -        | -              |
| Corn Bran  | -                     | -              | -           | -              | -          | -              | -            | -              | -             | -              | -        | -              |
| Fish Meal Local(45%)                             | 3.0                   | 3.36           | -           | -              | 8.0        | 8.96           | 12.0         | 13.44          | 8.0           | 1.47           | 17.0     | 3.13           |
| Limestone  | .5                    | .01            | .5          | .01            | 7.7        | .15            | .5           | .01            | 6.0           | 6.72           | 2.0      | 2.24           |
| Meat & Bone Meal<br>(50%)                        | 8.0                   | 10.40          | 7.5         | 9.75           | -          | -              | 2.5          | 3.25           | 1.0           | .02            | 1.0      | .02            |
| Molasses   | 4.8                   | .48            | 5.9         | .60            | -          | -              | -            | -              | 4.0           | 5.20           | 2.0      | 2.60           |
| Pollard  | 19.4                  | 3.88           | 38.2        | 7.64           | 7.1        | .71            | 2.0          | .20            | 3.0           | .30            | 5.0      | .50            |
| Soyameal (44%)                                   | 10.0                  | 10.80          | -           | -              | 16.4       | 3.28           | 10.0         | 2.00           | 7.0           | 1.40           | 6.0      | 1.20           |
| Vitamin Mix                                      | .1                    | .52            | .05         | .26            | 9.5        | 10.26          | 15.0         | 16.20          | 5.0           | 5.40           | 1.0      | 1.08           |
| Ipil-ipil  | 1.0                   | .21            | 2.0         | .42            | .1         | 52.00          | -            | -              | .25           | 1.30           | .25      | 1.30           |
| Salt   | .2                    | .02            | .2          | .02            | 2.0        | .42            | -            | -              | 5.0           | 1.06           | 5.0      | 1.06           |
| Corn Germ Meal                                   | -                     | -              | -           | -              | .2         | .02            | .2           | .02            | .5            | .04            | .5       | .04            |
| Corn Gluten Meal                                 | -                     | -              | -           | -              | -          | -              | -            | -              | 8.0           | 2.11           | 6.0      | 1.58           |
| Rapeseed Meal                                    | 5.0                   | 3.40           | -           | -              | -          | -              | -            | -              | 5.0           | 1.40           | 4.0      | 1.12           |
| Tricaphos  | -                     | -              | -           | -              | 2.0        | 1.36           | -            | -              | -             | -              | -        | -              |
| Meat & Bone Meal<br>(46%)                        | -                     | -              | -           | -              | 6.0        | 6.72           | -            | -              | .25           | .14            | .25      | .14            |
| Sub-Total -                                      |                       | 52.38          |             | 37.83          |            | 50.81          |              | 58.81          |               | 44.02          |          | 33.49          |
| Container  |                       | 3.00           |             | 3.00           |            | 3.00           |              | 3.00           |               | 3.00           |          | 3.00           |
| Direct Labor and Fixed<br>Manufacturing Overhead |                       | 3.09           |             | 3.09           |            | 3.09           |              | 3.09           |               | 3.09           |          | 3.09           |
| General & Administrative                         |                       | 2.32           |             | 2.32           |            | 2.32           |              | 2.32           |               | 2.32           |          | 2.32           |
| TOTAL COST TO PRODUCE                            |                       | <u>₱ 60.79</u> |             | <u>₱ 46.24</u> |            | <u>₱ 59.22</u> |              | <u>₱ 67.22</u> |               | <u>₱ 52.43</u> |          | <u>₱ 41.90</u> |

Source: National Grains Authority - June 20, 1974

**CHAPTER VII. MARKETING AND DISTRIBUTION**



CHAPTER VII. MARKETING AND DISTRIBUTION

About 46% of total corn production is channeled to the following outlets:

|                   |       |
|-------------------|-------|
| Local Assemblers  | 39.6% |
| Local Millers     | 2.8%  |
| Human Consumption | 0.3%  |
| Retailers         | 1.3%  |

A. Marketing Points in the Vertical Structure of the Corn System

1. Farm Level

At farm level, corn is sold in the field, by the roadside or at the warehouse of local buyers and assemblers. Fresh or dried corn on the cob are sold husked or unhusked by the hundreds, in rows, baskets or cartloads. Husked corn on the cob is sold in cans, kilos or in cavans. Shelled corn is sold by the kilo, picul or cavan, while milled corn is sold by the cavan or in gantas. Green corn is sold by the number of ears.

At farm level, corn is sold either immediately after harvest, before harvest, after drying or after shelling. Due to lack of adequate storage and drying facilities and the farmers' need for immediate cash, they often sell their produce without considering price movements.<sup>1/</sup>

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<sup>1/</sup>Corn Marketing in the Philippines, Hegino Ma. Orticio, Paper read at NFAC-NEC-USAID Sponsored Seminar-Workshop on Marketing of Fruits and Vegetables, Feed Grains and Livestock held on November 24-29, 1969.

Farm sales are made to agents, sub-agents, country buyers, commission agents, local wholesalers and local assemblers. Buyers provide the cost of transportation, container, storage, handling and, oftentimes, shelling facilities to facilitate transaction. Most farm sales are transacted in cash due to competition among buying agents. In fact, cash advances of as much as 20-50% of the estimated crop sales are often paid to the farmers long before harvest time.

## 2. Wholesaler Level

The wholesalers employ agents, sub-agents, country buyers, commission agents, and local wholesaler-millers who undertake the bulk of assembling, transporting, handling, and packaging of corn production for shipment to terminal markets and millers. Locally, grains are moved to the wholesale trading terminal centers from the farms at the expense of the assemblers.

The wholesale sector is composed of local millers and wholesalers-dealers.

Local millers undertake milling and processing of corn for the local markets. Local millers usually have limited milling capacities and small markets.

Wholesalers-dealers compete with wholesalers-millers since the bulk of their grains comes from local millers, assemblers and the farmers. Wholesalers-dealers generally have only warehouse facilities for storage. The bulk of their grain procurement is sold to Manila and Cebu through the wholesalers-millers.

2.a) Wholesalers-Millers

These are corporations or single proprietorships which are owned and operated mostly by naturalized Filipinos of Chinese descent. Their base of operations is centralized in principal shipping points to enable them to handle large volumes of corn stocks which they can dispose of easily. Their main sources of corn grains are the wholesalers-dealers, local millers and local assemblers. They are often affiliated with existing shipping enterprises and are assured of the regularity of vessels docking in the major ports of Mindanao and Visayas.

Because of the nature of their milling operations, the main products of wholesalers-millers are in the form of whole grains, corn grits, corn bran, and corn germ meal which are shipped to Manila and Cebu.

2.b) Cebu Wholesale Millers

These wholesale millers assume a dominant position in the corn marketing set-up. The prevailing prices in various marketing centers in Mindanao and Visayas are generally influenced by the market price structure in Cebu.

Cebu millers purchase corn at shipping points in Mindanao. After the corn is processed, corn grits and other by-products are sold directly to retailers and dealers within the Visayas area.

2.c) Wholesale Dealers of Corn Grits

These enterprises are found mainly in various corn marketing centers in Mindanao, Visayas and in Manila. Their corn supplies

come mainly from wholesale-millers or other dealers of corn grits.

2.d) Feed Millers

The majority of feed millers are highly dependent on the availability of corn supplies for their production operations. Therefore, the growing demand for meat as a result of increasing population and income cannot be met without raising actual yield levels.

Due to a more developed procurement program to meet their requirements, feed millers are able to buy directly from the farmers or from local assemblers and wholesalers in trading centers. Generally, feed millers send agents to main trading centers in Mindanao and Visayas during the corn harvest period to purchase their quarterly requirements. Most feed millers stock their corn requirements for about 3 to 4 months only to save spoilage, storage and handling costs.

Feed millers prefer yellow corn to white corn for livestock feeds due to the carotene content and higher nutrient content of yellow corn. However, due to the relative abundance of white corn and its lower price, most feed mills mix about 60% white corn and 40% yellow corn for their feed milling operations.<sup>2/</sup>

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<sup>2/</sup>An Industry Study on Corn and Sorghum as Feedgrains, Renato C. Valencia, Thesis submitted to the Graduate School of Business Management, Asian Institute of Management, November, 1970, p. 17.

The bulk of feed millers are situated within the greater Manila area, with 10 feed mills accounting for as much as 85% of the total feed sales in the industry.<sup>3/</sup>

2.e) Retailers

These are the immediate "signal points" of the corn commodity system with the final consumers. Retailers absorb the market reaction on the outputs of the commodity system which they manifest through their buying behavior and price offers.

Retail distribution flows through NGA retail outlets and ordinary retailers. These retailers get their corn stocks from NGA-designated wholesalers-millers and processors. Retailing in the local markets is handled by local millers and ordinary retailers. Farmers also retail their production in limited scale.

In major markets, corn is retailed as corn grits and by-products which come from local millers, wholesalers-millers, local grit dealers, and also directly from the farmers.

Retailers sell directly to the final consumers and sometimes to other retailers in public markets. Corn retailers have been observed to be more predominant in the Visayan region because of a higher concentration of corn-eating Filipinos there.<sup>4/</sup>

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<sup>3/</sup> Domestic Demand for and Marketing of Feedgrains, Nelia T. Gonzalez, Paper read at NFAC-NEC-USAID Sponsored Seminar-Workshop on Marketing of Fruits and Vegetables, Feed Grains and Livestock, November 24-29, 1969, p. 2.

<sup>4/</sup> Orticio, op. cit., p. 3.

The flow of corn grains from the various producing regions of the country is presented in Appendix Figure N while the movement of corn stocks from the farmers to the consumers is shown in Appendix Figure O

B . Corn Market Centers and Buying Stations in the Philippines

Corn production surpluses from Mindanao are shipped to Cebu and Manila, while corn coming from Leyte is channeled only to Cebu. In Luzon, corn producing coming from the northern areas, such as in Isabela is transported to Pangasinan and Manila with the wholesalers absorbing all the costs of handling and transport. Processed corn grits are often shipped back to Mindanao from Cebu for livestock feed and human consumption.

One reason why Cebu has evolved as the main converging center for corn is probably its better shipping facilities since most shipping companies plying the Visayas and Mindanao route have their base in Cebu City. Also, corn is the staple of most Cebuanos. Furthermore, the city has good banking facilities and an adequate communication system to facilitate transactions and dissemination of demand and price information.<sup>5/</sup>

Corn wholesaling in the Philippines is controlled by a group of strategically located wholesalers-millers who influence the trade

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<sup>5/</sup> Marketing of Corn in the Philippines: A Comment, Dr. Florencio Zablan, Paper read at NFAC-NEC-USAID Sponsored Workshop-Seminar on Marketing of Fruits and Vegetables, Feed Grains and Livestock, November 24-29, 1969, p. 2.

and price structure of corn. Most businessmen engaged in the corn trade maintain agents in Cebu to keep track of changing prices and market trends. Any change in price is immediately relayed to different shipping terminals in Mindanao through the existing communications network of these firms for instantaneous decisions and strategies.

C. Wholesale Trading and Terminal Shipping Centers for Corn

The trading centers and terminal shipping points are usually run by wholesale-millers and wholesale-dealers. Corn shipments for Cebu, other Visayan trading centers, Bicol provinces, Manila and other areas in Mindanao are made at the following trading and shipping centers.

1. Cotabato City, Cotabato
2. Dadiangas, Cotabato
3. Davao City, Davao del Sur
4. Cagayan de Oro City
5. Ozamis City
6. Pagadian City
7. Zamboanga City

Refer to Appendix Figure N for more details on the location of these trading centers in Mindanao.

D. Retail Trading Markets for Corn

There are a total of thirty-three (33) major retail market trade centers in the Philippines.

Table 13  
Retail Trade Centers<sup>6/</sup>

Greater Manila

1. North
2. Central
3. South

Northern Luzon

1. Tuguegarao, Cagayan
2. Ilagan, Isabela
3. Laoag City
4. Vigan, Ilocos Sur
5. San Fernando, La Union
6. Baguio City, Mountain Province

Central Luzon

1. Dagupan City, Pangasinan
2. Tarlac, Tarlac
3. Cabanatuan City
4. San Fernando, Pampanga
5. Balanga, Bataan
6. Malolos, Bulacan

Southern Luzon

1. Tanza, Cavite
2. Sta. Cruz, Laguna
3. San Pablo City, Laguna
4. Batangas City, Batangas
5. Calapan, Oriental Mindoro

Bicol Region

1. Naga City
2. Legaspi City

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<sup>6/</sup>NFAC, Department of Agriculture..

**Visayas Region**

1. Iloilo City, Iloilo
2. Bacolod City, Negros Occidental
3. Cebu City, Cebu
4. Tacloban City, Leyte

**Mindanao Region**

1. Cagayan de Oro City
2. Tagum, Davao del Norte
3. Mati, Davao Oriental
4. Davao City, Davao del Sur
5. Cotabato City, Cotabato
6. Marbel, South Cotabato
7. Zamboanga City, Zamboanga del Sur

**E. Number of Retailers and Wholesalers**

A total of 3,044 retailers are with the grain trade. Of this number, 677 are in the corn trade and 2,367 are engaged in rice and corn retail. In addition, there are 1,137 registered wholesalers in the Philippines with 376 in the corn business and 761 in rice and corn trading.

Majority or 54.5% of grain retailers are situated in Luzon, 17.9% in the Visayas and 27.6% in Mindanao. For the wholesalers, 60.6% are in Luzon, 22.0% are in Visayas and 17.4% are in Mindanao, Table 14. Despite the greater number of wholesalers and retailers in Luzon, majority of the Visayan wholesalers and retailers handle a bigger bulk of the grain trade by virtue of their central location and proximity to Mindanao.

**F. The Corn Export Market**

The world trade in corn totalled about 33.78 million metric tons in 1972, valued at \$2.3 billion. This is equivalent to four times

Table 14  
Registered Wholesalers and Retailers  
of Corn as of December 15, 1974

| Region             | RETAILERS  |              |              | WHOLESALERS |            |              |
|--------------------|------------|--------------|--------------|-------------|------------|--------------|
|                    | Corn       | Rice/Corn    | Total        | Corn        | Rice/Corn  | Total        |
| <u>Philippines</u> | <u>677</u> | <u>2,367</u> | <u>3,044</u> | <u>376</u>  | <u>761</u> | <u>1,137</u> |
| Manila & Suburbs   | 346        | 559          | 905          | 272         | 164        | 436          |
| Ilocos Region      | 11         | 25           | 36           | 2           | 15         | 17           |
| Cagayan Valley     | 11         | 141          | 152          | 3           | 102        | 105          |
| Central Luzon      | 36         | 190          | 226          | 7           | 89         | 96           |
| Southern Tagalog   | 36         | 125          | 161          | 3           | 19         | 22           |
| Bicol              | 46         | 133          | 179          | 2           | 11         | 13           |
| Western Visayas    | 107        | 98           | 205          | 9           | 50         | 59           |
| Central Visayas    | 22         | 318          | 340          | 47          | 144        | 191          |
| Eastern Visayas    | 8          | 373          | 381          | 7           | 54         | 61           |
| Western Mindanao   | 16         | 146          | 162          | 11          | 27         | 38           |
| Northern Mindanao  | 30         | 138          | 168          | 9           | 25         | 34           |
| Southern Mindanao  | 8          | 121          | 129          | 4           | 61         | 65           |

SOURCE: Directorate for Grains Business Regulations.  
NATIONAL GRAINS AUTHORITY

the total volume of the international rice trade. The corn exporting countries have agricultural systems in which a large average is planted to corn using modern farm technology, Table

Of the total international corn trade in 1972, the United States accounted for 56%, followed by France (10.3%), Argentina (9.0%), Thailand (5.0%) and Mexico (1.2%); other countries accounted for 8.5%. The countries listed in Table 15 produced 92% of the international corn trade in 1972.

The majority of corn-importing nations are characterized by a fast expanding human and livestock population and decreasing corn production areas. Some of the major corn-importing countries are shown in Table 16.

The ten countries listed in Table 15 accounted for 77% of total corn importations in 1971 and 72% in 1972. These countries are highly industrialized, thickly populated, and produce more wheat, barley and oats than corn.

#### G. Trends in Philippine Corn Exportation

In the Philippines, corn export has been minimal. Exports were recorded mostly to Japan in 1959 to 1961 when small quantities of domestic corn surplus were realized. The succeeding years brought about corn deficits which made the Philippines a net importer of corn. Most of the corn imports of the Philippines come from the United States, Table 17.

Table 15

## Comparative World Corn Exportations

|                           | <u>Volume</u><br>(000 MT) | <u>1 9 7 1</u><br><u>Value</u><br>(million\$) | <u>% to</u><br><u>Total</u> | <u>Volume</u><br>(000 MT) | <u>1 9 7 2</u><br><u>Value</u><br>(million\$) | <u>% to</u><br><u>Total</u> |
|---------------------------|---------------------------|---|-----------------------------|---------------------------|---|-----------------------------|
| World Corn Export Trade   | 30,741                    | 1,959   | 100.0                       | 33,776                    | 2,298   | 100                         |
| <u>Selected Countries</u> |                           |   |                             |                           |   |                             |
| <u>North America</u>      |                           |   |                             |                           |   |                             |
| USA                       | 12,884                    | 746   | 41.9                        | 22,386                    | 1,241   | 66.2                        |
| Mexico                    | 277                       | 17  | 0.9                         | 424                       | 22  | 1.2                         |
| <u>South America</u>      |                           |   |                             |                           |   |                             |
| Argentina                 | 6,128                     | 348   | 19.9                        | 3,039                     | 167   | 9.0                         |
| Brazil                    | 1,280                     | 75  | 4.1                         | 176                       | 10  | 0.5                         |
| <u>Africa</u>             |                           |   |                             |                           |   |                             |
| South Africa              | 1,467                     | 85  | 4.8                         | 3,000                     | 176   | 8.9                         |
| <u>Asia</u>               |                           |   |                             |                           |   |                             |
| Indonesia                 | 213                       | 13  | 0.7                         | 80                        | 5   | 0.2                         |
| Thailand                  | 1,806                     | 105   | 5.8                         | 1,719                     | 95  | 5.0                         |
| <u>Europe</u>             |                           |   |                             |                           |   |                             |
| France                    | 4,121                     | 360   | 13.4                        | 3,481                     | 374   | 10.3                        |
| Romania                   | 466                       | 34  | 1.5                         | 300                       | 21  | 0.9                         |
| USSR                      | 137                       | 12  | 0.4                         | 60                        | 5   | 0.1                         |

Source: 1972 Food and Agriculture Organization Yearbook, Rome, 1973.

Table 16

## Major Corn Importing Countries

| <u>Countries</u> | 1 9 7 1                   |                              |                             | 1 9 7 2                   |                              |                             |
|------------------|---------------------------|------------------------------|-----------------------------|---------------------------|------------------------------|-----------------------------|
|                  | <u>Volume</u><br>(000 MT) | <u>Value</u><br>(million \$) | <u>% to</u><br><u>Total</u> | <u>Volume</u><br>(000 MT) | <u>Value</u><br>(million \$) | <u>% to</u><br><u>Total</u> |
| <u>Countries</u> | 30,623                    | 2,260                        | 100.0                       | 35,517                    | 2,443                        | 100.0                       |
| Japan            | 5,007                     | 368                          | 16.3                        | 5,790                     | 360                          | 16.3                        |
| Italy            | 4,518                     | 320                          | 14.8                        | 4,842                     | 317                          | 13.6                        |
| West Germany     | 3,283                     | 251                          | 10.7                        | 3,280                     | 272                          | 9.2                         |
| United Kingdom   | 2,959                     | 213                          | 9.6                         | 3,145                     | 210                          | 8.8                         |
| Netherlands      | 2,756                     | 220                          | 9.0                         | 2,445                     | 212                          | 6.9                         |
| Spain            | 2,056                     | 143                          | 6.7                         | 2,383                     | 147                          | 6.7                         |
| Belgium          | 1,504                     | 138                          | 4.9                         | 1,489                     | 150                          | 4.2                         |
| East Germany     | 700                       | 46                           | 2.2                         | 730                       | 48                           | 2.0                         |
| Portugal         | 517                       | 36                           | 1.7                         | 775                       | 51                           | 2.2                         |
| China            | 554                       | 38                           | 1.8                         | 584                       | 41                           | 1.6                         |

SOURCE: FAO Yearbook

Table 17

Philippine Corn Exports and Imports  
1958 - 1972

| Year | Corn Exports | Value | Equivalent | Corn Imports | Value  | Equivalent |
|------|--------------|-------|------------|--------------|--------|------------|
|      | (MT)         | (\$)  | Value      | (MT)         | (\$)   | Value      |
|      |              | (000) | (Peso)     |              | (000)  | (Peso)     |
|      |              |       | (000)      |              |        | (000)      |
| 1958 | 76,620       | 5,734 | 11,468*    | 20,821       | 2,179  | 8,498*     |
| 1959 | 14,181       | 1,061 | 2,122*     | -            | -      | -          |
| 1960 | 6,239        | 467   | 1,401      | 1            | -      | -          |
| 1961 | -            | -     | -          | 86           | 9      | 35         |
| 1962 | -            | -     | -          | 14           | 2      | 8          |
| 1963 | -            | -     | -          | 78           | 17     | 66         |
| 1964 | -            | -     | -          | 62           | 11     | 43         |
| 1965 | -            | -     | -          | 2,248        | 214    | 835        |
| 1966 | -            | -     | -          | 1,049        | 107    | 417        |
| 1967 | -            | -     | -          | 48,934       | 2,728  | 10,639     |
| 1968 | -            | -     | -          | 77           | 21     | 82         |
| 1969 | -            | -     | -          | 25,788       | 1,570  | 6,123      |
| 1970 | -            | -     | -          | 1,014        | 140    | 546        |
| 1971 | -            | -     | -          | 54,772       | 3,304  | 22,302     |
| 1972 | -            | -     | -          | 162,000      | 9,000  | 60,750     |
| 1973 | -            | -     | -          | 96,722       | 8,532  | 57,928     |
| 1974 | -            | -     | -          | 100,000      | 14,547 | 97,901     |

SOURCE: Food and Agriculture Organization Yearbook, Rome, 1972.

\*Estimated based on the then prevailing foreign exchange rate of ₱3.90:\$1.00.

#### H. Corn Export Prices

The world corn export price has been relatively stable over the period from 1961 to 1972, with an annual average growth rate of 1.4%. Price decreases occurred in 1968 and 1972 due to improved world production of corn (See Table 18). The corn exports of the major exporting countries such as the United States, Mexico, Argentina, Brazil, South Africa and Thailand have been increasing over the years. The export prices in Europe have been increasing more than the other major exporting countries perhaps because the volume of export from Europe have been decreasing.

The corn import prices have been higher than export prices. Transport, handling and freight services accounted for about 8-14% of the import prices.

Table 19 and Figure D present the world export and import price trends.

Philippine corn exports in 1959-1961 realized an average price of \$74.85 per metric ton. The Philippine corn export prices were relatively higher than those of the United States, Mexico, Argentina, Brazil, France and Thailand. The average price of Thai exports has been only \$50.18 per metric ton, or 32% lower than that of the Philippines.

#### I. Factors Affecting Corn Exports

World corn exports have been increasing due to improved productivity and expanding acreage worldwide. The major factors behind these production increases are technological advancements,

Table 18

Corn Export Price of Leading Exporters/MT  
1961 - 1962

|              | <u>1961</u> | <u>1962</u> | <u>1963</u> | <u>1964</u> | <u>1965</u> | <u>1966</u> | <u>1967</u> | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>1971</u> | <u>1972</u> |
|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| USA          | 48.87       | 48.93       | 53.06       | 53.53       | 53.93       | 56.35       | 54.42       | 49.09       | 52.03       | 57.20       | 57.93       | 55.43       |
| Mexico       | -           | 72.08       | -           | 56.33       | 57.32       | 54.86       | 57.91       | 51.90       | 55.32       | -           | 61.46       | 51.62       |
| Argentina    | 47.86       | 41.44       | 51.70       | 50.34       | 54.81       | 53.50       | 51.76       | 48.34       | 48.36       | 50.74       | 56.81       | 54.95       |
| Brazil       | 40.46       | -           | 42.19       | 47.01       | 49.86       | 50.71       | 51.23       | 46.05       | 50.62       | 54.80       | 58.94       | 55.81       |
| South Africa | 50.62       | 48.84       | 49.46       | 52.92       | 59.91       | 87.23       | 55.15       | 50.28       | 53.98       | 62.37       | 57.95       | 58.66       |
| Indonesia    | -           | -           | 41.89       | -           | 24.03       | 30.08       | 27.86       | 57.62       | 54.91       | 60.00       | 62.00       | 60.00       |
| Thailand     | 50.18       | 51.12       | 53.51       | 58.02       | 57.88       | 59.96       | 59.74       | 50.52       | 54.53       | 64.95       | 58.04       | 55.01       |
| France       | 49.87       | 58.93       | 83.42       | 77.70       | 92.01       | 84.71       | 74.81       | 73.06       | 77.50       | 78.39       | 87.33       | 107.37      |
| Romania      | 75.40       | 88.19       | 94.20       | 77.70       | 71.91       | 79.76       | 81.02       | 89.81       | 70.01       | 70.90       | 72.96       | 70.00       |
| USSR         | 64.42       | 63.57       | 61.64       | 63.23       | 63.92       | 67.43       | 71.39       | 55.49       | 60.58       | 66.58       | 86.06       | 90.00       |

Table 19  
Corn Export & Import Prices<sup>1/</sup>

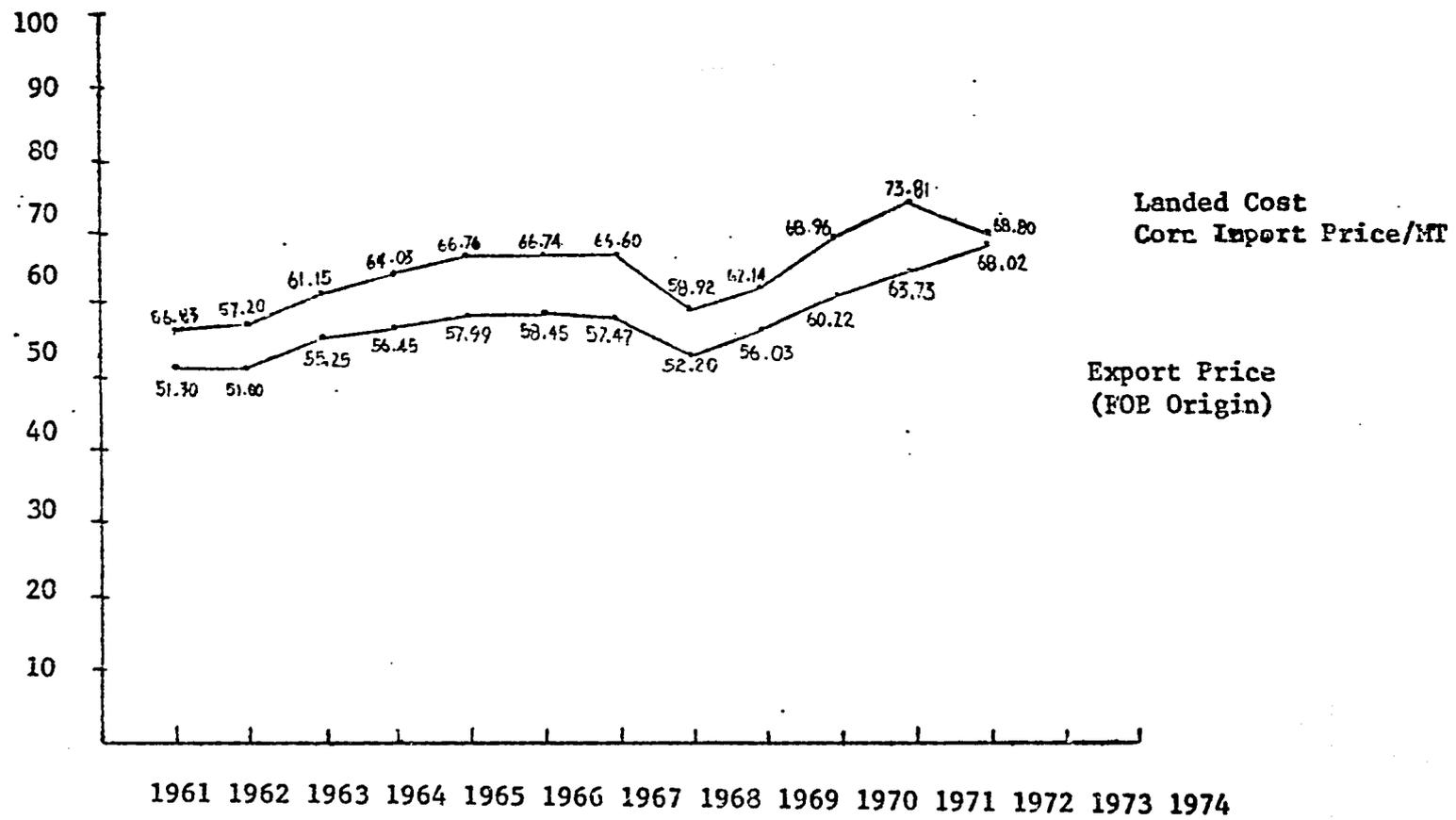
| <u>Year</u> | <u>Import Price/MT</u> | <u>Export Price/MT</u> | <u>Price Variation</u> | <u>% Variation</u> |
|-------------|------------------------|------------------------|------------------------|--------------------|
| 1961        | \$ 56.83               | \$ 51.30               | 5.53                   | 9.73               |
| 1962        | 57.20                  | 51.00                  | 6.20                   | 10.83              |
| 1963        | 61.15                  | 55.25                  | 5.90                   | 9.65               |
| 1964        | 64.03                  | 56.45                  | 7.58                   | 11.84              |
| 1965        | 66.76                  | 57.99                  | 8.77                   | 13.14              |
| 1966        | 66.74                  | 58.45                  | 8.29                   | 12.42              |
| 1967        | 66.60                  | 57.47                  | 9.13                   | 13.70              |
| 1968        | 58.90                  | 52.20                  | 6.70                   | 11.37              |
| 1969        | 61.14                  | 56.03                  | 5.11                   | 8.35               |
| 1970        | 68.96                  | 60.22                  | 8.74                   | 12.67              |
| 1971        | 73.81                  | 63.73                  | 10.08                  | 13.65              |
| 1972        | 68.80                  | 68.02                  | 0.78                   | 1.13               |

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<sup>1/</sup>1972 FAO Yearbook.

Figure D

World Corn Export and Import Price Trends  
1961-1972



favorable climatic conditions, and availability of agricultural inputs such as fertilizers, chemicals and farm machineries.

In the case of the Philippine corn producing sector, however, production has not shown marked improvements. Production per hectare has even decreased since 1969, despite increases in land area. The total land area devoted to corn production ranged from 2.0 million to 2.4 million from 1960 to 1971, while corn yield per hectare averaged from 0.59 MT to 0.83 MT only over the same period. This average yield is quite low when compared with 553 MT per hectare in the United States and 3.06 MT per hectare in Thailand.

#### J. Philippine Export Revenues

Corn export revenues have had very little contribution to the country's foreign exchange earnings. However, industry participants and government officials believe the system's potentials as a major export crop have not been tapped as vigorously as the traditional exports such as sugar.

Table 20 compares the export revenue from corn with those from the major Philippine exports.

#### K. Exporting Potential of the Philippine Corn System

The Philippines consumed a total of 2,388 million MT in 1974. A breakdown of the domestic corn use is presented in Table 19.

Table 20

Corn and the Major Philippine Exports  
(FOB Value in Million US Dollars)

| <u>Year</u> | <u>Exports</u> | <u>Sugar</u> | <u>Copper</u> | <u>Lumber</u> | <u>Copra</u> | <u>Coconut<br/>Oil</u> | <u>Pineapple</u> | <u>Bananas</u> | <u>Corn</u> | <u>Others</u> |
|-------------|----------------|--------------|---------------|---------------|--------------|------------------------|------------------|----------------|-------------|---------------|
| 1959        | 529.4          | 112.6        | 21.9          | 80.4          | 138.0        | 22.4                   | 8.0              | -              | 5.7         | 140.4         |
| 1960        | 560.3          | 133.4        | 29.6          | 91.6          | 138.6        | 15.7                   | 7.4              | -              | 1.0         | 90.0          |
| 1961        | 599.5          | 135.0        | 27.3          | 92.4          | 88.2         | 15.9                   | 10.4             | -              | 0.4         | 230.0         |
| 1962        | 556.0          | 121.9        | 28.6          | 112.7         | 112.9        | 31.5                   | 11.3             | -              | -           | 137.1         |
| 1963        | 727.1          | 146.5        | 41.3          | 152.8         | 168.2        | 46.7                   | 7.2              | -              | -           | 164.3         |
| 1964        | 742.0          | 146.2        | 34.2          | 143.1         | 156.0        | 59.9                   | 7.6              | -              | -           | 192.9         |
| 1965        | 768.4          | 132.4        | 46.5          | 162.0         | 170.0        | 68.0                   | 8.7              | -              | -           | 180.8         |
| 1966        | 828.1          | 132.9        | 74.6          | 204.7         | 157.1        | 74.5                   | 8.9              | -              | -           | 175.4         |
| 1967        | 821.4          | 141.7        | 74.9          | 212.2         | 129.4        | 59.2                   | 10.1             | -              | -           | 193.9         |
| 1968        | 857.7          | 144.0        | 89.2          | 216.6         | 123.0        | 77.3                   | 18.8             | -              | -           | 188.8         |
| 1969        | 854.6          | 148.8        | 132.9         | 225.9         | 87.3         | 50.5                   | 17.2             | 1.3            | -           | 190.7         |
| 1970        | 1,061.7        | 187.6        | 135.1         | 249.7         | 80.0         | 95.6                   | 21.4             | 4.9            | -           | 237.4         |
| 1971        | 1,136.4        | 212.3        | 185.9         | 225.9         | 114.0        | 103.4                  | 19.6             | 15.3           | -           | 260.0         |
| 1972        | 1,105.5        | 208.6        | 174.5         | 174.4         | 110.4        | 84.2                   | 19.5             | 23.7           | -           | 310.2         |

SOURCE: Statistical Bulletin, Central Bank of the Philippines, Department of Economic Research, Manila, Vol. XXIV, December 1972.

Table 21  
Corn Production and Utilization  
(000 MT)

|                        | <u>1971</u> | <u>1972</u> | <u>1973</u> | <u>1974</u> |
|------------------------|-------------|-------------|-------------|-------------|
| Domestic Production    | 2,022       | 1,920       | 1,831       | 2,288       |
| Corn Importations      | <u>55</u>   | <u>161</u>  | <u>97</u>   | <u>100</u>  |
| Total Available Supply | 2,077       | 2,081       | 1,928       | 2,388       |
| Utilization            |             |             |             |             |
| Human Consumption      | 1,664       | 1,689       | 1,555*      | 1,926*      |
| Animal Feeds           | 303         | 288         | 274*        | 339*        |
| Manufacturing          | 69          | 65          | 62*         | 77*         |
| Seeds                  | 40          | 38          | 36*         | 45*         |
| Waste                  | 1           | 1           | 1           | 1           |

\*Preliminary estimates

To meet the total domestic corn requirements, the system must increase its production to 2.4 million MT in 1974. This would entail an increase of 31.1% over the total yield in 1973 of 1.831 million MT. Assuming the same area of 2,325,410 hectares planted to corn, the average yield per hectare must be 1.03 MT per hectare. in contrast to the 1973 average of 0.79 MT per hectare. This means that improvements in corn productivity over 1.03 MT hectare in 1974 could have generated some surplus.

#### L. Domestic Trends in Corn Prices

The price of corn from 1946 to 1960 has been decreasing partly due to increases in productivity. However, changes in Philippine economic conditions during the early 1960's resulted

in a higher average domestic price of corn. From 1960 to 1973, corn prices have been increasing at an average rate of 7.7% per year. Significant price increases took place, especially in 1970 due to the devaluation of the Philippine peso. Corn price increased by 205% from 1970 to 1974, i.e., from ₱262 per metric ton to ₱800 as based on prevailing government price support at farm price levels.

Appendix Table 38 and Appendix Figure P.1 show the trends in corn production, price and value from 1946 to 1974.

#### L.1 White Corn vs. Yellow Corn

The price of yellow corn has been increasing at an average rate of 7.82% per year from 1957 to 1974. White corn price has likewise been increasing correspondingly at an average rate of 6.18% annually. Variations in the price and rate of increase between white and yellow corn are due to a higher preference for the more nutritious yellow corn. Variations in prices of yellow corn and white corn range from 0.3 to 10%, although the prices of white corn have been higher at one time or another in the past.

Appendix Table 39 and Appendix Figure P.2 present the average prices of yellow corn and white corn as well as price variances and trends from 1957 to 1974.

### Seasonal Price Trends

Variations in corn prices are caused by shifts in supply and demand over a period of time. Although changes in corn supply and demand may be gradual, they cause distinct and observable movements in corn prices. Fluctuations in corn prices are also affected by geographical and seasonal factors.

Changes in farm prices create subsequent and proportional changes in wholesale and retail prices. Prices vary from one region to another, with wholesale and retail prices being highest in non-producing regions. Corn price manifests itself on three levels.

1. Farm Price - This consists of the price at the point of sale or at the farm level from the producers.
2. Wholesale Price - This refers to the price paid by the retailers for corn stocks purchased from the wholesalers and millers obtained in bulk.
3. Retail Price - This refers to the price of retailers who sell their corn stocks in grain form or corn grits to the consumers and household.

Farm prices vary from one producing region to another. Wholesale and retail prices depend on the amount of marketing services performed on corn such as transporting, handling and

processing. The average farm price of corn in the Philippines is 19% lower than the average wholesale price. This price margin between the farm and wholesale price has remained constant through the years, despite upward and downward price movements.

Retail prices are 29.5% higher than average wholesale price of corn grains and 43.2% higher than farm price levels. This indicates that retail margins are higher than wholesale margins by as much as 10.5%.

Appendix Figures P.3-P.4 present the seasonal movements of corn prices from 1965 to 1974, while Appendix Table 40 shows the price variations among farm, wholesale, and retail prices.

#### Regional Price Trends

The country's nine regions may be grouped into three, depending on the level of their farm prices as follows.

- |  |   |
|--|---|
| 1. High-level<br>(Ave. ₱40-64<br>per 57 kg sack) <sup>8/</sup> | Southern Tagalog Region, Ilocos<br>Region and Central Luzon   |
| 2. Medium-level<br>(Ave. ₱41-55<br>per sack)                   | Western Visayas, Eastern Visayas,<br>and Bicol Region   |
| 3. Low-level<br>(Ave. ₱40-44<br>per sack)                      | Northern-Eastern Mindanao Region,<br>Southern-Western Mindanao Region<br>and Cagayan Valley Region. |

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<sup>8/</sup> Average regional price range for 1973-1974.

The low-level group is the major production center for corn. Together, those regions account for about 70% of total domestic corn production while the medium and high-level groups account for 17% and 13%, respectively.

These are two main corn market centers in the Philippines. The first is in Cebu where corn is the main staple food. Inasmuch as corn production in the Visayas region is not adequate for their requirements, corn from Mindanao has to be shipped from Davao/Cotabato to Cebu.

The second major corn market territory is located around the Greater Manila area and its environs. Corn prices are high in these trading centers since the bulk of corn sales is used for livestock feed manufacturing.

#### The Government Price Support Scheme

Farm and retail prices of corn are a function of the location, the timing and levels of corn harvest, prevailing government support prices, availability of government support funds, transportation facilities, market information systems and efficiency of the marketing organization.<sup>9/</sup> However, corn retail prices may not exceed the ceilings set by the government through its Price Control Council.

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<sup>9/</sup> Production and Market Relationship for Rice and Corn in the Philippines, Mahar Mangahas, Aida E. Recto and Vernon W. Ruttan, International Rice Research Institute, Technical Bulletin 1966, -. 73.

The government has a cereal procurement program implemented by the National Grains Authority, which establishes a corn pricing scheme for the benefit of both the farmers and the consumers. See Appendix Tables 40-41 for grain procurement costs from various regions of the Philippines.

In this scheme, the price of shelled corn, sold ex-farm, should not be below the government support price of ₱0.80 per kilo. If the corn produce is delivered by the farmer to the buyer, he charges the buyer the cost of transporting the stocks over and above the minimum support price.

Processed corn in the form of corn grits must not be sold above ₱1.40 per kilo to retailers nor above ₱1.45 per kilo to the final consumers.

From the margin between ₱0.80 to ₱1.00 per kilo of whole corn, the farmer has to deduct the added cost of transporting, packaging and handling. On the other hand, the middleman, agent buyer or wholesaler who buys at ₱0.80 per kilo ex-farm derives his profit margin between the support and ceiling price after deducting transport, collection and handling costs.

The millers and processors get the highest margins since they are able to sell the corn by-products, aside from the margins they obtain by selling processed corn at ₱1.40-₱1.45 per kilo. These amount, however, has to cover the overhead, labor, handling, packaging, and selling expenses before millers realize a profit.

Presently, corn millers and farmers alike are experiencing low profitability due to increasing costs amidst controlled prices.

At ₱1.45 per kilo as the selling price to the consumers, the retailers usually get ₱0.05 as margin per kilo. The ₱1.45 per kilo for corn grits excludes the cost of handling and delivery which is usually borne by the final end user.<sup>10/</sup>

The pricing structure established by the NGA for corn is as follows.

NGA Pricing Scheme for Corn, 1974

|  | Price Per Kg |         |        |
|--|--------------|---------|--------|
|  | Minimum      | Maximum | Range  |
| Ex-Farm Price (corn grain)             | ₱ 0.80       | ₱ 1.00  | ₱ 0.20 |
| Wholesale Price (processed corn grits) | 1.30         | 1.40    | 0.10   |
| Retail Price (corn grits)              | 1.40         | 1.45    | 0.05   |
| Other Corn By-Products                 |              |         |        |
| Corn Grits - 22                        | 0.70         | -       | -      |
| Corn Bran                              | 0.45         | -       | -      |

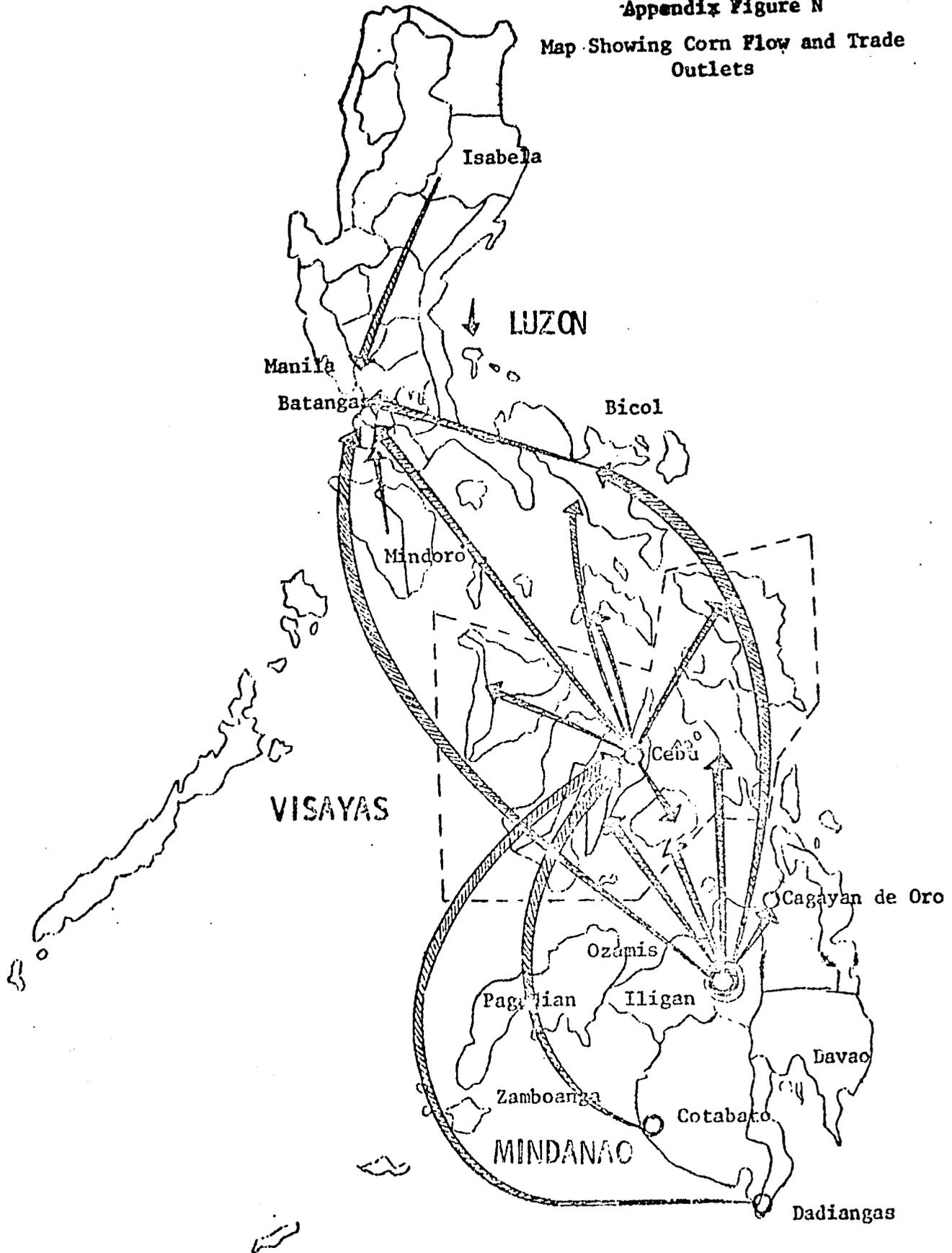
Note: Corn Price Supports

|      |           | <u>Per Cavan</u> | <u>Per Kilo</u> |
|------|-----------|------------------|-----------------|
| 1972 | November  | ₱ 20.00          | ₱ 0.40          |
| 1973 | February  | 25.00            | 0.50            |
| 1974 | February  | 31.00            | 0.62            |
| 1974 | September | 40.00            | 0.80            |

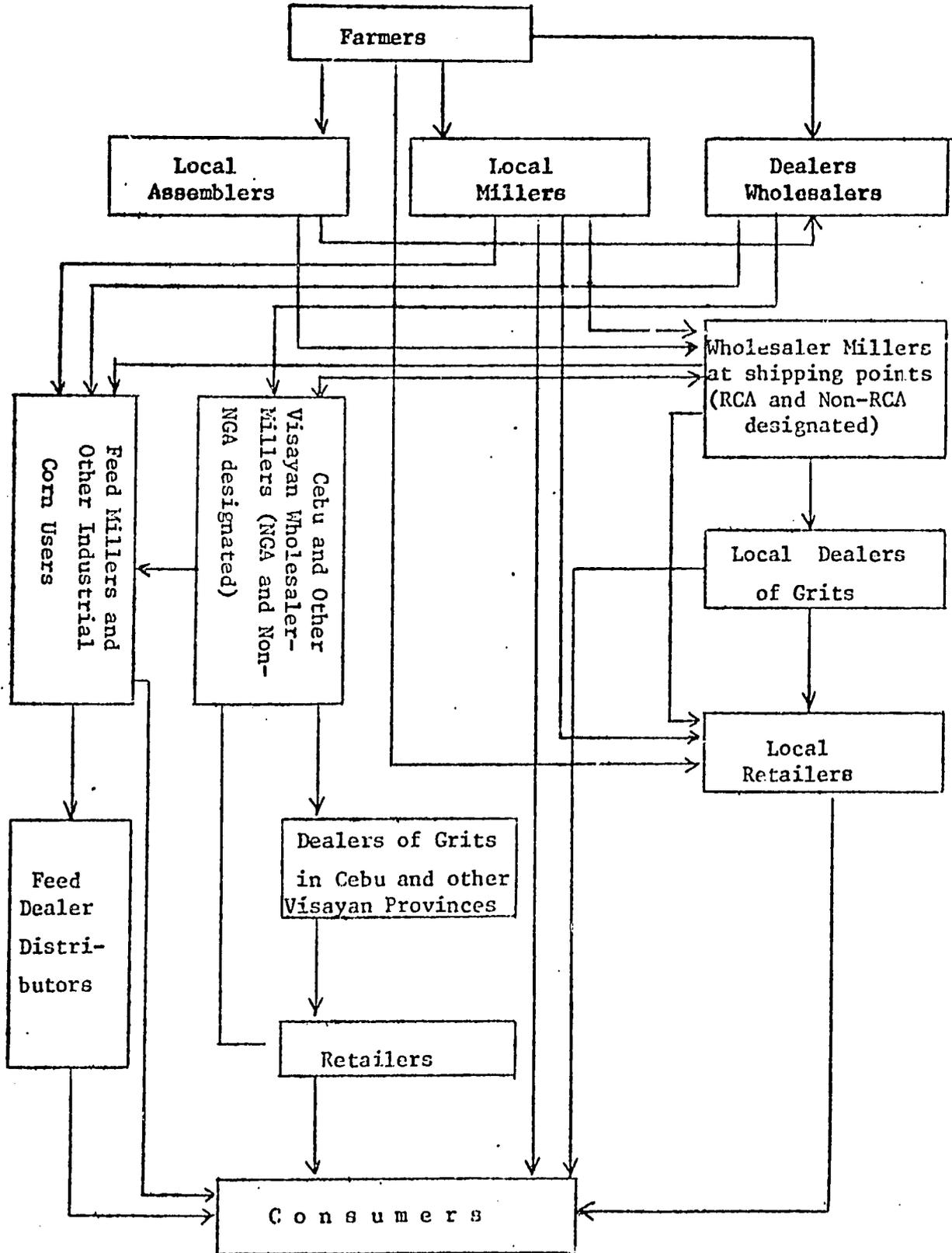
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<sup>10/</sup> - National Grains Authority

Appendix Figure N  
Map Showing Corn Flow and Trade  
Outlets



Appendix Figure 0  
Flow Channel of Corn



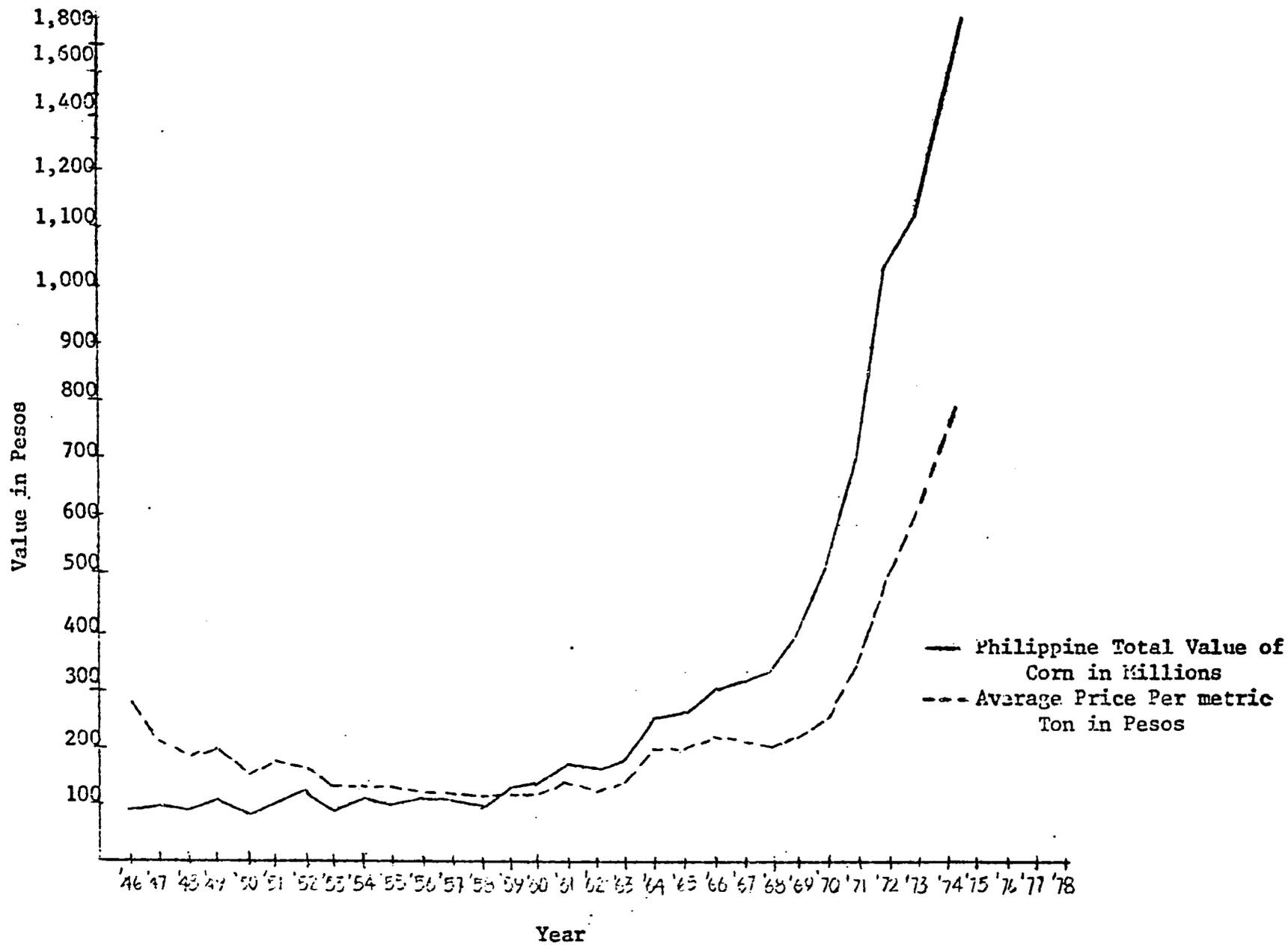
Source: Notes on the Corn Industry, J. D. Drilon Jr.  
Corn Marketing, H. M. Orticio

Appendix Table 3E  
Production Trends and Prices of Corn

|             | Quantity<br>(000 MT) | Value<br>(₱ 000 ) | Price/MT<br>(₱) |
|-------------|----------------------|-------------------|-----------------|
| 1946        | 331.3                | 93.1              | ₱281.01         |
| 1947        | 472.2                | 99.4              | 210.50          |
| 1948        | 519.0                | 99.0              | 190.75          |
| <u>1949</u> | <u>534.1</u>         | <u>106.9</u>      | <u>200.14</u>   |
| 1950        | 573.7                | 89.4              | 155.83          |
| 1951        | 603.2                | 107.7             | 178.54          |
| 1952        | 761.9                | 127.9             | 167.87          |
| 1953        | 709.5                | 98.7              | 139.11          |
| 1954        | 780.9                | 107.6             | 137.79          |
| <u>1955</u> | <u>770.1</u>         | <u>106.0</u>      | <u>137.64</u>   |
| 1956        | 907.4                | 116.1             | 127.94          |
| 1957        | 895.4                | 114.5             | 127.87          |
| 1958        | 852.1                | 105.6             | 123.93          |
| 1959        | 1,015.9              | 132.5             | 130.42          |
| <u>1960</u> | <u>1,165.3</u>       | <u>149.7</u>      | <u>128.46</u>   |
| 1961        | 1,209.6              | 187.9             | 155.34          |
| 1962        | 1,266.3              | 171.3             | 135.27          |
| 1963        | 1,272.8              | 188.4             | 148.02          |
| 1964        | 1,292.7              | 262.8             | 203.29          |
| <u>1965</u> | <u>1,312.7</u>       | <u>272.8</u>      | <u>207.81</u>   |
| 1966        | 1,379.8              | 310.5             | 225.03          |
| 1967        | 1,489.9              | 328.3             | 220.35          |
| 1968        | 1,619.2              | 247.4             | 214.55          |
| 1969        | 1,732.8              | 403.8             | 233.03          |
| <u>1970</u> | <u>2,008.2</u>       | <u>525.9</u>      | <u>261.87</u>   |
| 1971        | 2,005.0              | 720.9             | 359.55          |
| 1972        | 2,012.6              | 1,043.5           | 518.48          |
| 1973        | 1,831.1              | 1,135.3           | 620.00          |
| 1974        | 2,288.7              | 1,830.9           | 800.00          |

Appendix Figure P. 1

Total Value of Corn and Price Per Metric Ton  
1946-1973



Appendix Table 39

Average Farm Prices of Corn Grain in the Philippines <sup>1/</sup>  
1957-1974

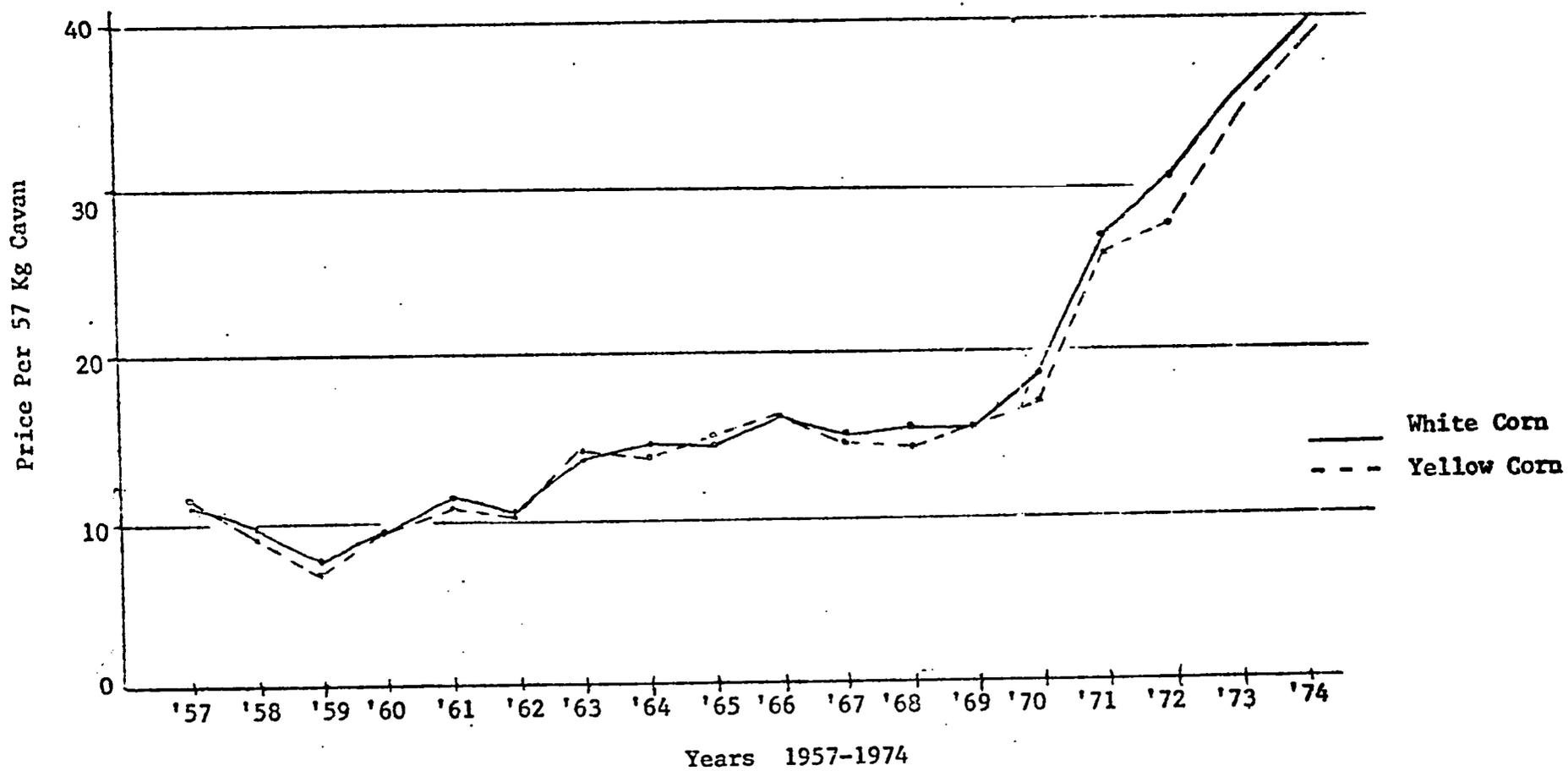
|      | Yellow Corn             |          | White Corn |          | Price Variance | %        |
|------|-------------------------|----------|------------|----------|----------------|----------|
|      | Per Cavan <sup>2/</sup> | Per Kilo | Per Cavan  | Per Kilo | Per Cavan      | Variance |
| 1957 | 10.84                   | 0.190    | 10.88      | 0.190    | ₱(0.04)        | (0.36)   |
| 1958 | 9.54                    | 0.167    | 9.33       | 0.163    | 0.21           | 2.20     |
| 1959 | 7.46                    | 0.130    | 6.94       | 0.121    | 0.52           | 6.97     |
| 1960 | 9.75                    | 0.171    | 9.73       | 0.170    | 0.02           | 0.20     |
| 1961 | 11.07                   | 0.194    | 10.96      | 0.192    | 0.11           | 1.00     |
| 1962 | 10.25                   | 0.179    | 10.22      | 0.179    | 0.03           | 0.29     |
| 1963 | 13.38                   | 0.234    | 13.56      | 0.237    | (0.18)         | (1.34)   |
| 1964 | 14.04                   | 0.246    | 13.52      | 0.237    | 0.52           | 3.70     |
| 1965 | 14.57                   | 0.255    | 14.64      | 0.256    | (0.07)         | (0.48)   |
| 1966 | 16.02                   | 0.281    | 16.06      | 0.281    | (0.04)         | (0.25)   |
| 1967 | 14.79                   | 0.259    | 14.73      | 0.258    | 0.06           | 0.40     |
| 1968 | 14.79                   | 0.259    | 14.17      | 0.248    | 0.62           | 4.19     |
| 1969 | 15.02                   | 0.263    | 15.02      | 0.263    | -              | -        |
| 1970 | 18.77                   | 0.329    | 16.98      | 0.297    | 1.79           | 9.54     |
| 1971 | 27.66                   | 0.485    | 26.69      | 0.468    | 0.97           | 3.50     |
| 1972 | 30.64                   | 0.537    | 27.84      | 0.488    | 2.80           | 9.13     |
| 1973 | 37.90                   | 0.665    | 34.43      | 0.604    | 3.47           | 9.15     |
| 1974 |                         |          |            |          |                |          |

<sup>1/</sup> Bureau of Agricultural Economics

<sup>2/</sup> 57 kilograms per cavan of corn

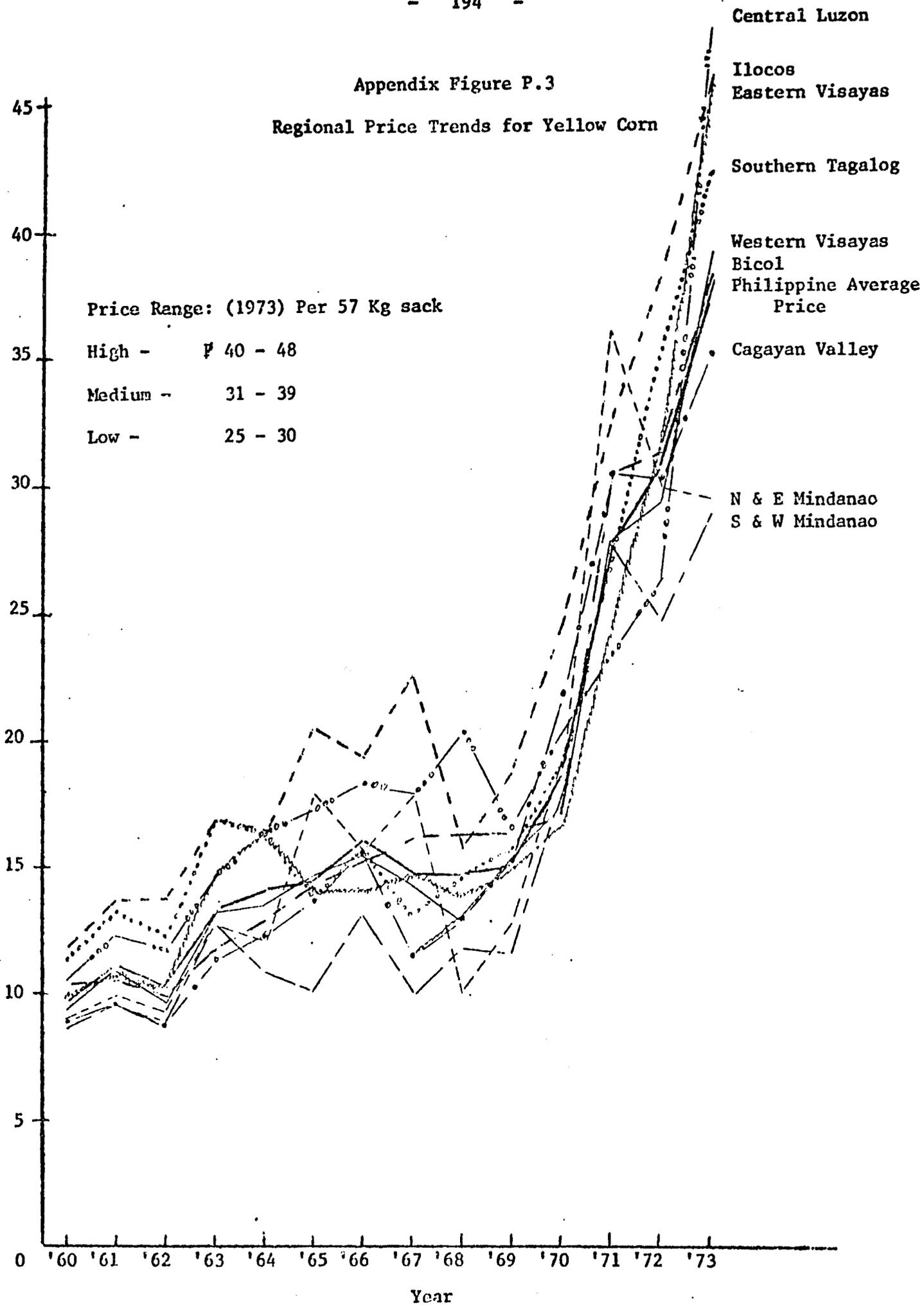
Appendix Figure P.2

Average Price Trends of Corn in the Philippines  
1957-1974

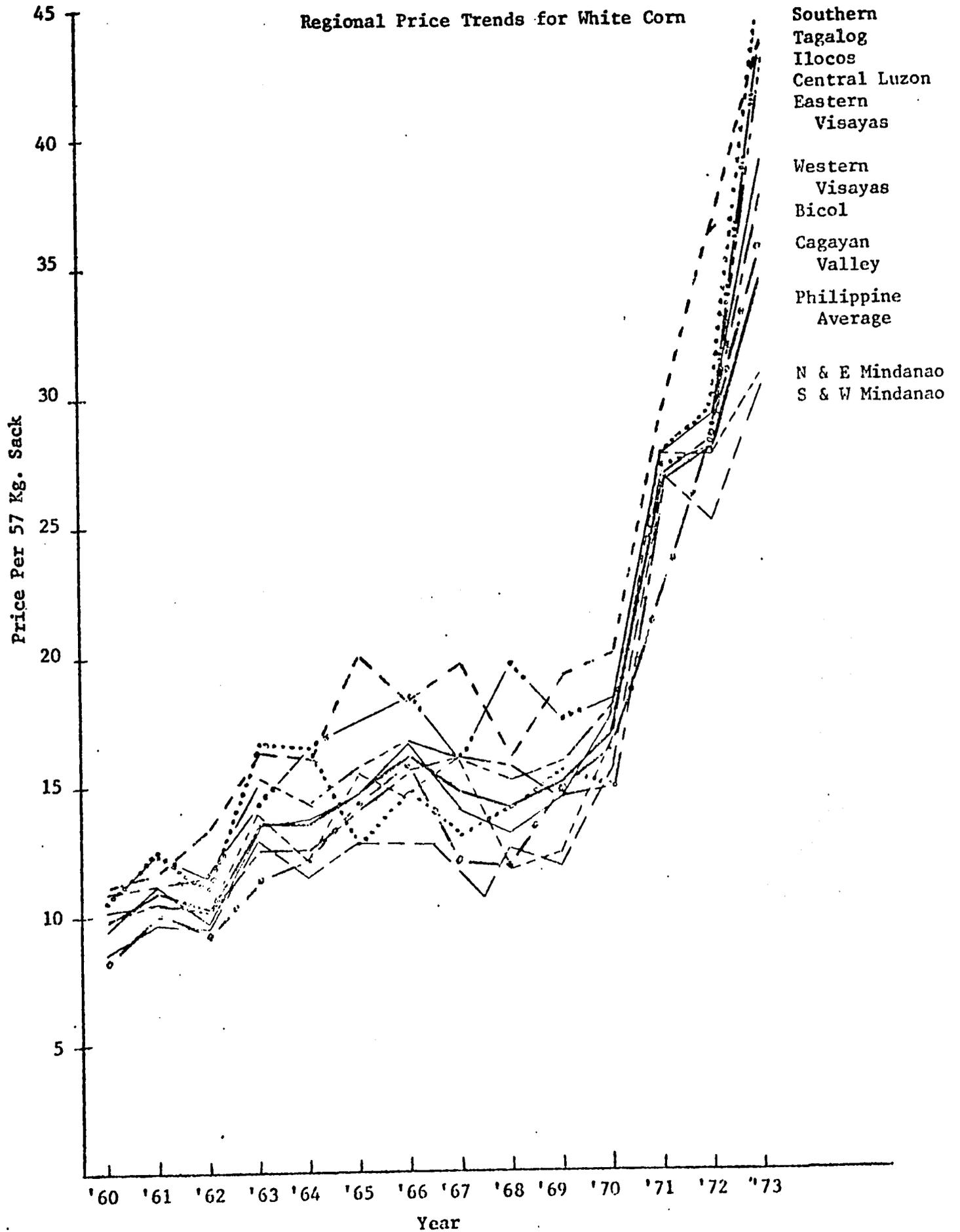


Appendix Figure P.3

Regional Price Trends for Yellow Corn



Appendix Figure P.4



Appendix Table 40

## Price Margins from Farm to Retail Price Levels

|  | 1965  | 1966  | 1967  | 1968  | 1969  | 1970  | 1971  | 1972  | 1973  | 1974  |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>A. Yellow Corn</b>                  |       |       |       |       |       |       |       |       |       |       |
| Average Farm Price/57 kg Sack          | 14.57 | 16.08 | 14.79 | 14.79 | 15.02 | 18.77 | 27.66 | 30.64 | 37.90 | 44.71 |
| Average Wholesale Price Per 57 Kg Sack | 19.76 | 20.21 | 17.83 | 18.32 | 18.26 | 20.72 | 36.51 | 38.48 | 42.52 | 55.41 |
| Average Retail Price/ Per 57 Kg Sack   | 25.39 | 28.24 | 25.90 | 26.42 | 28.75 | 28.75 | 49.22 | 50.52 | 52.52 | 72.24 |
| <u>Price Variation</u>                 |       |       |       |       |       |       |       |       |       |       |
| Farm to Wholesale                      | 5.19  | 4.13  | 3.04  | 3.53  | 3.24  | 1.95  | 8.85  | 5.84  | 4.62  | 10.70 |
| Farm to Retail                         | 10.82 | 12.16 | 11.11 | 11.63 | 13.73 | 9.98  | 21.56 | 19.88 | 14.62 | 27.53 |
| Wholesale to Retail                    | 5.63  | 8.03  | 8.07  | 8.10  | 10.49 | 8.03  | 12.71 | 14.04 | 10.00 | 16.83 |
| <u>Percent Price Variation</u>         |       |       |       |       |       |       |       |       |       |       |
| Farm to Wholesale                      | 26.26 | 20.43 | 17.05 | 19.26 | 17.74 | 9.41  | 24.24 | 16.00 | 10.86 | 19.31 |
| Farm to Retail                         | 42.61 | 43.06 | 42.89 | 44.01 | 47.75 | 34.71 | 43.80 | 39.35 | 27.53 | 38.10 |
| Wholesale to Retail                    | 22.17 | 28.43 | 31.15 | 30.65 | 36.48 | 27.93 | 25.82 | 27.79 | 19.04 | 23.29 |
| <b>B. White Corn</b>                   |       |       |       |       |       |       |       |       |       |       |
| Average Farm Price/57 Kg Sack          | 14.74 | 16.06 | 14.73 | 14.17 | 15.02 | 15.98 | 26.69 | 27.84 | 34.80 | 43.43 |
| Average Wholesale Price Per 57 Kg Sack | 19.42 | 19.86 | 17.52 | 18.00 | 17.94 | 20.36 | 35.87 | 30.70 | 41.58 | 48.51 |
| Average Retail Price Per 57 Kg Sack    | 25.65 | 27.20 | 25.00 | 28.24 | 26.42 | 30.83 | 47.67 | 50.26 | 50.16 | 76.09 |
| <u>Price Variation</u>                 |       |       |       |       |       |       |       |       |       |       |
| Farm to Wholesale                      | 4.68  | 3.80  | 2.79  | 3.83  | 2.92  | 3.38  | 9.18  | 2.86  | 6.78  | 5.08  |
| Farm to Retail                         | 10.91 | 11.14 | 11.17 | 14.07 | 11.40 | 13.85 | 20.98 | 22.42 | 15.36 | 32.66 |
| Wholesale to Retail                    | 6.23  | 7.34  | 8.38  | 10.24 | 8.48  | 10.47 | 11.80 | 19.56 | 8.58  | 27.58 |
| <u>Percent Price Variation</u>         |       |       |       |       |       |       |       |       |       |       |
| Farm to Wholesale                      | 24.09 | 19.13 | 15.92 | 21.27 | 16.27 | 15.60 | 19.25 | 9.32  | 16.30 | 10.47 |
| Farm to Retail                         | 42.53 | 40.95 | 43.12 | 49.82 | 43.14 | 44.92 | 44.01 | 44.60 | 30.62 | 42.92 |
| Wholesale to Retail                    | 24.29 | 26.98 | 32.35 | 36.26 | 32.09 | 33.96 | 24.75 | 38.91 | 17.10 | 36.24 |

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Source: Bureau of Agricultural Economics (BAEcon)

Appendix Table 41

Costing for Local Corn Procurement  
(Corn Grains)

|   | Cagayan de Oro<br>Manila | Cagayan de Oro<br>Albay | Cagayan de Oro<br>La Union | Cagayan de Oro<br>Bataan | Cagayan de Oro<br>Cebu | Cotabato<br>Manila | Cotabato<br>Albay | Cotabato<br>La Union | Cotabato<br>Bataan | Cotabato<br>Cebu |
|---|--------------------------|-------------------------|----------------------------|--------------------------|------------------------|--------------------|-------------------|----------------------|--------------------|------------------|
| <u>Buying Price</u>                             | <u>620.00</u>            | <u>620.00</u>           | <u>620.00</u>              | <u>620.00</u>            | <u>620.00</u>          | <u>620.00</u>      | <u>620.00</u>     | <u>620.00</u>        | <u>620.00</u>      | <u>620.00</u>    |
| <u>Procurement Cost:</u>                        |                          |                         |                            |                          |                        |                    |                   |                      |                    |                  |
| <u>A. Ex-Farm Expenses</u>                      | <u>78.00</u>             | <u>78.00</u>            | <u>78.00</u>               | <u>78.00</u>             | <u>78.00</u>           | <u>78.00</u>       | <u>78.00</u>      | <u>78.00</u>         | <u>78.00</u>       | <u>78.00</u>     |
| Empty sacks at ₱2.45                            | 49.00                    | 49.00                   | 49.00                      | 49.00                    | 49.00                  | 49.00              | 49.00             | 49.00                | 49.00              | 49.00            |
| Handling-out (2 movements)<br>at ₱0.10/movement | 4.00                     | 4.00                    | 4.00                       | 4.00                     | 4.00                   | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Trucking expense (₱15.00)                       | 15.00                    | 15.00                   | 15.00                      | 15.00                    | 15.00                  | 15.00              | 15.00             | 15.00                | 15.00              | 15.00            |
| Handling-in (2 movements)<br>at ₱0.10/movement  | 4.00                     | 4.00                    | 4.00                       | 4.00                     | 4.00                   | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Storage ₱0.10 for 3 months                      | 6.00                     | 6.00                    | 6.00                       | 6.00                     | 6.00                   | 6.00               | 6.00              | 6.00                 | 6.00               | 6.00             |
| <u>B. Other Expenses (Shipping)</u>             | <u>22.50</u>             | <u>22.50</u>            | <u>22.50</u>               | <u>22.50</u>             | <u>22.50</u>           | <u>22.50</u>       | <u>22.50</u>      | <u>22.50</u>         | <u>22.50</u>       | <u>22.50</u>     |
| Handling-out (2 movements)<br>at ₱0.10          | 4.00                     | 4.00                    | 4.00                       | 4.00                     | 4.00                   | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Trucking cost                                   | 12.00                    | 12.00                   | 12.00                      | 12.00                    | 12.00                  | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Arrastre  | 6.50                     | 6.50                    | 6.50                       | 6.50                     | 6.50                   | 6.50               | 6.50              | 6.50                 | 6.50               | 6.50             |
| <u>FOB Cost</u>                                 | <u>720.50</u>            | <u>720.50</u>           | <u>720.50</u>              | <u>720.50</u>            | <u>720.50</u>          | <u>720.50</u>      | <u>720.50</u>     | <u>720.50</u>        | <u>720.50</u>      | <u>720.50</u>    |
| <u>+ Freight</u>                                | <u>34.90</u>             | <u>170.90</u>           | <u>102.15</u>              | <u>65.90</u>             | <u>15.40</u>           | <u>47.89</u>       | <u>183.89</u>     | <u>115.14</u>        | <u>78.89</u>       | <u>31.97</u>     |
| <u>C &amp; F</u>                                | <u>755.40</u>            | <u>891.40</u>           | <u>722.65</u>              | <u>786.40</u>            | <u>735.90</u>          | <u>768.39</u>      | <u>904.90</u>     | <u>835.64</u>        | <u>799.39</u>      | <u>752.47</u>    |
| <u>C. Other Expenses</u>                        | <u>24.50</u>             | <u>24.50</u>            | <u>24.50</u>               | <u>24.50</u>             | <u>24.50</u>           | <u>24.50</u>       | <u>24.50</u>      | <u>24.50</u>         | <u>24.50</u>       | <u>24.50</u>     |
| Arrastre  | 6.50                     | 6.50                    | 6.50                       | 6.50                     | 6.50                   | 6.50               | 6.50              | 6.50                 | 6.50               | 6.50             |
| Trucking cost to warehouse                      | 12.00                    | 12.00                   | 12.00                      | 12.00                    | 12.00                  | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Handling-in (2 movements)<br>at ₱0.10/movement  | 4.00                     | 4.00                    | 4.00                       | 4.00                     | 4.00                   | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Port Operations                                 | 2.00                     | 2.00                    | 2.00                       | 2.00                     | 2.00                   | 2.00               | 2.00              | 2.00                 | 2.00               | 2.00             |
| <u>Total Cost</u>                               | <u>779.90</u>            | <u>915.90</u>           | <u>847.15</u>              | <u>810.90</u>            | <u>760.40</u>          | <u>792.89</u>      | <u>928.89</u>     | <u>860.14</u>        | <u>823.89</u>      | <u>776.97</u>    |
| <u>Cost Per Kilo</u>                            | <u>0.78</u>              | <u>0.92</u>             | <u>0.85</u>                | <u>0.81</u>              | <u>0.76</u>            | <u>0.79</u>        | <u>0.93</u>       | <u>0.86</u>          | <u>0.82</u>        | <u>0.78</u>      |

Appendix Table 41 (continued)

|   | Davao-Manila  | Davao-Albay   | Davao-La Union | Davao-Bataan  | Davao-Cebu    | Gen. Santos-Manila | Gen. Santos-Albay | Gen. Santos-La Union | Gen. Santos-Bataan | Gen. Santos-Cebu |
|---|---------------|---------------|----------------|---------------|---------------|--------------------|-------------------|----------------------|--------------------|------------------|
| <u>Buying Price</u>                             | <u>620.00</u> | <u>620.00</u> | <u>620.00</u>  | <u>620.00</u> | <u>620.00</u> | <u>620.00</u>      | <u>620.00</u>     | <u>620.00</u>        | <u>620.00</u>      | <u>620.00</u>    |
| <u>Procurement Cost:</u>                        |               |               |                |               |               |                    |                   |                      |                    |                  |
| <u>A. Ex-Farm Expenses</u>                      | <u>78.00</u>  | <u>78.00</u>  | <u>78.00</u>   | <u>78.00</u>  | <u>78.00</u>  | <u>78.00</u>       | <u>78.00</u>      | <u>78.00</u>         | <u>78.00</u>       | <u>78.00</u>     |
| Empty sack at P2.45                             | 49.00         | 49.00         | 49.00          | 49.00         | 49.00         | 49.00              | 49.00             | 49.00                | 49.00              | 49.00            |
| Handling-in (2 movements)<br>at P0.10/movement  | 4.00          | 4.00          | 4.00           | 4.00          | 4.00          | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Trucking expense                                | 15.00         | 15.00         | 15.00          | 15.00         | 15.00         | 15.00              | 15.00             | 15.00                | 15.00              | 15.00            |
| Handling-in (2 movements)<br>at P0.10/movement  | 4.00          | 4.00          | 4.00           | 4.00          | 4.00          | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Storage P0.10 for 3 months                      | 6.00          | 6.00          | 6.00           | 6.00          | 6.00          | 6.00               | 6.00              | 6.00                 | 6.00               | 6.00             |
| <u>B. Other Expenses (Shipping)</u>             | <u>22.50</u>  | <u>22.50</u>  | <u>22.50</u>   | <u>22.50</u>  | <u>22.50</u>  | <u>22.50</u>       | <u>22.50</u>      | <u>22.50</u>         | <u>22.50</u>       | <u>22.50</u>     |
| Handling-out (2 movements)<br>at P0.10/movement | 4.00          | 4.00          | 4.00           | 4.00          | 4.00          | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Trucking cost                                   | 12.00         | 12.00         | 12.00          | 12.00         | 12.00         | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Arrastre  | 6.50          | 6.50          | 6.50           | 6.50          | 6.50          | 6.50               | 6.50              | 6.50                 | 6.50               | 6.50             |
| <u>FOB Cost</u>                                 | <u>720.50</u> | <u>720.50</u> | <u>720.50</u>  | <u>720.50</u> | <u>720.50</u> | <u>720.50</u>      | <u>720.50</u>     | <u>720.50</u>        | <u>720.50</u>      | <u>720.50</u>    |
| <u>+ Freight</u>                                | <u>50.00</u>  | <u>186.00</u> | <u>117.25</u>  | <u>81.00</u>  | <u>33.00</u>  | <u>51.00</u>       | <u>187.00</u>     | <u>118.25</u>        | <u>82.00</u>       | <u>36.77</u>     |
| <u>C &amp; F</u>                                | <u>770.50</u> | <u>906.50</u> | <u>837.75</u>  | <u>801.50</u> | <u>753.50</u> | <u>771.50</u>      | <u>907.50</u>     | <u>838.75</u>        | <u>802.50</u>      | <u>757.27</u>    |
| <u>C. Other Expenses</u>                        | <u>24.50</u>  | <u>24.50</u>  | <u>24.50</u>   | <u>24.50</u>  | <u>24.50</u>  | <u>24.50</u>       | <u>24.50</u>      | <u>24.50</u>         | <u>24.50</u>       | <u>24.50</u>     |
| Arrastre  | 6.50          | 6.50          | 6.50           | 6.50          | 6.50          | 6.50               | 6.50              | 6.50                 | 6.50               | 6.50             |
| Trucking cost to warehouse                      | 12.00         | 12.00         | 12.00          | 12.00         | 12.00         | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Handling-in (2 movements)<br>at P0.10/movement  | 4.00          | 4.00          | 4.00           | 4.00          | 4.00          | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Port Operations                                 | 2.00          | 2.00          | 2.00           | 2.00          | 2.00          | 2.00               | 2.00              | 2.00                 | 2.00               | 2.00             |
| <u>Total Cost</u>                               | <u>795.00</u> | <u>931.00</u> | <u>862.25</u>  | <u>826.00</u> | <u>778.00</u> | <u>796.00</u>      | <u>932.00</u>     | <u>863.25</u>        | <u>827.00</u>      | <u>781.77</u>    |
| <u>Cost Per Mile</u>                            | <u>0.80</u>   | <u>0.93</u>   | <u>0.86</u>    | <u>0.83</u>   | <u>0.78</u>   | <u>0.80</u>        | <u>0.93</u>       | <u>0.86</u>          | <u>0.83</u>        | <u>0.78</u>      |

Appendix Table 42

Costing for Local Corn Procurement  
(Corn Grains)

|  | Cagayan de Oro<br>Manila | Cagayan de Oro<br>Albay | Cagayan de Oro<br>La Union | Cagayan de Oro<br>Bataan | Cagayan de Oro<br>Cebu | Cotabato<br>Manila | Cotabato<br>Albay | Cotabato<br>La Union | Cotabato<br>Bataan | Cotabato<br>Cebu |
|--|--------------------------|-------------------------|----------------------------|--------------------------|------------------------|--------------------|-------------------|----------------------|--------------------|------------------|
| <u>Total Cost Ex-Warehouse</u>           | <u>698.00</u>            | <u>698.00</u>           | <u>698.00</u>              | <u>698.00</u>            | <u>698.00</u>          | <u>698.00</u>      | <u>698.00</u>     | <u>698.00</u>        | <u>698.00</u>      | <u>698.00</u>    |
| <u>Total Cost Ex-Mill (66% recovery)</u> | <u>1,057.58</u>          | <u>1,057.58</u>         | <u>1,057.58</u>            | <u>1,057.58</u>          | <u>1,057.58</u>        | <u>1,057.58</u>    | <u>1,057.58</u>   | <u>1,057.58</u>      | <u>1,057.58</u>    | <u>1,057.58</u>  |
| <u>Milling Expenses</u>                  | <u>22.00</u>             | <u>22.00</u>            | <u>22.00</u>               | <u>22.00</u>             | <u>22.00</u>           | <u>22.00</u>       | <u>22.00</u>      | <u>22.00</u>         | <u>22.00</u>       | <u>22.00</u>     |
| Trucking Expenses to Mill                | 12.00                    | 12.00                   | 12.00                      | 12.00                    | 12.00                  | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Handling (5 movements) P0.10             | 10.00                    | 10.00                   | 10.00                      | 10.00                    | 10.00                  | 10.00              | 10.00             | 10.00                | 10.00              | 10.00            |
| <u>Total Cost Before Dispersal</u>       | <u>1,079.58</u>          | <u>1,079.58</u>         | <u>1,079.58</u>            | <u>1,079.58</u>          | <u>1,079.58</u>        | <u>1,079.58</u>    | <u>1,079.58</u>   | <u>1,079.58</u>      | <u>1,079.58</u>    | <u>1,079.58</u>  |
| <u>Shipping Expenses</u>                 | <u>22.50</u>             | <u>22.50</u>            | <u>22.50</u>               | <u>22.50</u>             | <u>22.50</u>           | <u>22.50</u>       | <u>22.50</u>      | <u>22.50</u>         | <u>22.50</u>       | <u>22.50</u>     |
| Handling-out (2 movements)<br>P0.10      | 4.00                     | 4.00                    | 4.00                       | 4.00                     | 4.00                   | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Trucking (mill to pier)                  | 12.00                    | 12.00                   | 12.00                      | 12.00                    | 12.00                  | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Arrastre                                 | 6.50                     | 6.50                    | 6.50                       | 6.50                     | 6.50                   | 6.50               | 6.50              | 6.50                 | 6.50               | 6.50             |
| <u>FCB Cost</u>                          | <u>1,102.08</u>          | <u>1,102.08</u>         | <u>1,102.08</u>            | <u>1,102.08</u>          | <u>1,102.08</u>        | <u>1,102.08</u>    | <u>1,102.08</u>   | <u>1,102.08</u>      | <u>1,102.08</u>    | <u>1,102.08</u>  |
| <u>Freight</u>                           | <u>34.90</u>             | <u>170.90</u>           | <u>102.15</u>              | <u>65.90</u>             | <u>15.40</u>           | <u>47.89</u>       | <u>183.89</u>     | <u>115.14</u>        | <u>78.85</u>       | <u>31.97</u>     |
| <u>C &amp; F</u>                         | <u>1,136.98</u>          | <u>1,272.98</u>         | <u>1,204.23</u>            | <u>1,167.98</u>          | <u>1,117.48</u>        | <u>1,149.97</u>    | <u>1,285.97</u>   | <u>1,217.22</u>      | <u>1,180.91</u>    | <u>1,134.05</u>  |
| <u>Other Expenses</u>                    | <u>24.50</u>             | <u>24.50</u>            | <u>24.50</u>               | <u>24.50</u>             | <u>24.50</u>           | <u>24.50</u>       | <u>24.50</u>      | <u>24.50</u>         | <u>24.50</u>       | <u>24.50</u>     |
| Arrastre                                 | 6.50                     | 6.50                    | 6.50                       | 6.50                     | 6.50                   | 6.50               | 6.50              | 6.50                 | 6.50               | 6.50             |
| Trucking cost to warehouse               | 12.00                    | 12.00                   | 12.00                      | 12.00                    | 12.00                  | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Handling-in (2 movements)<br>at P0.10    | 4.00                     | 4.00                    | 4.00                       | 4.00                     | 4.00                   | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Port Operations                          | 2.00                     | 2.00                    | 2.00                       | 2.00                     | 2.00                   | 2.00               | 2.00              | 2.00                 | 2.00               | 2.00             |
| <u>Total Cost</u>                        | <u>1,161.48</u>          | <u>1,297.48</u>         | <u>1,228.73</u>            | <u>1,192.48</u>          | <u>1,141.98</u>        | <u>1,174.47</u>    | <u>1,310.47</u>   | <u>1,241.72</u>      | <u>1,205.47</u>    | <u>1,158.55</u>  |
| <u>Other Expenses</u>                    | <u>20.99</u>             | <u>20.99</u>            | <u>20.99</u>               | <u>20.99</u>             | <u>20.99</u>           | <u>20.99</u>       | <u>20.99</u>      | <u>20.99</u>         | <u>20.99</u>       | <u>20.99</u>     |
| Interest charges 6.94%/a<br>for 3 months | 10.76                    | 10.76                   | 10.76                      | 10.76                    | 10.76                  | 10.76              | 10.76             | 10.76                | 10.76              | 10.76            |
| Stock insurance 2.59%                    | 4.03                     | 4.03                    | 4.03                       | 4.03                     | 4.03                   | 4.03               | 4.03              | 4.03                 | 4.03               | 4.03             |
| Tolerable spillage<br>allowance          | 1.55                     | 1.55                    | 1.55                       | 1.55                     | 1.55                   | 1.55               | 1.55              | 1.55                 | 1.55               | 1.55             |
| Agent bank commission at 3%              | 4.65                     | 4.65                    | 4.65                       | 4.65                     | 4.65                   | 4.65               | 4.65              | 4.65                 | 4.65               | 4.65             |
| <u>Distribution Expenses</u>             | <u>20.00</u>             | <u>20.00</u>            | <u>20.00</u>               | <u>20.00</u>             | <u>20.00</u>           | <u>20.00</u>       | <u>20.00</u>      | <u>20.00</u>         | <u>20.00</u>       | <u>20.00</u>     |
| Handling (3 movements) P0.10             | 6.00                     | 6.00                    | 6.00                       | 6.00                     | 6.00                   | 6.00               | 6.00              | 6.00                 | 6.00               | 6.00             |
| Trucking cost                            | 12.00                    | 12.00                   | 12.00                      | 12.00                    | 12.00                  | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Delivery and labor                       | 2.00                     | 2.00                    | 2.00                       | 2.00                     | 2.00                   | 2.00               | 2.00              | 2.00                 | 2.00               | 2.00             |
| <u>Total Cost</u>                        | <u>1,202.47</u>          | <u>1,338.47</u>         | <u>1,269.72</u>            | <u>1,233.47</u>          | <u>1,182.97</u>        | <u>1,215.46</u>    | <u>1,341.46</u>   | <u>1,282.71</u>      | <u>1,246.46</u>    | <u>1,199.54</u>  |
| <u>Add: Contingency of 2%</u>            | <u>24.05</u>             | <u>26.77</u>            | <u>25.39</u>               | <u>24.67</u>             | <u>23.66</u>           | <u>24.51</u>       | <u>27.03</u>      | <u>25.65</u>         | <u>24.93</u>       | <u>23.99</u>     |
| <u>Cost After Contingency</u>            | <u>1,226.52</u>          | <u>1,365.24</u>         | <u>1,295.11</u>            | <u>1,258.14</u>          | <u>1,206.63</u>        | <u>1,239.77</u>    | <u>1,378.49</u>   | <u>1,308.36</u>      | <u>1,271.39</u>    | <u>1,223.53</u>  |
| <u>Cost Per Kilo</u>                     | <u>1.23</u>              | <u>1.37</u>             | <u>1.30</u>                | <u>1.26</u>              | <u>1.21</u>            | <u>1.24</u>        | <u>1.38</u>       | <u>1.31</u>          | <u>1.27</u>        | <u>1.22</u>      |
| <u>Selling Price of Corn</u>             | <u>1.20</u>              | <u>1.20</u>             | <u>1.20</u>                | <u>1.20</u>              | <u>1.20</u>            | <u>1.20</u>        | <u>1.20</u>       | <u>1.20</u>          | <u>1.20</u>        | <u>1.20</u>      |
| <u>Subsidy</u>                           | <u>0.03</u>              | <u>0.17</u>             | <u>0.10</u>                | <u>0.06</u>              | <u>0.01</u>            | <u>0.04</u>        | <u>0.18</u>       | <u>0.11</u>          | <u>0.08</u>        | <u>0.02</u>      |

Appendix Table 42 (continued)

|  | Davao-Manila    | Davao-Albay     | Davao-La Union  | Davao-Bataan    | Davao-Cebu      | Gen. Santos-Manila | Gen. Santos-Albay | Gen. Santos-La Union | Gen. Santos-Bataan | Gen. Santos-Cebu |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------|-------------------|----------------------|--------------------|------------------|
| <u>Total Cost-Ex-Warehouse</u>           | <u>698.00</u>   | <u>698.00</u>   | <u>698.00</u>   | <u>698.00</u>   | <u>698.00</u>   | <u>698.00</u>      | <u>698.00</u>     | <u>698.00</u>        | <u>698.00</u>      | <u>698.00</u>    |
| <u>Total Cost Ex-Mill (66% recovery)</u> | <u>1,057.58</u> | <u>1,057.58</u> | <u>1,057.58</u> | <u>1,057.58</u> | <u>1,057.58</u> | <u>1,057.58</u>    | <u>1,057.58</u>   | <u>1,057.58</u>      | <u>1,057.58</u>    | <u>1,057.58</u>  |
| <u>Milling Expenses</u>                  | <u>22.00</u>    | <u>22.00</u>    | <u>22.00</u>    | <u>22.00</u>    | <u>22.00</u>    | <u>22.00</u>       | <u>22.00</u>      | <u>22.00</u>         | <u>22.00</u>       | <u>22.00</u>     |
| Trucking                                 | 12.00           | 12.00           | 12.00           | 12.00           | 12.00           | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Handling (5 movements)                   |                 |                 |                 |                 |                 |                    |                   |                      |                    |                  |
| 70.10/movement                           | 10.00           | 10.00           | 10.00           | 10.00           | 10.00           | 10.00              | 10.00             | 10.00                | 10.00              | 10.00            |
| <u>Total Cost Before Dispersal</u>       | <u>1,079.58</u> | <u>1,079.58</u> | <u>1,079.58</u> | <u>1,079.58</u> | <u>1,079.58</u> | <u>1,079.58</u>    | <u>1,079.58</u>   | <u>1,079.58</u>      | <u>1,079.58</u>    | <u>1,079.58</u>  |
| <u>Shipping Expenses</u>                 | <u>22.50</u>    | <u>22.50</u>    | <u>22.50</u>    | <u>22.50</u>    | <u>22.50</u>    | <u>22.50</u>       | <u>22.50</u>      | <u>22.50</u>         | <u>22.50</u>       | <u>22.50</u>     |
| Handling-out (2 movements)               | 4.00            | 4.00            | 4.00            | 4.00            | 4.00            | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Trucking (mill to pier)                  | 12.00           | 12.00           | 12.00           | 12.00           | 12.00           | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Arrastre                                 | 6.50            | 6.50            | 6.50            | 6.50            | 6.50            | 6.50               | 6.50              | 6.50                 | 6.50               | 6.50             |
| <u>FOB Cost</u>                          | <u>1,102.08</u> | <u>1,102.08</u> | <u>1,102.08</u> | <u>1,102.08</u> | <u>1,102.08</u> | <u>1,102.08</u>    | <u>1,102.08</u>   | <u>1,102.08</u>      | <u>1,102.08</u>    | <u>1,102.08</u>  |
| <u>Freights</u>                          | <u>50.00</u>    | <u>186.00</u>   | <u>117.25</u>   | <u>81.00</u>    | <u>33.00</u>    | <u>51.00</u>       | <u>187.00</u>     | <u>118.25</u>        | <u>82.00</u>       | <u>36.77</u>     |
| <u>C &amp; F</u>                         | <u>1,152.08</u> | <u>1,288.08</u> | <u>1,219.33</u> | <u>1,183.08</u> | <u>1,135.08</u> | <u>1,153.08</u>    | <u>1,289.08</u>   | <u>1,220.33</u>      | <u>1,184.08</u>    | <u>1,138.85</u>  |
| <u>Other Expenses</u>                    | <u>24.50</u>    | <u>24.50</u>    | <u>24.50</u>    | <u>24.50</u>    | <u>24.50</u>    | <u>24.50</u>       | <u>24.50</u>      | <u>24.50</u>         | <u>24.50</u>       | <u>24.50</u>     |
| Arrastre                                 | 6.50            | 6.50            | 6.50            | 6.50            | 6.50            | 6.50               | 6.50              | 6.50                 | 6.50               | 6.50             |
| Trucking cost to warehouse               | 12.00           | 12.00           | 12.00           | 12.00           | 12.00           | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Handling-in (2 movements)                | 4.00            | 4.00            | 4.00            | 4.00            | 4.00            | 4.00               | 4.00              | 4.00                 | 4.00               | 4.00             |
| Port operations                          | 2.00            | 2.00            | 2.00            | 2.00            | 2.00            | 2.00               | 2.00              | 2.00                 | 2.00               | 2.00             |
| <u>Total Cost</u>                        | <u>1,176.58</u> | <u>1,312.58</u> | <u>1,243.83</u> | <u>1,207.58</u> | <u>1,159.58</u> | <u>1,177.58</u>    | <u>1,313.58</u>   | <u>1,244.83</u>      | <u>1,209.30</u>    | <u>1,163.35</u>  |
| <u>Other Expenses</u>                    | <u>20.99</u>    | <u>20.99</u>    | <u>20.99</u>    | <u>20.99</u>    | <u>20.99</u>    | <u>20.99</u>       | <u>20.99</u>      | <u>20.99</u>         | <u>20.99</u>       | <u>20.99</u>     |
| Interest charges 6.94%/a<br>for 3 months | 10.76           | 10.76           | 10.76           | 10.76           | 10.76           | 10.76              | 10.76             | 10.76                | 10.76              | 10.76            |
| Stock insurance 2.59%                    | 4.03            | 4.03            | 4.03            | 4.03            | 4.03            | 4.03               | 4.03              | 4.03                 | 4.03               | 4.03             |
| Tolerable spillage<br>allowance          | 1.55            | 1.55            | 1.55            | 1.55            | 1.55            | 1.55               | 1.55              | 1.55                 | 1.55               | 1.55             |
| Agent banks commission<br>at 3%          | 4.65            | 4.65            | 4.65            | 4.65            | 4.65            | 4.65               | 4.65              | 4.65                 | 4.65               | 4.65             |
| <u>Distribution Expenses</u>             | <u>20.00</u>    | <u>20.00</u>    | <u>20.00</u>    | <u>20.00</u>    | <u>20.00</u>    | <u>20.00</u>       | <u>20.00</u>      | <u>20.00</u>         | <u>20.00</u>       | <u>20.00</u>     |
| Handling (3 movements)                   | 6.00            | 6.00            | 6.00            | 6.00            | 6.00            | 6.00               | 6.00              | 6.00                 | 6.00               | 6.00             |
| Trucking cost                            | 12.00           | 12.00           | 12.00           | 12.00           | 12.00           | 12.00              | 12.00             | 12.00                | 12.00              | 12.00            |
| Delivery and Labor                       | 2.00            | 2.00            | 2.00            | 2.00            | 2.00            | 2.00               | 2.00              | 2.00                 | 2.00               | 2.00             |
| <u>Total Cost</u>                        | <u>1,217.59</u> | <u>1,353.57</u> | <u>1,284.82</u> | <u>1,248.57</u> | <u>1,200.57</u> | <u>1,218.57</u>    | <u>1,354.57</u>   | <u>1,285.82</u>      | <u>1,250.29</u>    | <u>1,204.34</u>  |
| Add: Contingency of 2%                   | 24.35           | 27.07           | 25.70           | 24.97           | 24.01           | 24.37              | 27.09             | 25.72                | 25.01              | 24.09            |
| <u>Cost After Contingency</u>            | <u>1,241.92</u> | <u>1,380.64</u> | <u>1,310.52</u> | <u>1,273.54</u> | <u>1,224.58</u> | <u>1,242.94</u>    | <u>1,381.66</u>   | <u>1,311.54</u>      | <u>1,275.30</u>    | <u>1,228.43</u>  |
| <u>Cost Per Mile</u>                     | <u>1.24</u>     | <u>1.38</u>     | <u>1.31</u>     | <u>1.27</u>     | <u>1.22</u>     | <u>1.24</u>        | <u>1.38</u>       | <u>1.31</u>          | <u>1.28</u>        | <u>1.28</u>      |
| <u>Selling Price of Corn</u>             | <u>1.20</u>     | <u>1.20</u>     | <u>1.20</u>     | <u>1.20</u>     | <u>1.20</u>     | <u>1.20</u>        | <u>1.20</u>       | <u>1.20</u>          | <u>1.20</u>        | <u>1.20</u>      |
| <u>Subsidy</u>                           | <u>0.04</u>     | <u>0.18</u>     | <u>0.11</u>     | <u>0.07</u>     | <u>0.02</u>     | <u>0.04</u>        | <u>0.18</u>       | <u>0.11</u>          | <u>0.08</u>        | <u>0.03</u>      |

CHAPTER VIII. CONSUMPTION, UTILIZATION AND THE  
NUTRITION DIMENSION



CHAPTER VIII. CONSUMPTION, UTILIZATION AND THE  
NUTRITION DIMENSION

A. Trends in Corn Consumption and Utilization

Corn is an important crop as human food, animal feed and as a raw material for processing industries. In 1972, about 81.2% of the total available supply was used directly for human consumption, 13.8% for livestock and poultry feeds, 3.14% for industrial processes, 1.8% for seed stock, and 0.05% as wastage.

Table 22 presents the total utilization of corn and the breakdown of its uses over the past years.

B. Consumption of Corn as Human Food

As human food, corn is eaten either as corn grits, green corn, canned sweet corn, corn flakes, popcorn, crackers, cakes or bread. However, in spite of corn's versatility as human food, most Filipinos do not consider it as a main part of their diet.

The proportion of regional population eating corn in the Philippines for the years 1960, 1968 and 1973 is shown in Table 23.

In the Philippines, corn ranks second to rice in importance. About 21% of the entire population eat corn as a staple cereal. The highest corn consumers are those from Central Visayas which consume an average of 88.2 kilos/capita/year. In 1972, total food consumption of corn amounted to 1,689,003 MT. Corn consumption as food has been increasing at the rate of 7.0% per annum on the average,

due mainly to population growth. It should be noted, however, that this is not necessarily inconsistent with the common observation that the proportion of the total population eating corn is decreasing.

Table 22  
Corn Utilization  
(MT)

| Year             | Total Utilization | Food       | Animal Feed | Manufacturing | Seed    | Waste  |
|------------------|-------------------|------------|-------------|---------------|---------|--------|
| 1961             | 1,231,759         | 809,823    | 332,614     | 55,598        | 32,981  | 743    |
| 1962             | 1,269,589         | 1,015,285  | 179,962     | 41,478        | 32,202  | 762    |
| 1963             | 1,289,855         | 1,039,101  | 175,409     | 43,337        | 31,238  | 770    |
| 1964             | 1,309,498         | 1,054,941  | 178,751     | 44,000        | 31,921  | 785    |
| 1965             | 1,352,068         | 1,084,297  | 188,476     | 45,773        | 32,714  | 808    |
| 1966             | 1,409,698         | 1,129,268  | 197,036     | 47,852        | 34,696  | 844    |
| 1967             | 1,530,060         | 1,234,960  | 207,358     | 50,358        | 36,510  | 874    |
| 1968             | 1,678,703         | 1,332,742  | 251,399     | 56,984        | 36,572  | 1,006  |
| 1969             | 1,898,687         | 1,515,422  | 280,578     | 63,598        | 37,967  | 1,122  |
| 1970             | 2,007,679         | 1,598,199  | 300,985     | 68,223        | 39,068  | 1,204  |
| 1971             | 2,077,182         | 1,664,035  | 303,362     | 68,762        | 39,810  | 1,213  |
| 1972             | 2,080,083         | 1,689,003  | 287,935     | 65,265        | 37,765  | 1,115  |
| 1973             | 1,928,000*        | 1,555,000* | 274,000*    | 62,000*       | 36,000* | 1,000* |
| 1974             | 2,388,000*        | 1,926,000* | 339,000*    | 77,000*       | 45,000* | 1,000* |
| Rate of Increase | 4.82%             | 7.0%       | 0.36*       | 1.91%         | 1.27%   | 3.73%  |

\*Preliminary estimates

Source: "Food Balance Sheet of the Philippines," Statistical Reporter, National Economic Council, 1961-1972

Figure D

Comparative Trends in Corn Utilization

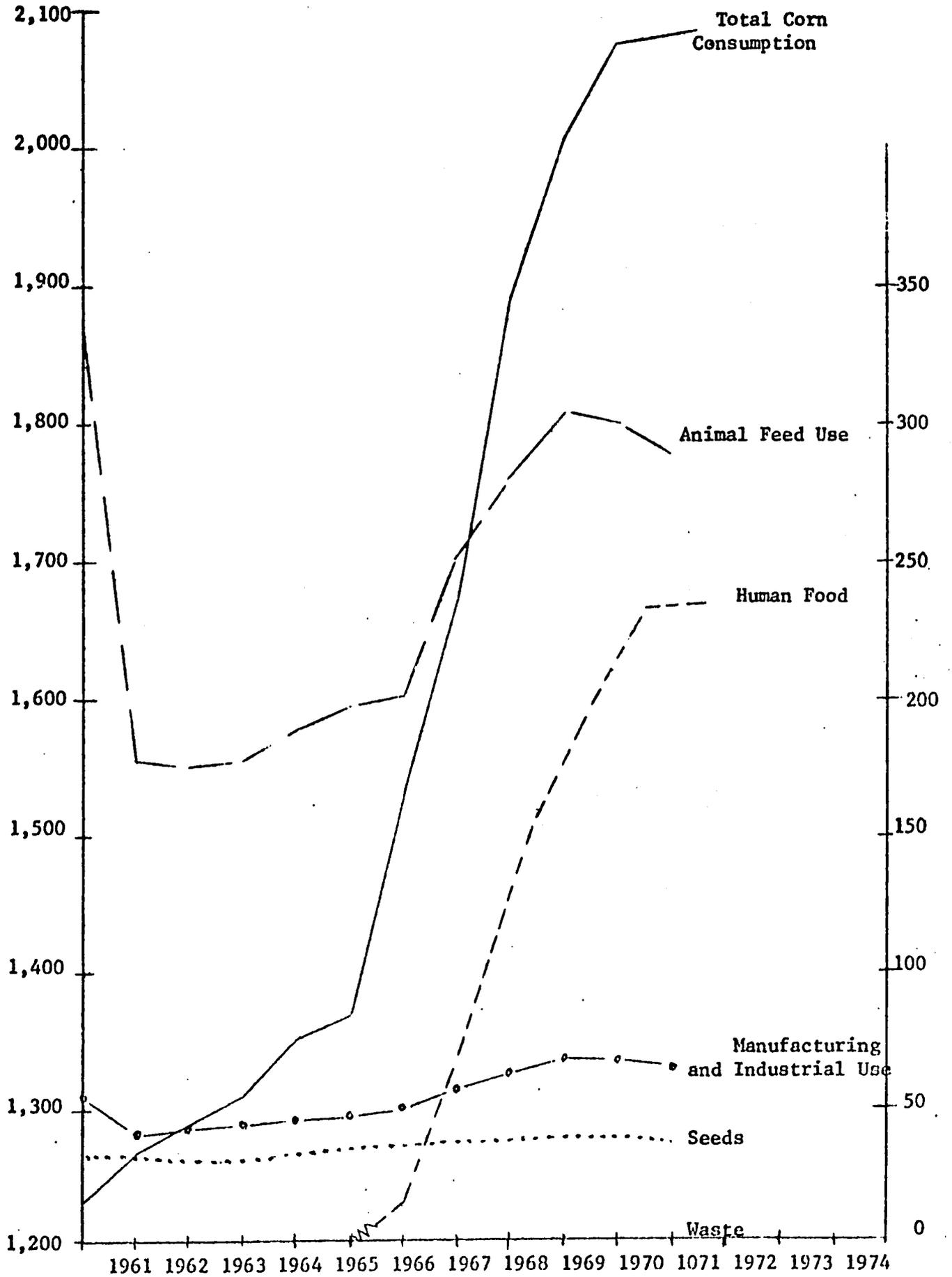


Table 23  
Proportion of Regional Population Eating Corn  
Philippines, 1960, 1968 and 1973

| Region                        | 1960 | 1968<br>(In Percent) | 1973* |
|-------------------------------|------|----------------------|-------|
| Central Visayas               | n.a. | n.a.                 | 71.0  |
| Eastern Visayas               | 67.0 | 49.9                 | 30.0  |
| Northern and Eastern Mindanao | 42.9 | 29.4                 | 6.0   |
| Southern and Western Mindanao | 23.0 | 26.4                 | 25.5  |
| Western Visayas               | 12.5 | 24.1                 | 16.0  |
| Cagayan Valley                | 38.7 | 21.9                 | 22.0  |
| Bicol                         | 8.0  | 14.7                 | 22.0  |
| Others**                      | n.a. | 6.0                  | 5.5   |

\*NFAC Estimates

\*\*These include Central Luzon, Ilocos and Southern Tagalog regions.

Source: Project Cornelius: Cases and Notes on the Corn Industry in the Philippines

Bureau of the Census and Statistics, Philippine Statistical Survey on Census and Statistics, 1960

V. R. Carangal, Maize Production Conditions in the Philippines and Future Problems, a reprint from Proceedings of a Symposium on Tropical Agriculture Researches, September, 1968

### C. Corn as an Animal Feed Ingredient

Yellow corn varieties which contain high amounts of carotene, cryptoxanthin and xanthophyll are preferred to white corn in animal feeding because it promotes pigmentation in the egg yolk, breasts and legs of chicken. Consequently, the domestic demand for yellow corn for feed milling has almost always exceeded its production. Thus, feed processors have purchased more white corn.

Corn grain is generally fed to animals as ground corn or grit. Other forms include corn gluten meal, corn gluten feed, corn bran, and corn germ meal which are the by-products in the process of refining corn starch. The corn stalk can also be made into silage for cattle and swine corn feed.

The country's requirements for feed corn will continue to increase in view of the population growth rate and increasing per capita income. Likewise, the integrated operations of large feed millers and contract growing should also lead to higher corn consumption.

#### C.1 Corn and Substitutes in Animal Feeding

A good feed mixture would normally contain about 50% corn for poultry and 35% for swine. Whenever there is a corn shortage, livestock raisers substitute sorghum, soybean, rice bran and cassava for corn. Substitution becomes a necessity also when the price of corn increases.

Even though it is possible to substitute corn with sorghum to as high as 70% of the corn content in mixed feeds, most feed millers would rather not use sorghum.

#### D. Elasticity of Demand for Corn Vs. Rice and Other Cereal Products

##### D.1 Income elasticity

Income or earning capacity, food prices and food availability are some of the major economic factors which influence the amount, kind and pattern of food consumption. An increase in income usually

leads to an improvement in the quality and quantity of food consumed. The extent to which the purchasing behavior of consumers responds to a change in income is measured by their income elasticity of demand. The income elasticity of demand for rice and corn products has been estimated to be about 0.07, which means that a doubling of income would result in 7% more expenditure for rice and rice products. The income-quantity elasticity for corn and corn products has been calculated as -0.53. This indicates a substantial tendency to reduce corn purchases as income increases. This is probably because corn is considered as a "poor man's" staple food. For instance, even in a major corn consumption center, like Cebu, the upper middle and upper income groups eat rice. As such, the consumption of corn as a human food is strongly affected by changes in income and the price of rice. Shifts in consumption toward rice is therefore expected with higher incomes and lower price of rice.

Table 24 shows the income-quantity elasticity for various cereals.

In contrast to rice and corn, wheat products have a relatively high, positive income elasticity. This means that wheat products are substituted for corn and rice as income increases. In general, income elasticities of demand for all cereals are very low, hence, the demands for such goods are quite income inelastic.

Table 24

Income Elasticity: Selected Items, Average for 4 Surveys, Philippines

| Item                         | Income-<br>quantity<br>elasticity | Income-<br>expenditure<br>elasticity | Item                       | Income-<br>quantity<br>elasticity | Income-<br>expenditure<br>elasticity |
|------------------------------|-----------------------------------|--------------------------------------|----------------------------|-----------------------------------|--------------------------------------|
| Rice and rice products (all) | 0.07                              | 0.16                                 | Fresh, frozen fish (all)   | 0.26                              | 0.44                                 |
| Rice (all)                   | 0.06                              | 0.14                                 | First class (all)          | 0.51                              | 0.64                                 |
| Wagwag                       | 0.34                              | *                                    | Milkfish                   | 0.67                              | 0.72                                 |
| C-4                          | 0.20                              | *                                    | Mackerel                   | 0.49                              | 0.68                                 |
| IR-8                         | -0.56                             | *                                    | Mudfish                    | -0.17                             | -0.10                                |
| Rice noodles                 | 0.43                              | 0.53                                 | Second class (all)         | 0.02                              | 0.20                                 |
| Rice cakes                   | 0.22                              | 0.31                                 | Slipmouth                  | -0.27                             | -0.09                                |
|                              |                                   |                                      | Tilapia                    | 0.19                              | 0.25                                 |
| Corn and corn products (all) | -0.53                             | -0.50                                | Third class (all)          | -0.03                             | 0.12                                 |
| Corn grits                   | -0.56                             | -0.57                                | Round Sead                 | -0.38                             | -0.10                                |
| White corn                   | -0.62                             | -0.48                                | Bonito                     | 0.03                              | 0.17                                 |
| Green corn                   | 0.06                              | 0.31                                 | Dried, smoked fish (all)   | 0.08                              | 0.16                                 |
| Wheat products (all)         | 0.55                              | 0.63                                 | Crust. & Mollusks(all)     | 0.52                              | 0.82                                 |
| Pan de sal                   | 0.32                              | 0.32                                 | Shrimp                     | 0.70                              | 0.88                                 |
| Loaf bread                   | 0.91                              | 0.89                                 | Crabs                      | 0.61                              | 0.79                                 |
| Cookies                      | 0.56                              | 0.60                                 | Fresh fruit (all)          | 0.34                              | 0.44                                 |
| Wheat noodles                | 0.60                              | 0.74                                 | Bananas                    | 0.26                              | 0.42                                 |
| Wheat flour                  | 0.60                              | 0.69                                 | Mangoes                    | 0.50                              | 0.66                                 |
| Pork (all)                   | 0.73                              | 0.77                                 | Papayas                    | 0.34                              | 0.46                                 |
| Lean meat                    | 0.78                              | 0.80                                 | Pineapples                 | 0.48                              | 0.57                                 |
| Meat with fat                | 0.73                              | 0.77                                 | Fresh vegetables (all)     | 0.22                              | 0.41                                 |
| Meat with bone               | 0.40                              | 0.44                                 | Leafy, yellow (all)        | 0.27                              | 0.47                                 |
| Pork chops                   | 1.01                              | 0.02                                 | Cabbage                    | 0.65                              | 0.70                                 |
| Beef, carabeef (all)         | 0.70                              | 0.83                                 | Camote tops                | -0.02                             | 0.00                                 |
| Lean meat                    | 0.76                              | 0.83                                 | Kangkong                   | -0.07                             | 0.05                                 |
| Meat with bone               | 0.45                              | 0.65                                 | Pechay                     | 0.43                              | 0.54                                 |
| Tenderloin/sirloin           | 0.95                              | 1.01                                 | Fruit vegetable (all)      | 0.27                              | 0.38                                 |
| Processed meat (all)         | 0.93                              | 0.96                                 | Eggplant                   | 0.13                              | 0.21                                 |
| Corned beef/beef loaf        | 0.87                              | 0.93                                 | Tomatoes                   | 0.39                              | 0.51                                 |
| Langoniza/sausage            | 0.87                              | 0.91                                 | Squash                     | 0.22                              | 0.31                                 |
| Chicken                      | 0.57                              | 0.59                                 | Upo                        | 0.34                              | 0.49                                 |
| Live                         | 0.38                              | 0.35                                 | Legume vegetable (all)     | 0.35                              | 0.41                                 |
| Dressed                      | 0.86                              | 0.89                                 | Sitao                      | 0.30                              | 0.32                                 |
| Eggs, chicken                | 0.69                              | 0.68                                 | Mongo                      | 0.25                              | 0.29                                 |
| Dairy products (all)         | 0.68                              | 0.76                                 | Baguio beans               | 0.66                              | 0.76                                 |
| Evap. milk                   | 0.74                              | 0.74                                 | Roots, bulbs, tubers (all) | 0.05                              | 0.37                                 |
| Condensed milk               | 0.17                              | 0.16                                 | Sweet potatoes             | -0.26                             | -0.14                                |
| Cheese                       | 1.04                              | 1.03                                 | Onions                     | 0.38                              | 0.51                                 |
| Sugar: white                 | 0.54                              | 0.56                                 | Irish potatoes             | 0.79                              | 0.87                                 |
| brown                        | -0.47                             | -0.44                                | Garlic                     | 0.36                              | 0.48                                 |
| Salt                         | 0.09                              | 0.08                                 | Cooking oil                | 0.61                              | 0.51                                 |
|                              |                                   |                                      | Coffee                     | -0.17                             | 0.42                                 |
|                              |                                   |                                      | Cocoa                      | 0.65                              | 0.76                                 |

\*Not computed

Source: Darrah and Dosayla  
Average for four surveys each covering a 1 week period (October-November, 1970; May-June, 1971; August-September, 1972; February-March, 1973)

#### D.1 Price Elasticity of Demand for Corn and Income Expenditure Elasticities of Various Commodities

The price of commodities also determines consumer behavior. Generally, an increase in price would result in less purchases, while a decrease in price would bring about more purchases. but the degree of change varies widely among different products. The amount of change in quantity purchase as a result of an increase or decrease in price is measured by price elasticity.

For rice, the price elasticity of demand ranges from 0.3 to 0.5 which means that it is relatively inelastic.<sup>1/</sup> Likewise, corn is also price inelastic with an elasticity coefficient of -0.5<sup>2/</sup> Income and expenditure elasticities for corn products, IR-8, some fish varieties and some vegetables as camote and kangkong are inelastic. This indicates that as income increases, there is a notable decrease in the consumption of these products. Shifts to higher priced substitutes and better quality consumer products occur as income of families increase. (See Table 24 for income-quantity elasticity and income-expenditure elasticities.)

#### E. Nutritional Attributes of Corn Compared with Other Cereals

As a source of energy, corn contains about 128 and 188 calories for white and yellow corn, respectively. Protein is about 4.4% in

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<sup>1/</sup> Leon A. Mears, "Rice and Corn Statistics"

<sup>2/</sup> Renato C. Valencia, "An Industry Study on Corn and Sorghum as Feed Grains," November, 1970, p. 21.

white and 4.9% in yellow corn. Good corn should contain adequate levels of tryptophan and lysine. Fat and carbohydrate are usually higher in yellow than in white corn. However, the calcium and phosphorous content of white corn is higher. The nutritional advantage of yellow corn over white corn and other cereals is its carotene and cryptoxanthine content which are readily converted by the animal body into Vitamin A.

#### Corn Vs. Rice

Corn has only approximately one-half of the calories found in the same amount of rice. The protein content of white and enriched milled rice is 7.4% and 7.1%, respectively. However, rice protein is lower in quality than corn protein. Rice has a lower fat content but its carbohydrate content is twice that of corn. The calcium and phosphorous content of rice and corn are comparable, but the iron and niacin content of rice is relatively higher than corn. On the other hand, rice has lower riboflavin and thiamine content than corn.

#### Corn Vs. Sorghum

Sorghum has a higher protein, calorie, fat and carbohydrate content. Sorghum has a higher fiber and ash content which makes it less palatable. The calcium and phosphorous content of sorghum are 0.03% and 0.28%, respectively, which are higher compared to corn while the thiamine and riboflavin content of corn and sorghum are comparable. Vitamin A is also absent in sorghum.

### Corn Vs. Wheat

The protein content of the entire wheat grain is higher than corn. However, the quality of wheat protein is only slightly better than corn protein. Wheat protein has about 2.2% fat compared with 0.8% in white and 1.9% in yellow corn. Wheat has a higher carbohydrate and calorie content than corn. It is also low in calcium having only 0.04% while its phosphorous content of 0.39% is appreciably higher than corn. Wheat is also deficient in vitamin A but is a good source of thiamine. (See Appendix Table 10, Chapter II.)

### F. Trends and Projections in Corn Consumption

Cereal grains are the major sources of energy and protein for most Filipinos. Total cereal consumption averaged 144.3 kilos per capita per year from 1970 to 1973. Rice and rice products accounted for the bulk of cereals consumed, averaging nearly 104 kilos per capita per year. On the other hand, corn and corn products amounted to only 14.3% of the total consumption while wheat products only comprise 13.7%. Annual per capita corn and corn products consumption averaged about 21.0 kilos. Based on the NIST-NSDB daily recommended cereals intake, the Filipinos have been consuming too much of cereals.

Table 25 shows the average annual per capita consumption of cereals by region in the Philippines.

Table 26 presents the NIST-NSDB recommended daily cereal intake.

The actual daily per capita cereal consumption of 395 grams exceeded the recommended intake by 70 grams. Due to the high cereal intake, Filipino diet has been characterized by high carbohydrate, low protein, and low fat content. This has caused malnutrition among the children. Rice consumption alone satisfies the whole amount recommended for all cereals.

Corn consumption for human food increased as a result of the mid-1973 rice shortage. The government-enforced rice-corn mixtures seems to have changed the attitudes and tastes of most Filipinos towards corn. This, coupled with inflation that lowers the purchasing ability of the Filipinos, might lead to further substitution of rice with corn.

Table 25

Annual Per Capita Consumption of Cereals by Region<sup>3/</sup>

| Region                      | Number of Families | Rice & Rice Products<br>(Kilos per capita per year) | Corn & Corn Products | Wheat Products | Total |
|-----------------------------|--------------------|---|----------------------|----------------|-------|
| Northern Luzon              | 341                | 117.0   | 16.3                 | 19.4           | 152.7 |
| Central Luzon <sup>4/</sup> | 549                | 126.4   | 2.1                  | 27.6           | 156.1 |
| Southern Luzon              | 835                | 106.5   | 0.7                  | 21.1           | 128.3 |
| Bicol                       | 332                | 113.3   | 2.8                  | 21.5           | 137.6 |
| Eastern Visayas             | 297                | 110.1   | 25.6                 | 14.9           | 150.6 |
| Central Visayas             | 345                | 43.2  | 88.2                 | 16.0           | 147.4 |
| Western Visayas             | 464                | 113.3   | 18.2                 | 15.4           | 146.9 |

<sup>3/</sup> . Average for four surveys each covering a 1 week period (October–November, 1970; May–June, 1971; August–September, 1972; February–March, 1973)

<sup>4/</sup> Includes Greater Manila Area

|                               |       |       |      |      |       |
|-------------------------------|-------|-------|------|------|-------|
| Northern and Eastern Mindanao | 300   | 89.5  | 41.8 | 20.7 | 152.0 |
| Southern and Eastern Mindanao | 329   | 90.2  | 35.0 | 21.5 | 146.7 |
| Southern and Western Mindanao | 219   | 87.1  | 37.6 | 21.7 | 146.4 |
| Philippines                   | 4,011 | 103.8 | 20.7 | 19.7 | 144.3 |
| Grams/day/capita              |       | 284.4 | 56.7 | 54.0 | 395.0 |
| Percent                       |       | 72.0  | 14.3 | 13.7 | 100.0 |

Source: M. Z. V. de los Angeles, et al. "Regional Consumption Patterns for Major Foods," November, 1973

Table 26

Recommended Daily Cereal Intake

|                          | As Purchased (gm) | Equivalent Household Measure (cooked cup) <sup>5/</sup> |
|--------------------------|-------------------|---|
| Reference Man 25 years   | 430               | 6   |
| 30-49 years              | 420               | 5 3/4   |
| 50-69 "                  | 380               | 5 1/4   |
| 70 +                     | 290               | 4   |
| Reference Woman 25 years | 310               | 4 1/4   |
| 30-49 years              | 300               | 4   |
| 50-69 "                  | 265               | 3 1/2   |
| 70 +                     | 200               | 2 3/4   |
| Pregnant                 | 360               | 5   |
| Nursing                  | 430               | 6   |
| Infants: 6-12 months     | 100               | 2 1/2 (lugao)   |
| Children: 1 - 3 years    | 180               | 2 1/2   |
| 4 - 6 "                  | 240               | 3 1/3   |
| 7 - 9 "                  | 310               | 4 1/4   |

<sup>5/</sup> One cup cooked rice (175 gms) = 5 slices bread, about 17 gms each  
 = 5 pieces pan de sal, about 15 gms each  
 = 1 1/4 cups cooked corn meal, 250 gms.

|                  |     |       |
|------------------|-----|-------|
| 10 - 12 years    | 410 | 5 1/2 |
| Boys: 13 - 15 "  | 470 | 6 1/2 |
| 16 - 19 "        | 470 | 6 1/2 |
| Girls: 13 - 15 " | 380 | 5 1/4 |
| 16 - 19 "        | 350 | 4 3/4 |
| Gm Per Capita    | 325 | 4 1/2 |

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Source: Food and Nutrition Research Center

G. Food Consumption Pattern of Selected Cereals Relative to Income

A study undertaken by E. D. Dosayla and L. B. Darrah<sup>6/</sup> regarding the food consumption pattern of selected cereals relative to income showed that as income increased from the lowest to the highest income group the rate of consumption of rice and rice produce increased moderately about 13%; corn and corn products decreased sharply, 64%; wheat products increased sharply, 188%, Table 27.

Table 27

Cereals: Average Rates of Use, 4 Surveys, Philippines  
(October-November, 1970; May-June, 1971; August-September, 1972; February-March, 1973)

| Item                   | Per Capita Income Group              |            |              |               | All Families |
|------------------------|--------------------------------------|------------|--------------|---------------|--------------|
|                        | Less than ₱400                       | ₱400 - 799 | ₱800 - 1,499 | ₱1,500 & Over |              |
|                        | <u>Kilos Per 1,000 People Weekly</u> |            |              |               |              |
| Rice and rice products | 1,876.4                              | 1,995.3    | 2,097.0      | 2,122.1       | 1,997.0      |

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<sup>6/</sup> Instructor, Dept. of Agricultural Economics, UP in Los Baños, and Co-Project Leader, Marketing Research Institute, and Project Specialist in Agriculture, Ford Foundation, respectively.

|                        |         |         |         |         |         |
|------------------------|---------|---------|---------|---------|---------|
| Corn and corn products | 579.6   | 398.8   | 236.2   | 211.4   | 398.6   |
| Wheat products         | 229.1   | 367.7   | 475.2   | 659.6   | 379.0   |
| Total                  | 2,685.1 | 2,761.8 | 2,808.4 | 2,993.1 | 2,774.6 |

The rate of use of all cereals averaged approximately 2.8 kilos per capita each week; 2.0 kilos per week per person for rice and rice products or 72% of the total cereals used; 0.40 kilo per week per person for corn and corn products on 14% of the total and 0.38 kilo per week per person for wheat products or 14% of the total, Tables 28, 29 and 30.

Table 28

Rice and Rice Products: Average Rates of Use, 4 Surveys,  
Philippines (October-November, 1970; May-June, 1971;  
August-September, 1972; February-March, 1973)

| Item         | Per Capita Income Group              |          |            |               | All Families |
|--------------|--------------------------------------|----------|------------|---------------|--------------|
|              | Less than ₱400                       | ₱400-799 | ₱800-1,499 | ₱1,500 & Over |              |
|              | <u>Kilos Per 1,000 People Weekly</u> |          |            |               |              |
| C-4          | 357.0                                | 449.8    | 524.8      | 510.7         | 438.8        |
| Wagwag       | 227.1                                | 293.1    | 388.3      | 422.8         | 311.0        |
| IR-8         | 153.6                                | 136.3    | 115.8      | 52.4          | 121.6        |
| BE-3         | 93.0                                 | 138.1    | 128.2      | 143.0         | 120.1        |
| IR-5         | 157.8                                | 87.4     | 65.7       | 67.8          | 105.3        |
| Intan        | 67.9                                 | 67.2     | 75.2       | 96.3          | 73.3         |
| IR-20        | 69.6                                 | 61.1     | 42.2       | 30.7          | 53.7         |
| BPI-76       | 11.5                                 | 13.9     | 15.8       | 14.4          | 13.4         |
| Other        | 687.2                                | 680.4    | 633.9      | 687.9         | 685.0        |
| Sub-total    | 1,824.7                              | 1,927.3  | 1,989.9    | 2,026.0       | 1,922.2      |
| Rice noodles | 27.8                                 | 39.6     | 59.1       | 60.9          | 43.0         |
| Rice cakes   | 23.9                                 | 28.4     | 48.0       | 35.2          | 31.8         |
| Total        | 1,876.4                              | 1,995.3  | 2,097.0    | 2,122.1       | 1,997.0      |

Table 29

Corn and Corn Products: Average Rates of Use, 4 Surveys,  
Philippines (October-November, 1970; May-June, 1971;  
August-September, 1972; February-March, 1973

| Item                 | Per Capita Income Group              |             |               |                  |                 |
|----------------------|--------------------------------------|-------------|---------------|------------------|-----------------|
|                      | Less than<br>₱400                    | ₱400<br>799 | ₱800<br>1,499 | ₱1,500<br>& Over | All<br>Families |
|                      | <u>Kilos Per 1,000 People Weekly</u> |             |               |                  |                 |
| Corn grits           | 521.8                                | 336.6       | 187.4         | 176.4            | 344.6           |
| White corn           | 36.4                                 | 39.5        | 23.9          | 10.7             | 30.8            |
| Green and sweet corn | 17.1                                 | 19.4        | 15.4          | 19.1             | 17.7            |
| Corn flour or meal   | 2.3                                  | 1.8         | 6.1           | 0.8              | 2.8             |
| Yellow cakes         | 2.0                                  | 1.5         | 3.4           | 4.4              | 2.7             |
| Total                | 579.6                                | 398.8       | 236.2         | 211.4            | 398.6           |

Table 30

Wheat Products: Average Rates of Use, 4 Surveys, Philippines,  
(October-November, 1970; May-June, 1971; August-  
September, 1972; February-March 1973)

| Item                | Per Capita Income Group              |             |               |                  |                 |
|---------------------|--------------------------------------|-------------|---------------|------------------|-----------------|
|                     | Less than<br>₱400                    | ₱400<br>799 | ₱800<br>1,499 | ₱1,500<br>& Over | All<br>Families |
|                     | <u>Kilos Per 1,000 People Weekly</u> |             |               |                  |                 |
| Pañ de sal          | 145.0                                | 208.2       | 228.5         | 260.3            | 192.9           |
| Loaf bread          | 22.0                                 | 55.6        | 109.8         | 191.7            | 76.0            |
| Cookies/crackers    | 21.6                                 | 34.7        | 45.0          | 62.7             | 36.5            |
| Wheat noodles       | 12.1                                 | 23.4        | 26.4          | 38.7             | 22.6            |
| Wheat flour         | 11.1                                 | 16.3        | 21.0          | 35.3             | 16.4            |
| Cakes and pies      | 1.7                                  | 5.2         | 13.6          | 32.4             | 9.7             |
| Rolls               | 5.0                                  | 9.2         | 10.8          | 10.1             | 8.1             |
| Stuffed baked bread | 7.3                                  | 8.7         | 12.2          | 18.8             | 10.5            |
| Lumpia wrappers     | 0.7                                  | 1.0         | 1.1           | 3.9              | 1.4             |
| Other               | 2.6                                  | 5.4         | 6.8           | 5.7              | 4.9             |
| Total               | 229.1                                | 367.7       | 475.2         | 659.6            | 379.0           |

It was also found out in the same study that corn and corn products represented 22% of the cereals used in the lowest income group and only 7% in the highest income group. Wheat products represented 8% of the cereals used in the lowest income group. Rice and rice products represented 70% of the cereals used in the lowest income group and 71% in the highest income group.

#### H. Trends in Corn Importation

Corn consumption and utilization from 1965 to 1972 increased faster than production. It should be noted that corn importations in the early 1960's were negligible and became significant only in recent years. It was only about 1965 when the local processors began to feel the effects of large deficits of corn. The deficits were largely due to the increase in feed consumption and the industrial use of corn, without any attendant increase in production.

##### 1. Rationale behind importations of corn

###### a) Typhoons and floods

Records of the Weather Bureau show that the Philippines registers the highest frequency of atmospheric depressions in the world with an average of 21 typhoons per year. In addition to this, from 1960 to 1970, the country suffered six drought spells, one of which was severe. The flood of 1972 destroyed a large portion of the country's food crops, reducing the GNP in 1972 by 8.1%.

From 1968 to 1971, the value of crop losses due to climate adversities amounted to some ₱1,072 billion. Of this total, losses on rice and corn crops ran up to ₱527.3 million or an average of ₱131.8 million per year. This represents about 50% of the total value of crop losses.

b) Lack of adequate inputs such as fertilizers and insecticides

The dependence of agriculture to fertilizers and insecticides and other chemical inputs have grown so much that because of the low purchasing abilities of most farmers in the Philippines, it has become difficult for them to obtain profitable yield levels.

Table 31

Corn Consumption by the Livestock Industry 1968-1973 <sup>7/</sup>

| Year | Consumption (in thousand metric tons) |        |                |           |
|------|---------------------------------------|--------|----------------|-----------|
|      | Poultry                               | Swine  | Cattle/Carabao | T o t a l |
| 1968 | 133.20                                | 70.42  | 5.74           | 209.36    |
| 1970 | 138.62                                | 113.79 | 6.03           | 255.44    |
| 1971 | 146.28                                | 128.81 | 6.24           | 281.33    |
| 1972 | 154.74                                | 146.43 | 6.46           | 307.63    |
| 1973 | 162.10                                | 166.43 | 6.70           | 335.23    |

Poultry raisers accounted for the highest consumption of corn, followed by the swine raisers, and only a small portion goes to the cattle raisers.

<sup>7/</sup> Bureau of Animal Industry

Livestock raisers prefer to use corn in their feed formulations rather than sorghum, rice bran and other substitutes. In fact, according to the BAI, most livestock raisers prefer corn even if the price of substitutes are lower. This could be attributed to corn's palatability and nutritional value.

## I. The Future Outlook

### I.1 On Human Consumption of Corn

The aggregate utilization of corn for feeds, seeds, industrial processes, and food has been increasing at the rate of 5.58% per annum. Based on this growth rate, the projections for 1975-1977 are summarized in Table 32.

Table 32

#### Project Corn Consumption, 1975-1977

| Year | Animal<br>Feed | Projected Consumption (mt) |            |       |           | T p t a l |
|------|----------------|----------------------------|------------|-------|-----------|-----------|
|      |                | Seed                       | Industrial | Waste | Food      |           |
| 1975 | 308,406        | 54,983                     | 75,432     | 1,360 | 1,793,599 | 2,233,780 |
| 1976 | 313,217        | 58,161                     | 77,492     | 1,402 | 1,843,102 | 2,293,374 |
| 1977 | 318,104        | 61,523                     | 79,607     | 1,446 | 1,893,972 | 2,354,652 |

Source: Bureau of Agricultural Economics

### I.2 Animal Industry Projections

Based on the consumption patterns of livestock raisers, projections have been made on their requirements, as shown in Table 33.

Table 33

Summary of Estimated Corn Requirements for Livestock and Poultry Feeds (million cavan of 50 kilos) 1975-1978

| Year | Corn Requirement for |                    | T o t a l |
|------|----------------------|--------------------|-----------|
|      | Mixed Feeds*         | Household Foods*** |           |
| 1975 | 7.97                 | 5.78               | 13.75     |
| 1976 | 8.19                 | 5.93               | 14.12     |
| 1977 | 8.69                 | 6.29               | 14.98     |
| 1978 | 9.19                 | 6.66               | 15.85     |

\*Includes farm mixed feeds based on BAE's feed formula  
\*\*Livestock and poultry

Source: Bureau of Animal Industry

J. The Nutrition Dimension

J.1 The Malnutrition Problem

In 1968, the Food and Nutrition Research Center (FNRC)<sup>8/</sup> completed a survey which showed the extent and seriousness of the malnutrition problem in the Philippines.

Diets of a high carbohydrate, low protein, and low fat mix prevail in all the regions of the country. The diet mix is characteristic in many LDC's where fast population expansion rates outstrip the pace of food production. Low levels of productivity, income and purchasing ability, and ignorance of the principles and value of proper nutrition are some of the causes of malnutrition. Due to the exploding population, the pressures on government efforts in agriculture have been primarily on food quantity and only secondarily on quality.

<sup>8/</sup> An agency under the National Science Development Board (NSDB)

The average Filipino diets is deficient in protein and energy. Although Filipinos eat enough staple cereals, they do not take adequate amounts of high energy-yielding foods such as beans, starchy roots, sugars and fats and oils, Table 34. The Filipino diet considerably lacks nutrients such as calcium, vitamin A, thiamine and riboflavin, Table 35. Staple cereals, mostly rice, were the main nutrient contributors in the diet. The deficiency in the diet have caused inadequate body energy for daily physical activities, poor work performance, and low productivity.

The protein intake, which is really inadequate, is diverted from its tissue-building and body repair functions to meet energy purposes due to the calorie deficiency. This protein utilization for energy purposes is wasteful especially for the infants, the children, and the adolescent groups. These groups need more protein for growth. Chronic protein deficiency from the ages of 0 to 6 have been found to result in irreversible physical and mental retardation which, in the long run, would make them less productive participants of the economy and the nation.

FNRC statistics indicate that about 80% of the 0-6 years population group of the Philippines suffer from varying degrees of malnutrition broken down as follows.

- a) 5% suffer from third-degree malnutrition (below standard weight by 40% or more)
- b) 30% suffer from second-degree malnutrition (below standard weight by 25% to 39%)

**Table 34**  
**Average Daily Per Capita Food Intakes Compared to**  
**Recommended Allowances in Nine (9) Regions**  
**of the Philippines, 1958-69**  
**(in grams)**

| <u>Food Group</u>                                | <u>Intake</u> | <u>Recommended Allowances</u> | <u>Intake as % of Recommended Allowances</u> |
|--|---------------|-------------------------------|--|
| <b>TOTAL</b>                                     | <u>657</u>    | <u>849</u>                    | <u>77.6%</u>                                 |
| Cereals  | 335           | 325                           | 103.1  |
| Starchy roots and tubers                         | 52            | 60                            | 87.7   |
| Sugar and syrups                                 | 18            | 28                            | 64.3   |
| Dried beans, nuts and seeds (excluding coconuts) | 7             | 16                            | 43.8   |
| Leafy and yellow vegetables                      | 18            | 55                            | 32.7   |
| Vitamin C rich foods                             | 23            | 55                            | 41.8   |
| Other fruits and vegetables                      | 92            | 90                            | 102.2  |
| Meat, poultry and fish                           | 76            | 87                            | 87.4   |
| Eggs   | 4             | 13                            | 30.8   |
| Milk and milk products                           | 24            | 90                            | 26.7   |
| Fats and oils (including fats from coconut)      | 8             | 30                            | 26.7   |

Source: Food and Nutrition Research Center (FNRC)

Table 35

Average Daily Per Capita Nutrient Intakes Compared to Recommended Allowances in Nine (9) Regions of the Philippines  
1958-1969

| Nutrients          | Intake | Recommended Allowances | Intake as % of Recommended Allowances |
|--------------------|--------|------------------------|---------------------------------------|
| Calories           | 1673   | 2006                   | 83.5%                                 |
| Protein (gm)       | 47     | 49.4                   | 95.1%                                 |
| Calcium (gm)       | 0.35   | 0.57                   | 61.5%                                 |
| Iron (gm)          | 9.73   | 10.00                  | 97.3                                  |
| Vitamin A (IU)     | 1886   | 4066                   | 46.4                                  |
| Thiamine (mg)      | 0.74   | 1.02                   | 72.6                                  |
| Riboflavin (mg)    | 0.49   | 1.02                   | 48.0                                  |
| Niacin (mg)        | 14     | 13                     | 107.7                                 |
| Ascorbic Acid (mg) | 66     | 69                     | 98.6                                  |

Source: Food and Nutrition Research Center (FNRC)

c) 45% suffer from first-degree malnutrition (below standard weight by 10% to 24%)

Poorly nourished children are also highly susceptible to infection, disease and death. Of the child population, 25 to 35% die before reaching the age of 5 years. This high mortality rate has a bearing on the success of family planning programs since there are many parents who tend to insure against high infant mortality by the frequency of conception.

The effects of malnutrition among infants are carried through childhood, adolescence and even adulthood. Among adolescents, malnutrition would trigger susceptibility to respiratory and gastro-intestinal infections. And among pregnant women, protein malnutrition appears to be related to complications of pregnancy and labor, premature delivery, and low birth weight of the baby.

## J.2 The Need for Concerted Action

Malnutrition is one of the more complex problems in the LDC's which have far reaching implications for the socio-economic development of a country. Since the problem is generated by many inter-related causes, concerted action in agriculture, health, education and other fields is needed to solve the problem.

### J.3 The Philippine Food and Nutrition Program

The overall national food program in the Philippines has incorporated an active nutrition program. Launched in 1971, the Philippine Food and Nutrition Program (PFNP) is an integrated program which grouped together the on-going projects and activities related to food and nutrition in the country.<sup>9/</sup> The responsibility for coordination of all nutrition activities was given to the National Food and Agriculture Council (NFAC). See Appendix 43.1 to 43.4 for program objectives policies and organizational structure.

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<sup>9/</sup> Appendix 43.2 shows the participating organizations in the PFNP.

### Appendix 43.1

#### NEAC Food and Nutrition Program

##### 1. Policy Objectives and Major Thrusts

The policy objectives of PFNP include increasing food production, promoting proper utilization of foodstuffs, stimulating income-generating activities to improve general family living conditions, intensifying food research, and establishing an organizational machinery for coordination of inter-disciplinary and intersectoral participation in nutrition activities.

The PFNP has five major thrusts, namely, nutrition training, nutrition education, supplementary feeding, food production in schools, homes and communities, and nutrition rehabilitation wards. Supportive thrusts involve nutrition communications, food and nutrition research, and income-generating activities.

Nutrition training is primarily designed to improve the competence of trainers in the program.

The objective of nutrition education is to promote appreciation of the value of proper nutrition in maintaining health.

The purpose of the supplementary feeding project is to protect the health of the young children, pregnant women and nursing mothers, and promote recovery of the severely malnourished through supplemental feeding.

The food production project involves the establishment of school, home and communal gardens, as well as the operations of seed banks and nurseries. Its aim is to augment food supply, improve the diet of the community and increase family income.

Nutrition rehabilitation wards are being established to rehabilitate and preserve the health of the nutritionally sick child through proper nutrition and health education.

The goal of nutrition mass communications is to facilitate the spread of information on correct food and nutrition towards increased awareness.

The intensified research thrust on food and nutrition aims at translating results obtained in terms of the production and distribution of newly developed food products which should preferably be low-cost and of high-protein content.

Finally, income-generating activities are being established to develop the vocational skills and creative potentials of Filipinos in the preservation of excess foodstuffs, handicrafts and other similar projects.

## 2. The Organizational Machinery

The government, through the NFAC, gives direction and coordination to the activities of PFNP. With many governmental and private agencies participating in the national program, the responsibilities for the tasks in the various sectoral thrusts have been assigned to those with implementation capabilities. It is however common for various agencies to cooperate and supplement each other's resources in task performance.

The organization chart and participants of PFNP is shown in Appendix 43.2 and 43.3.

In the organizational machinery, the important function of policy formulation is undertaken by a Nutrition Policy Council composed of the heads of participating government agencies .

The task of translating policies into action plans are then taken on by Nutrition Work Groups in the participating government agencies. These work groups also coordinate all food and nutrition activities in their respective agencies.

All the chairmen of the nutrition work groups of participating government agencies and representatives of private agencies from the Management Committee. This Committee outlines the common agreements on strategies and translates policies into guidelines for sectoral project implementation.

Meanwhile, the Interagency Action Group (INTACT) evaluates the progress of program implementation. This group, which is composed of representatives from participating agencies conducts periodic field visits and meets with program personnel to assess progress made in the provinces.

Coordinating the development and distribution of information materials is the Interdepartmental Committee on Nutrition Communications (ICNC) which is composed of representatives of agencies in nutrition information, education and communication.

At the barrio (village) level, work teams have been organized. These teams usually include a home management technician, a farm management technician, a rural health nurse or a midwife, a home economics teacher,

and an agriculture or practical arts teacher. The group's composition reflects the interdisciplinary approach in the national nutrition program.

### 3. Progress Indicators

In FY 1971-72, the PFNP started in 75 barrios of 11 priority provinces. The following year, the national program expanded to 138 barrios in 10 additional provinces. This has brought PFNP's coverage to 213 barrios in 21 provinces. Appendix 43.4 presents a list of provinces covered by PFNP.

Gradual expansion will involve ten additional provinces annually until 1977. It is expected that 51 provinces of the country shall have been brought them into the national program coverage.

So far, the progress of the national program as of FY 1972-73 is encouraging as shown by certain indicators, as follows.

- a) Over 16,000 administrators, supervisors and lay leaders on the national and provincial levels have undergone nutrition training
- b) In nutrition education, 196 Rural Improvement Clubs and 193 4-H Clubs with a total membership of over 11,000 homemakers and youths have been organized. Their activities include home gardening, poultry and livestock production, and pre-school supplementary feeding.

- c) In supplementary feeding, 737,000 pre-school children have been served. Locally produced foods augmented by donations from international organizations have been utilized.
- d) Hectarage of home, school and community gardens reached 135 in food production. Also, about 69,000 homemakers have pushed food production activities in the rural areas.
- e) Ten nutrition rehabilitation wards have been established in seven provincial hospitals. These wards have served some 1,130 children.

In the next few years, more substantive achievements are anticipated with the enthusiasm and sustained efforts of participating organizations in the national nutrition program.

Appendix 43.2

Participating Organizations in the Philippines  
Food and Nutrition Program

Government Organizations

National Food and Agriculture Council  
Department of Agriculture

Bureau of Agriculture Extension  
Bureau of Plant Industry  
Bureau of Animal Industry  
Bureau of Fisheries\*  
Bureau of Soils

Department of Education and Culture  
Department of Health  
Department of Local Government and Community Development  
Department of Social Welfare  
National Science Development Board

Food and Nutrition Research Center

Philippine National Red Cross  
Nutrition Foundation of the Philippines

Private Organizations

Catholic Relief Services  
National Council of Churches in the Philippines  
National Secretariat for Social Action  
Philippine Business for Social Progress  
Kilusan ng Wastong Pagkain sa Bagong Lipunan

Foreign and International Organizations

United Nations Agency for International Development  
United Nations International Children's Emergency Fund  
Food and Agriculture Organization  
World Health Organization  
Peace Corps  
Cooperative for American Relief Everywhere

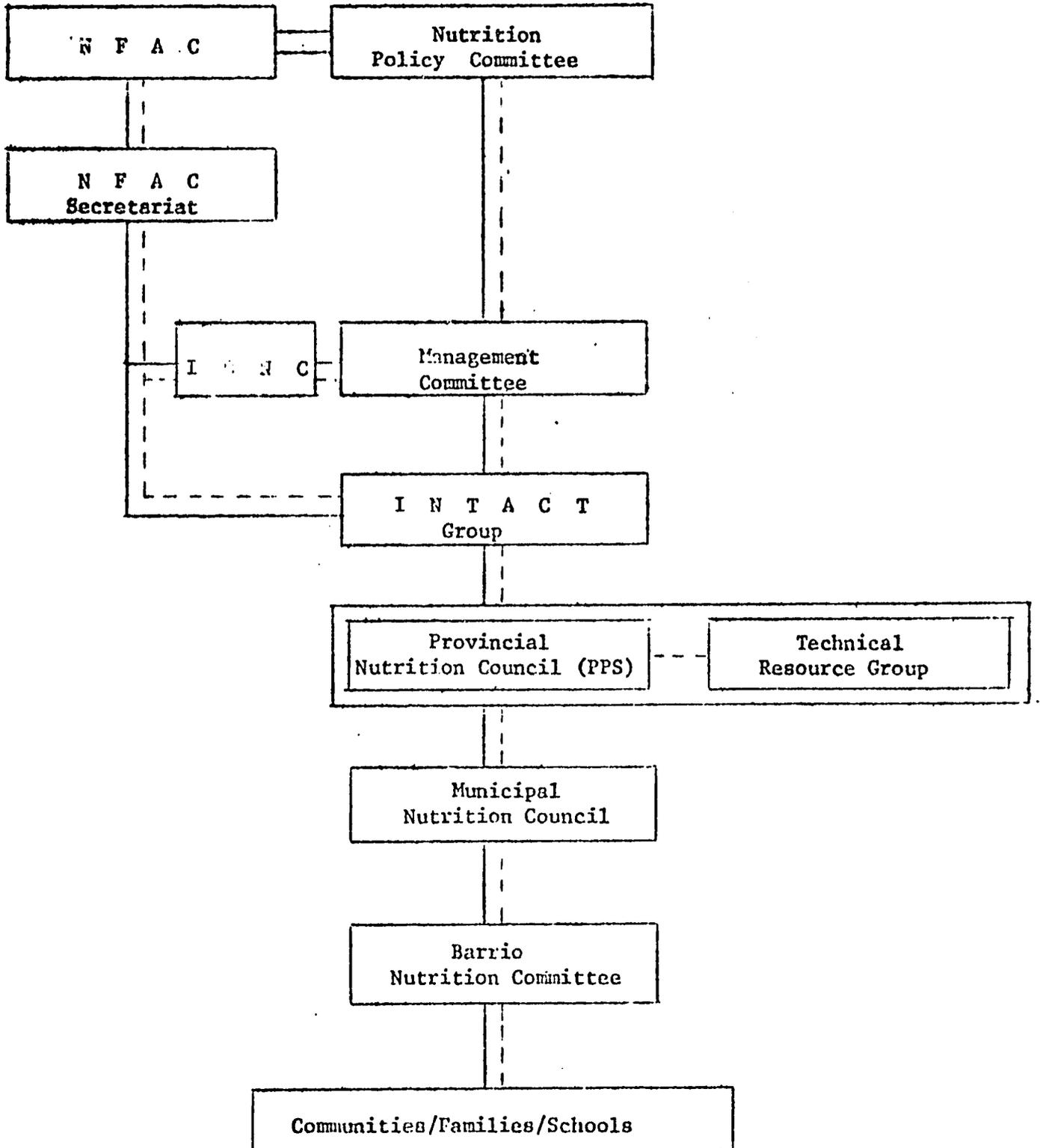
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\*Fisheries administratively belongs to the Department of Natural Resources

Appendix 43.3

Philippine Food and Nutrition Program

Organization Chart



Appendix 43.4

Provincial Coverage of the  
Philippine Food and Nutrition Program

FY 1971-72

Isabela  
Pangasinan  
Nueva Ecija  
Rizal  
Camarines Sur  
Cebu  
Iloilo  
Batangas  
Cotabato  
South Cotabato  
Davao del Norte

FY 1972-73 (Additional Provinces)

Ilocos Norte  
Nueva Vizcaya  
Zamboanga del Norte  
Zambales  
Laguna  
Albay  
Negros Occidental  
Leyte  
Bukidnon  
Misamis Oriental

CHAPTER IX. FACILITATIVE AND DEVELOPMENTAL COORDINATION:  
THE GOVERNMENT PROGRAMS



CHAPTER IX. FACILITATIVE AND DEVELOPMENTAL COORDINATION:  
THE GOVERNMENT PROGRAMS

Agriculture is the largest among the sectors of the Philippine economy. It accounts for one-third of GNP, one-half of total employment and two-thirds of export earnings.<sup>1/</sup> In view of the magnitude and importance of the agricultural sector, the government has given it primary attention in national development programs.

The policies governing agricultural development through the years, have followed a similar pattern in national development plans. The difference has been in the development strategies and implementation measures adopted. Over the post-war period, the areas stressed in agricultural development programs have included the following.<sup>2/</sup>

1. Production and productivity programs and the means to attain them
2. Development of agricultural credit and marketing systems
3. Land reform measures including social development measures
4. Infrastructural development
5. Administrative measures to facilitate effective program implementation

In spite of the emphasis on agriculture in the past, major problems which have become bottlenecks to national economic development

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<sup>1/</sup> Arturo R. Tanco Jr., "Agricultural Strategies for the Seventies," Accent, August-September, 1973, p. 9.

<sup>2/</sup> J. M. Lawas, "Philippines", Regional Seminar on Agriculture Paper and Proceedings, Asian Development Bank, April 1969, p. 202.

persist, among which are:

1. Uneven distribution of land and high tenancy rates
2. Low farm productivity and income
3. Untapped foreign markets for agricultural products
4. Alarming forest denudation

To resolve these problems, the current four- (77)  
development plan for agriculture has established the following  
major objectives.<sup>3/</sup>

- a) Acceleration of land transfer and distribution
- b) Self-sufficiency in food and food products
- c) Expansion of agricultural exports and production  
of import-substitute crops
- d) Conservation and development of forest resources

A. Acceleration of Land Transfer and Distribution

The acceleration of land transfer and distribution ranks high in the national development plan for agriculture. Presidential Decree No. 27 provides for the gradual transfer of rice and corn lands to tenants. The tenant-farmer shall be deemed owner of a family-size farm of five unirrigated hectares and three irrigated hectares. The landowner may retain an area of not more than seven hectares if he is cultivating such area or shall henceforth cultivate it.

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<sup>3/</sup> Four-Year Development Plan FY 1974-1977, National Economic Development Authority, p. 163.

Figure E shows the tenancy density by region for rice and corn.

The granting of land titles to tenant-farmers is subject to his membership in a duly recognized farmer's cooperative. Landowners, on the other hand, have been assured that the amortization on the value of the land will be paid by the cooperative. The government guarantees such amortizations with bonds and shares of stock in government-owned and government controlled corporations.

To support the land reform program, complementary infrastructure projects have been planned in the land reform areas.

Land transfer is implemented by the Bureau of Lands which identifies the tenant-farmers, farm holding and the landowners; collect data on production of the lands involved for the last three years; parcels mapping with the aid of aerial photographs; determines land values; and issues land transfer certificates.

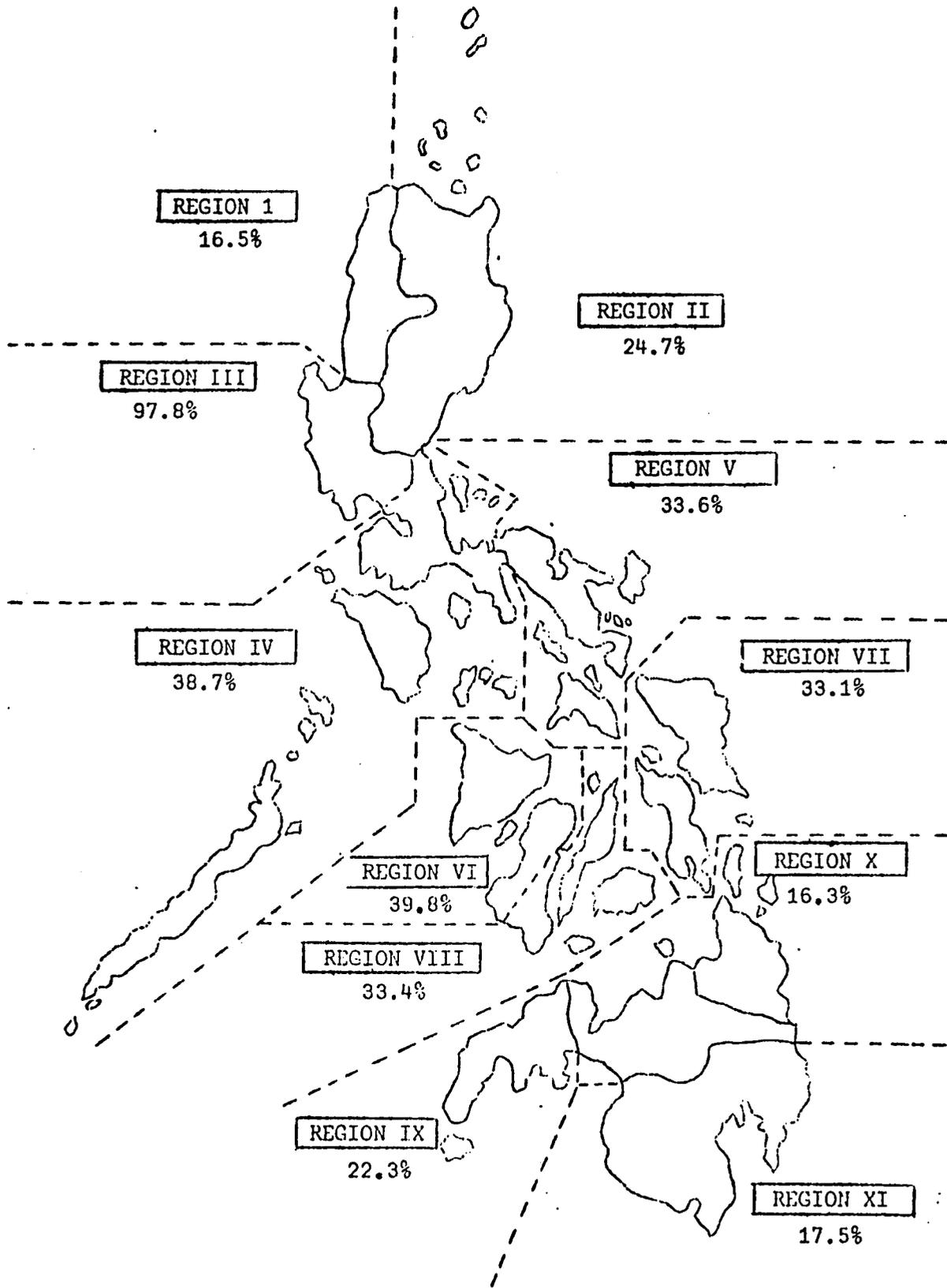
The massive land distribution program is particularly emphasized in Mindanao to ease or totally remove social disorders partly arising from land disputes.

## B. Food Self-Sufficiency Programs

### B.1 Grains Production

Self-sufficiency in grains production is gradually implemented through expansion of irrigated area, production technology, credit support, price support, marketing arrangements, and seed production and distribution.

Figure E  
TENANCY DENSITY BY REGION (Rice and Corn)



The importance of irrigation development has been recognized. For regular rice production, the target in FY 1974 was to irrigate 736,600 hectares, up to 1,094,500 hectares in FY 1977. For the dry season crop, the goal is to provide irrigation for 294,100 hectares in FY 1974 and 403,300 hectares by FY 1977.<sup>4/</sup>

To improve farm productivity, farmers are enjoined to adopt a package of production technology with the assistance of credit and farm management technicians through a massive, sustained educational campaign to extend the modern technologies to the farmers. In addition, credit support is extended through the various credit institution.

The price support and marketing arrangements are implemented through a tie-up between the NGA and authorized farmer-producers' cooperatives or private warehousemen-millers. Procurement of grains would be made through the "quedan system."<sup>5/</sup> In areas where the private sector may not be performing efficiently in procurement, the NGA would come in with its price support program.

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<sup>4/</sup> Four-Year Development Plan FY 1974-1977, National Economic Development Authority, p. 165.

<sup>5/</sup> Farmers store their grains in registered bonded warehouses and are given receipts for the volume and value of the grain stocks stored. The receipts may be used as collateral in securing loans or redeemed at designated banks and government grain institutions (Philippine National Bank, Rural Banks and National Grain Authority).

Limited quantities and high price of HYV seeds also limit grain production. The government intends to improve seed processing centers and launch an intensive campaign to produce foundation seeds; the production of certified seeds which the farmers sow. In addition, government assistance in seed technology will also be extended.

Specific goals and target growth rates have been set for grains production. For rice, the goal is to satisfy the consumption needs of the population by FY 1977. Concerning white corn and feedgrains, the projected annual growth rates are 1.8%, white corn; 1.1%, yellow corn; 32.9%, sorghum and 2.9%, soybeans.

Table 36 shows the production targets and total requirements for rice, corn, sorghum and soybeans from 1974 to 1977.

### C. Fish Production

Fish is one of the main items in the Filipino diet. However, fish production has lagged behind the requirements of the population. The fishery resources of the country are virtually untapped. There are 126,000 hectares of freshwater areas and 367,000 hectares of mangrove swamps which can be farmed in addition to the present 171,000 hectares of productive fishpond areas. Traditional sea fishing grounds cover an area of 643,243 square miles while untapped sea fishing areas total 125,950 square miles.<sup>6/</sup>

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<sup>6/</sup> Felix R. Gonzales, "The Blue Revolution," Accent, August-September, 1973, p. 29.

Table 36

Production Targets and Total Requirements for Rice, Corn,  
Sorghum and Soybeans, 1971-77

| I t e m   | FY 1974       | FY 1975       | FY 1976       | FY 1977       |
|---|---------------|---------------|---------------|---------------|
| <b>Rough Rice (in million cavans)</b>                   |               |               |               |               |
| Production  | 130.6         | 139.9         | 148.5         | 159.7         |
| Requirement   | 134.4         | 147.9         | 152.5         | 157.2         |
| Surplus (deficit)                                       | (12.8)        | ( 8.0)        | ( 4.0)        | ( 2.5)        |
| <b>Corn and Sorghum (in thousand cavans of 57 kgms)</b> |               |               |               |               |
| Production  | <u>40,202</u> | <u>41,454</u> | <u>42,922</u> | <u>44,388</u> |
| White Corn  | 35,136        | 35,916        | 36,674        | 37,134        |
| Yellow Corn   | 4,400         | 4,730         | 5,420         | 5,700         |
| Sorghum   | 952           | 1,555         | 1,440         | 2,200         |
| Requirement   | 39,108        | 40,032        | 40,968        | 41,931        |
| Surplus (deficit)                                       | 84            | 1,422         | 1,954         | 2,457         |
| <b>Soybeans (in thousand metric tons)</b>               |               |               |               |               |
| Production  | 8             | 24            | 42            | 64            |
| Requirement   | 364           | 397           | 445           | 493           |
| Surplus (deficit)                                       | (356)         | (373)         | (403)         | (429)         |

Source: Four-Year Development Plan FY 1974-77, National Economic and Development Authority, Manila, 1973

The Philippines has large unexploited swamplands which can field this sector for FY 1974-1977.

The fishing industry could boost food production and contribute to GNP, employment, and export earnings. Consequently, the government has stimulated production effort to attain self-sufficiency, promote import substitution and expand fish exports by FY 1975 with a projected growth rate at 5.8% annually from 1974 to 1977.

Some alternatives in improving the yield capacity of marine resources include increasing the yield per hectare of presently productive fishponds, increasing the catch per vessel, increasing the area of fishponds, and/or increasing the number of fishing vessels.<sup>7/</sup> Inland fisheries rank first in priority, followed by commercial fisheries, and then municipal fisheries.

Development of fish estates provides for the construction and development of family-size fishponds to be leased on a long-term basis to qualified landless participants in land reform areas. The fishpond estates will be run as cooperative-type organizations with the financial assistance and supervision of the government.

Concerning municipal and commercial fisheries, the goal over the four-year period is to increase production from 1,337,700 metric tons to 1,367,000 metric tons. The growth rate is about 2.5% yearly. The scheme to improve production involve the following.

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<sup>7/</sup> Ibid, p. 32.

- a) Mechanization of fishing craft employed through government financial assistance
- b) Research work to put marine fisheries operations under sound scientific management
- c) Training of fishermen and personnel in the industry, and
- d) Construction of fishing ports in strategic locations in the country

D. Livestock and Poultry Production

In the production of pork, poultry and table eggs, the country has attained near self-sufficiency. Accordingly, the goal from 1974-1977 is to increase livestock production primarily beef and "carabeef"<sup>8/</sup> to meet the domestic requirements.

In beef and carabeef production, the emphasis is on forage improvement, feedlot operations, and upgrading of native herd through artificial insemination. Several leguminous grasses for cattle and carabao have been recommended for pasture improvement.

A loan of \$14.5 million was secured from the World Bank in 1972 to develop the poultry and livestock industries. Integrated coconut/beef cattle farms, hill beef cattle breeding ranches, pig breeding/fattening farms, and poultry/broiler and egg farms are financed by this loan.

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<sup>8/</sup> Carabeef is the meat of carabaos or water buffalos, a bovine variety used for farming.

Auction markets will be established in various towns and provinces of the country. The auction market project will tie-up with the processing, wholesaling and retailing operations of the Food Terminal, Incorporated (formerly Greater Manila Terminal Food Market, Inc.).

E. Beans and Vegetable Production

In beans and vegetable production, the goal is to increase production in backyard and commercial farms to reduce the wide gap between output and requirements. The projected production in FY 1974 of 1.4 million tons represents a self-sufficiency ratio of only 50%. Output is expected to gradually rise so that by FY 1977, production is estimated at 1.9 million tons, representing a 65% self-sufficiency ratio.

Vegetable research was given attention to growing semi-temperate vegetables such as cabbage in lowland areas and the cultivation of certain varieties of tomatoes during the wet season.

F. Expansion of Agricultural Exports and Production of Import-Substitute Crops

One of the major objectives of the agricultural development plan for FY 1974-1977 is to augment foreign exchange earnings through higher production of traditional exports and develop non-traditional exports and import-substitute crops.

The traditional exports of the country include coconut, sugar, abaca, bananas and tobacco. Non-traditional exports which present potential are mango, ginger, papaya, melon, shrimp, tuna, eels and seaweeds. The major import-substitute crops are cotton, paper pulp and grapes.

#### F.1 Coconut

Among the traditional exports, coconut has contributed the largest to the foreign exchange earnings of the country. Copra, dessicated coconut and coconut oil have invariably been among the top 10 exports of the country.

A Coconut Investment Fund made up of farmers' contribution accumulates around P1 million monthly. The funds are intended for investment in end-user firms, in rural banks, credit unions and cooperatives, as well as for loan purposes in production and training endeavors.

Research efforts on improved coconut varietics, more efficient copra-making techniques, and control of "cadang-cadang" disease are being undertaken by the Philippine Coconut Administration (PHILCOA). The Bureau of Plant Industry lends support in developing coconut hybrids.

#### F.2 Sugar

Another mainstay among the export crops is sugar. Demand for the commodity is expected to increase in both the domestic

and foreign markets. Deficits are expected during the period 1974-1977 unless production can be stepped up considerably.

Increasing yield per unit area remains to be the key to expanded production. Aside from research on the agronomic aspects of sugarcane production, the use of HYVs, proper water management and fertilizer application are expected to increase yield by 15 to 20 piculs of sugar per hectare. To raise sugar milling recoveries, a campaign is being made for the early milling of sugarcane as recoveries are low from the month of September to November.

### F.3 Bananas

The export of bananas has shown encouraging trends during the early part of the 1970s. The country accounts for about 30% of the Japanese banana market. Total hectarage in commercial plantations has been limited recently to 21,000 because of an expected price depressing oversupply. Increased exports will involve a search for new markets and maintaining strict quarantine requirements to make sure that exports pass the quality standards of the importing countries.

### F.4 Fruit Export Potential

The local fruit industry has much to offer in generating foreign exchange through exports. Mangoes, papayas and melons, for example, have export potentials in Japan, Hongkong and South Korea. The big drawback, however, is that these fruits are often attacked by fruit flies. Researches are being conducted to solve this problem.

Meanwhile, a fruit development program is also underway to increase exports and produce sufficient quantities of imported fruits which can be grown in the country such as grapes and citrus.

#### F.5 Import-Substitution

The Philippines imports a sizable quantity of cotton for the raw material requirements of textile mills. Around 240,000 bales of cotton are imported annually. To meet the present raw material requirements, around 150,000 to 300,000 of cotton hectarage is needed which permits commercial cultivation of the fiber.

Paper pulp production is also being encouraged as the paper industry is too dependent on importation of the raw material. The country imports about 49,000 tons of pulp annually, more than 50% of which consists of long fiber pulp. Long fiber pulp can be produced from Benguet pine, Mindoro pine, and Albizzies falcata. Around 30,000 hectares (10,000 to Albizzies falcata, 20,000 to pine) is planned for planting to these varieties in the provinces of Abra, Kalinga-Apayao, Nueva Viscaya, Zambales and Bataan.

#### F.6 Conservation and Development of Forest Resources

Two-thirds of the land resources of the country are forests. The forest-based industries directly support an estimated half a million people. Logs and timber exports rank among the top dollar-earners of the Philippines.

For the period FY1974-1977, the government will give emphasis to forest protection, better utilization of forest products, and

reforestation. Also, log exports are being discouraged while in-country wood processing is encouraged.

Better utilization of forest products through a competitive bidding system for logging concessions is being implemented. Under the system, vacant forest areas appropriated for logging purposes will be awarded to the qualified applicants offering the highest price for available timber.

The rehabilitation and reforestation of watersheds and forest areas will be undertaken with the involvement of barrio people, municipal officials, and provincial officials. Allied with this policy is the encouragement of tree farming and fruit tree plantations to help in the rehabilitation of denuded watersheds, to convert some of the wide bare lands in public forests to commercial wood production and increase fruit production.

#### G. Selected Agricultural Programs

The major agricultural programs of the government are essentially designed to promote self-sufficiency in food and food-products and expand the production of exportable and import-substitute crops.

For strategic reasons, special emphasis is being given to self-sufficiency in rice and corn. Programs are also on-going for increased production of vegetables, fish, livestock and other feedgrains.

The agricultural programs basically involve the modernization of traditional agriculture in the country. The modernization strategy includes the provision of HYVs, fertilizer, credit support, marketing arrangements, research and extension services, and adequate infrastructure.

#### G.1 "Masagana 99" - A Rice Production Program

An extensive rice production program, dubbed "Masagana 99"<sup>9/</sup>, was launched in May 1973. Implemented nationwide, the program involves the adoption of a package of production technology among farmers, provision of inputs, supervised credit assistance, and marketing arrangements for the rice produce.

#### H. Programs of the National Grains Authority

The National Grains Authority (NGA) took over the functions of the now-defunct Rice and Corn Administration (RCA) to accomplish the following:<sup>10/</sup>

1. Maintain and manage buffer stocks sufficient to stabilize prices;
2. Implement a realistic farm support price as an incentive to farmers to increase their efficiency and productivity;

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<sup>9/</sup>"Masagana" means bountiful. 99 is the targeted average yield per hectare in cavans.

<sup>10/</sup>The NGA Program 1973-74, p. 10.

3. Upgrade and develop existing grains facilities and encourage the establishment of new facilities;
4. Develop a more responsible and effective manpower in the grains industry;
5. Coordinate the activities of the various components of the industry;
6. Promote local and foreign investments in the grains industry; and
7. Adopt other measures as may be necessary for the integrated growth and development of the industry.

The severe fluctuations of farm prices caused by imbalances and seasonality in production have directed NGA's attention to the regulation of prices and monitoring of the flow of grains from the production to the consuming centers. NGA estimates that government control over 10% of the total rice and corn production during the year would be adequate for price stabilization purposes. The NGA intends to import grains until the Philippines has attained self-sufficiency.

To encourage farmers to produce more and bring the country to self-sufficiency levels for grains, the government has increased the support price for corn grains from 50 centavos per kilo or ₱25 per 50-kilo cavan to 62 centavos per kilo or ₱31 per 50-kilo cavan ex-farm.

In grain procurement, private traders, millers and warehousemen are encouraged to participate as NGA-accredited agents. Also,

NGA and lending institutions are negotiating to enable farmers to pay their obligations in kind, which in turn will be procured by NGA in areas where procurement operations by private traders are inadequate.

NGA intends to launch a program to rehabilitate, upgrade and further develop grain processing facilities in the country. To professionalize the NGA personnel, training programs are conducted.

#### H.1 Better Enforcement of Warehouse Laws

Since Martial Law the warehousing laws and policies have been enforced more strongly to promote quality storage and minimize grain losses.

The "quedan system" has also been strengthened by policies and restrictions necessary to guarantee its integrity. Some pertinent provisions to maintain the quedan system's integrity are the following:

1. A warehouse receipt issued by a warehouseman for rice, corn or other grains to the depositor thereof shall be on forms provided by the NGA, and its issuance by the warehouseman shall be in accordance with the rules, regulations and procedures prescribed.
2. Any warehouseman who cannot deliver the stock of grains on deposit, upon surrender of the warehouse receipt therefor, shall be liable for estafa.

The NGA has been given confiscatory powers. Warehouses, mills, manufacturing/processing establishments utilizing grains and/or their by-products as ingredients in the manufacture of their finished products, and other grain business establishments can be ordered sealed by the NGA upon violation of the provisions of Presidential Decree No. 4 and the NGA rules and regulations. The grain stocks in those establishments can be confiscated and seized by the NGA for sale to the market. During the rice and corn shortage of 1972-73, stocks were confiscated due to hoarding and overpricing on the part of some wholesalers.

#### I. Integrated Rural Development Projects

One of the more massive rural development projects of the government is the Bicol River Basin Project. The basin area, which is about 312,000 hectares, is the center of agricultural activity in the Bicol region. The area's agricultural potential is largely untapped.

The development of the basin area involves a complex of projects which include land reform measures, irrigation, flood control, compact farm development, construction and rehabilitation of secondary roads, electrification, livestock, crop and fish production, provision of farm inputs, marketing and processing of agricultural products, farm credit, and provision of other agribusiness services.

An outlay of approximately ₱773 million will be required over the six-year duration of the project. About two-thirds of this amount will be used for the short-term requirements of the crop and livestock production activities under the compact farm program.

Two other integrated rural development projects worthy of mention are the Infrastructure Support for Land Reform in Cagayan and the Infrastructure Support for Land Reform in Iloilo. In both provinces, roads, irrigation, schools, health centers and artesian wells are being constructed. Cost estimates for the package of infrastructure support are ₱259 and ₱93 million for Cagayan and Iloilo, respectively.

In these two provinces, it has been recognized that the success of the land reform program depends on the provision of adequate infrastructure facilities to serve as basic inputs to production. Consequently, an extensive network of feeder roads is being constructed to enable the farmers to transport their produce to the markets and obtain the necessary agricultural inputs. More irrigation systems are planned to benefit from the use of modern farming techniques, fertilizers, and HYVs. In addition, social overhead services such as schools, health centers, and water supply will be provided in these provinces.

Other rural development projects are to be implemented in Mindanao. In this region, infrastructure is being provided with

special attention to the underdeveloped Muslim areas. The dissidence in Muslim Mindanao has underscored the need for spreading the benefits of economic growth in this area. The Mindanao area offers substantial development potentials with its good and untapped resource endowments. The Muslim area covers around 5 million hectares or 48% of the total land area of the Mindanao island.

J. The National White Corn and Feedgrains Program

In 1969, NFAC established the White Corn and Feedgrains Production Program.

The program was launched because the development of the livestock industry has been constrained by the high costs of animal feeds due largely to the chronic shortage of corn and other feedgrains.

The area and production targets of the program for crop year 1973-74 is shown in Table 37.

Table 37

National Targets on Area Planted and Production of Corn for Crop Year 1973-74

| <u>Variety</u>    | <u>Area in Hectares</u> | <u>Production in Tons</u> | <u>Average Yield in Tons Per Ha.</u> |
|-------------------|-------------------------|---------------------------|--------------------------------------|
| <u>Programmed</u> |                         |                           |                                      |
| HYV               | 470,000                 | 725,000                   | 1.54                                 |
| Ordinary          | <u>680,000</u>          | <u>540,000</u>            | <u>0.79</u>                          |
| Total             | 1,150,000               | 1,265,000                 | 1.10                                 |

|                     |           |         |      |
|---------------------|-----------|---------|------|
| <u>Unprogrammed</u> | 1,294,190 | 712,000 | 0.55 |
|---------------------|-----------|---------|------|

Source: NFAC

The programmed area increased by 63% over that of 1972-73. Area devoted to the HYVs similarly increased by 58%.

#### J.1 The Intensified Corn Production Program

The Intensified Corn Production Program (ICPP) supports the National White Corn and Feedgrains Program along the lines of training, applied research, seed production and extension.

Financed by NFAC, the ICPP is a national program coordinated by UP at Los Baños, and jointly implemented by various government agencies and agricultural institutions.

The applied research phase is concerned with the establishment of variety, fertilizer and demonstration trials in selected provinces through the distribution of corn production kits to farmers. The corn variety trials are conducted to determine the most suitable varieties for particular provinces. On the other hand, fertilizer trials are several treatments conducted to test the effects of varying dosage levels of nitrogen, phosphorus, and potassium. The variety and fertilizer trials are conducted by provincial corn specialists in cooperation with farmer-cooperators. The corn specialists supervise the cultural operations and data gathering. Data sheets are sent to UP at Los Baños for processing and interpretation. Recommendations are discussed among corn specialists in annual conventions at U.P. at Los Baños.

The training of corn specialists, corn technicians and corn farmers is undertaken by UP at Los Baños.

K. The Corn Downy Mildew Action Program

Downy mildew for the past 15 years or so has been the most destructive corn disease. This corn disease has been most severe in Mindanao, Cagayan Valley and Bicol. Many farmers in these areas tend to plant corn without rotating it with other crops.

Efforts to develop downy mildew-resistant (DMR) varieties have resulted in the development of Philippine DMR 1, Philippine DMR 2, and MIT Var 2. UP at Los Baños, Central Mindanao University and the Bureau of Plant Industry cooperated in the development of the Philippine DMR varieties while MIT Var 2 was developed by the Mindanao Institute of Technology.

The downy mildew resistant varieties have produced yields of 60 to 75 cavans per hectare in several yield trials. These varieties have shown from 30 to 40% infection compared with 100% infection in susceptible varieties under very spore density.

The downy mildew resistant varieties, however, have certain characteristics that are not totally acceptable to farmers. The varieties are relatively tall, late maturing, and susceptible to lodging, corn borer, and weevil infestation. These problems have given rise to the Downy Mildew Action Program.

The program, so far, has continuously received several HYVs from exchanges with breeding centers in other countries. Corn

hybrids of several varieties are developed utilizing the HYVs from foreign exchanges with breeding centers. From these corn population are being developed high yielding varieties that are downy mildew resistant, borer and weevil resistant, early maturing and shorter.

Fungicides to control downy mildew are also screened under the program at UPLB.

L. "Masaganang Maisan"<sup>11/</sup> Program

The objectives of the program are: to satisfy the increasing demand for white corn for human consumption and at the same time produce sufficient yellow corn, sorghum, and soybeans to satisfy the feed requirements of the poultry and livestock industry the Masaganang Maisan was conceived. It also aims to produce enough corn for export in the form of corn starch and other by-products and study and estimate joint venture, multilateral feedgrain projects with foreign investors.

The overall target area for 1974-1975 is 750,000 hectares broken down as follows:

|             |   |
|-------------|---|
| White Corn  | 500,000 hectares involving 25 provinces |
| Yellow Corn | 200,000 hectares involving 26 provinces |
| Soybeans    | 20,000 hectares involving 37 provinces  |
| Sorghum     | 30,000 hectares involving 32 provinces  |

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<sup>11/</sup>"Masaganang Maisan" literally means bountiful corn.

The target hectarage for sorghum and soybeans is distributed in many provinces. These two crops are relatively new commodities to Filipino farmers and the object is to try and introduce farmers to its technology and further test the regional adaptability of these crops. Hence, future production strategy will consider the cultivation of these crops in strategic areas.

#### L.1 Production and Demand Projections

Estimates indicate that the total production of corn in 1974-75 period is expected to reach 56 million cavans (1 cavan of 50 kilos). Out of which 32.4 million cavans or 58% of total production is expected to be contributed by Massganang Maisan. This is significant considering that only 25% of the total corn area composed of 2.8 million hectares is considered as programmed areas.\* This increased contribution to national output relative to lesser hectarage is attributable to high productivity index in programmed areas.

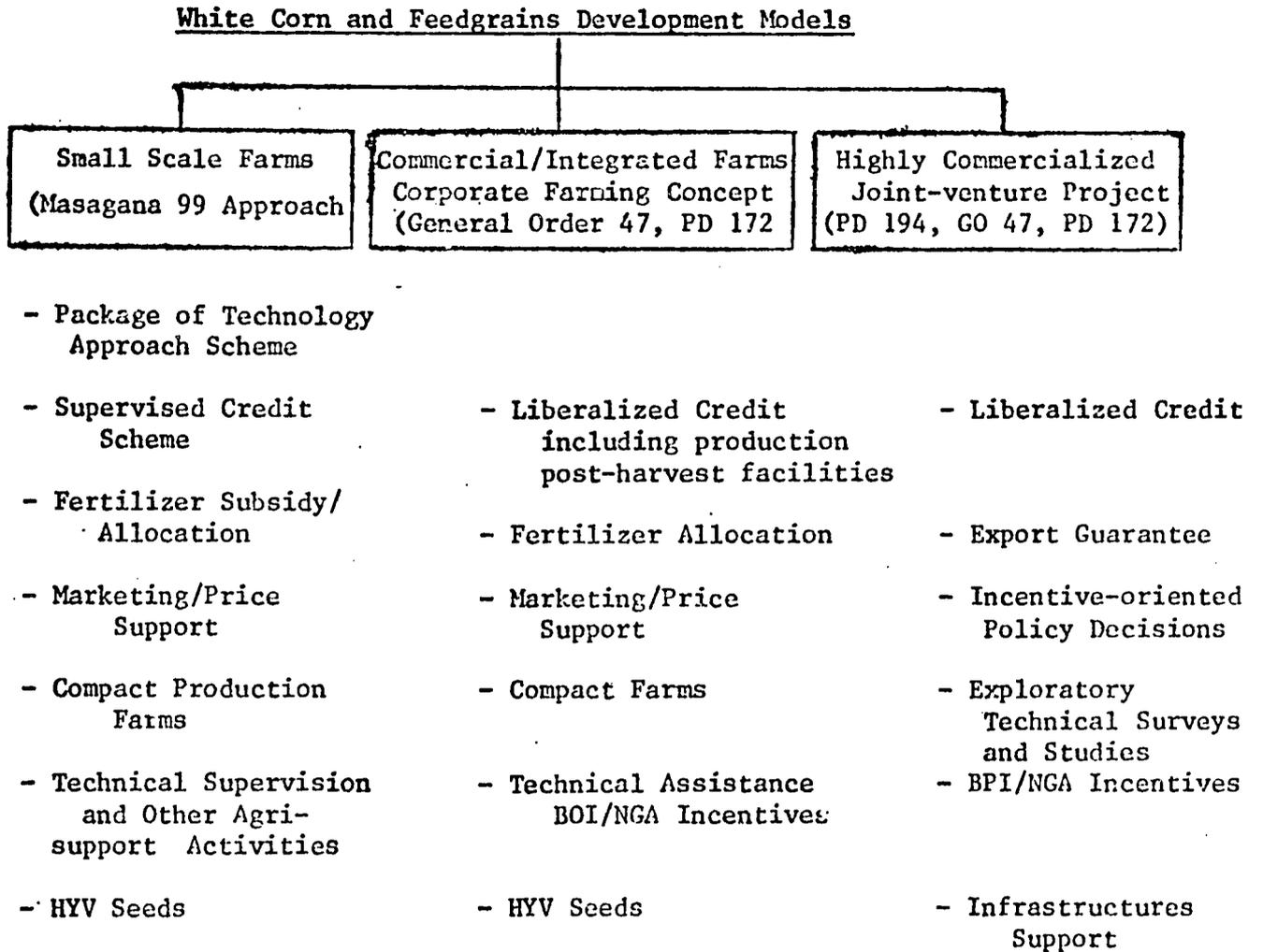
#### L.2 Tri-Sectoral Production Models

Figure F.1-F.2 present the volume price/info flow and tri-sectoral approach to corn and feedgrains development.

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\* By "programmed areas" is meant the full adoption of the package of technology approach - use of high yielding varieties (HYVs) 253 million in loans without collateral; technical supervision; involvement of local governors and mayors; available fertilizers rationed by a coupon system; soil management practices; government price support; and mass media programs.

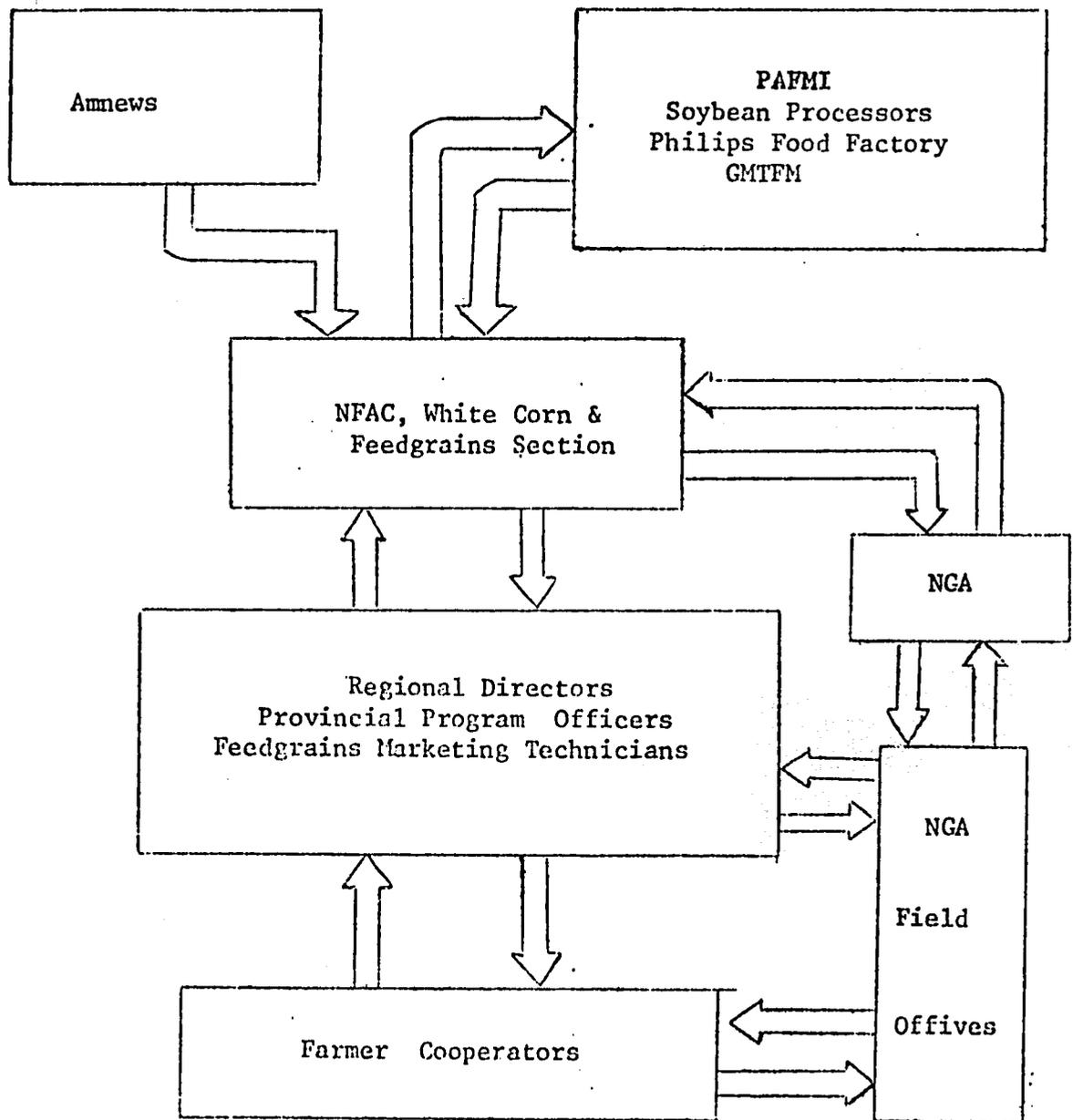
Figure F.1



- Previously, government efforts in grains development is concentrated in assisting small, atomistic farmers.
- The tri-sectoral approach to corn and feedgrains development is an innovative scheme to insure an adequate stockfile of grains for domestic as well as export market.
- This system of production is complementary and mutually-reinforcing. This will be realized through sustained partnership between government and private sector, and innovative linkages through well-directed, incentive-oriented government policies and programs.

Figure F.2

VOLUME/PRICE INFO FLOW



## Resources

In strategic planning and control, the availability, efficient allocation and utilization of resources are critical areas of considerations. The following are recommended:

1. A system of matching existing resources or manageable inputs with realistic targets or goals.
2. Applying the concept of "resources concentration" rather than "resource dispersion".
3. Effective time phasing of resources to insure timely availability and utilization of resources.

The resources available to the program areas follows:

### a) Manpower

1. Availability - The manpower requirement of the Masaganang Maisan program are vital to the efficient management, execution and implementation of the program. To effectively cover the target areas, about 80 specialists and 900 technicians are needed. Two hundred new technologists are now being hired and 20 additional specialists were deployed to cover a minimum of 350 hectares or 200 farmers per technologist per cropping season. In a year's time, this means a technician would cover a total effective hectarage of almost 1,000 hectares in areas where three corn crops are planted per annum.

2. Training - Regular training is being done at U.P. at Los Baños as well as in the provinces by Mobile Training Teams from the staff of the Intensified Corn Production Program and Upland Crops Program in collaboration with NFAC member agencies.

3. Mobility - As of date, only about 29% of the technicians with motorcycles.

b) Credit

The supervised credit scheme concept of non-collateral production loans is provided for farmer-cooperators through organized "seldas" or "Samahang Nayan."

The provisions of credit for each crop will be arranged with CB-DRB, PNB, DBP, and ACA. A total of ₱253 million is needed to finance the target of 500,000 hectares programmed by crop and by province. Of this total loan input, 55% will come from PNG, 35% from the rural banking system and ACA; and DBP will handle 4% and 6%, respectively. DBP will handle the credit needs of large commercial plantations.

c) Fertilizer

The increase in target areas and the implementation of package of technology have effected dramatic increments in fertilizer consumption in corn, sorghum and soybean farms. The fertilizer requirement for the period April 1974

to March 1975 will be about 120,000 metric tons or roughly 10% of the available supply.

d) Price Guarantee and Marketing Facilities

Reasonable prices are made possible through NGA's price support scheme of ₱0.80 per kilo for corn and sorghum and ₱2.20 for soybeans. Direct procurement is implemented and supported by 11 regional directors, 45 provincial managers, and 9 operations officers.

Facility-wise, NGA has a total of 37 moisture meters, 71 driers of 28,480 cavans/12 hours, 44 NGA owned rice mills with capacity of 4,610 cavans/12 hours and 258 platform scales.

The private sector provides a more elaborate network of marketing facilities which include warehouses, corn mills, driers and threshers.

e) Operational Budget

The operational budget covers additional personnel and travelling expenses, supplies, sundries, representation and other operational expenses. The operational budget allocation amount to about ₱2.2 million, of which almost ₱500,000 is allocated for the funding of massive national communication network and strategy. Funds for applied research, production and processing programs as well as incentive allowances amount to more than ₱3 million.

## Strategies

The strategies of program implementation areas follows:

1. CONCENTRATE PRODUCTION IN MAJOR CORN-PRODUCING AND CONSUMING AREAS AND IN GEOGRAPHIC COMPACT AREAS
  - Forty-two (42) provinces as priority areas
  - Employ resource concentration concept rather than resource dispersion to create program impact.
2. ARRANGE AND PROVIDE CREDIT FACILITIES TO THE FARMERS UNDER THE SUPERVISED CREDIT SCHEME
  - Lending program of CB-Rural Banks, PNB, DBP, ACA
  - Mobile Banks
  - Lending rate:
    - ₱500/ha - corn and sorghum
    - ₱659/ha - soybeans
  - Detail of NFAC technicians to banks
3. PROVIDE AND FACILITATE SUPPLY AND DISTRIBUTION OF FERTILIZER, CHEMICALS AND OTHER INPUTS TO PROGRAMMED AS WELL AS NON-PROGRAMMED PROVINCES
  - Fertilizer allocation - NFAC
  - Fertilizer inventory and distribution - FIA
  - Chemicals - NFAC/APIP
4. INTENSIFY INFORMATION CAMPAIGN AND EXTENSION WORK
  - Network of information task force
  - Package of recommended technology campaign
  - Use mass media facilities and posted materials to disseminate information to farmers
  - Information and promotional efforts thru a communication strategy

5. INVOLVE LOCAL OFFICIALS IN THE PROVINCIAL ACTION COMMITTEES AND MUNICIPAL ACTION TEAMS

- Governors, mayors, provincial program officers and farm technologists will all be responsible in the implementation of the program in their respective level.

6. SEED PRODUCTION/DISTRIBUTION ON THE PROVINCIAL LEVEL AND DEVELOP SEED PRODUCTION CENTERS

- Seeds needed will be produced by UPCA, BPI experiment stations and selected seed cooperators.
- Built-in seed production and distribution scheme in provincial programs (BPI)

7. CREATION OF THE NATIONAL MANAGEMENT COMMITTEE AND FIELD ACTION TASK FORCE

- All representatives of member-agencies under the NFAC in cooperation with private agencies will outline the operational strategies to be adopted and formulate guidelines in solving major constraints during the process of implementation.
- Program monitoring thru field action and evaluation teams.

8. FORMULATE MARKETING PROGRAMS AND ESTABLISH PRICE SUPPORT FOR WHITE CORN AND FEEDGRAINS

- Price support scheme of ₱0.62 per kilo of corn and sorghum and ₱2.20 per kilo of soybeans
- Price monitoring system (See volume/price info flow)
- NGA procurement program
- PAFMI buying stations
- Promotion of orderly marketing and effective marketing procedures

- Marketing infrastructures - farm to market, road, post-harvest facilities (threshers, driers, storage, warehouse facilities) efficient transport facilities.
9. INCREASE MANPOWER DEPLOYMENT AND TRAIN UNSKILLED TECHNICIANS TO IMPROVE THEIR MANAGERIAL SKILLS AND COVER THE INCREASED TARGETS AND INCENTIVE REMUNERATION SYSTEM
- Increase the number of corn and feedgrains specialists from 60 to at least 80 personnel to cover the 750,000 target area
  - Employ additional 200 technicians to make technologists' force of about 900 people
  - Enhance technician's mobility through the use of motorized vehicles
  - NFAC grants incentive remuneration of ₱75 per month per technologist and ₱25 gasoline allowance per month for technologists with motorcycles; ₱1.00 per technician per month for every farmer served with credit and ₱3.00/ farmer for matured loans repaid on time. The technologists also receive regular travelling allowances from their mother agency.

#### Organization and Management

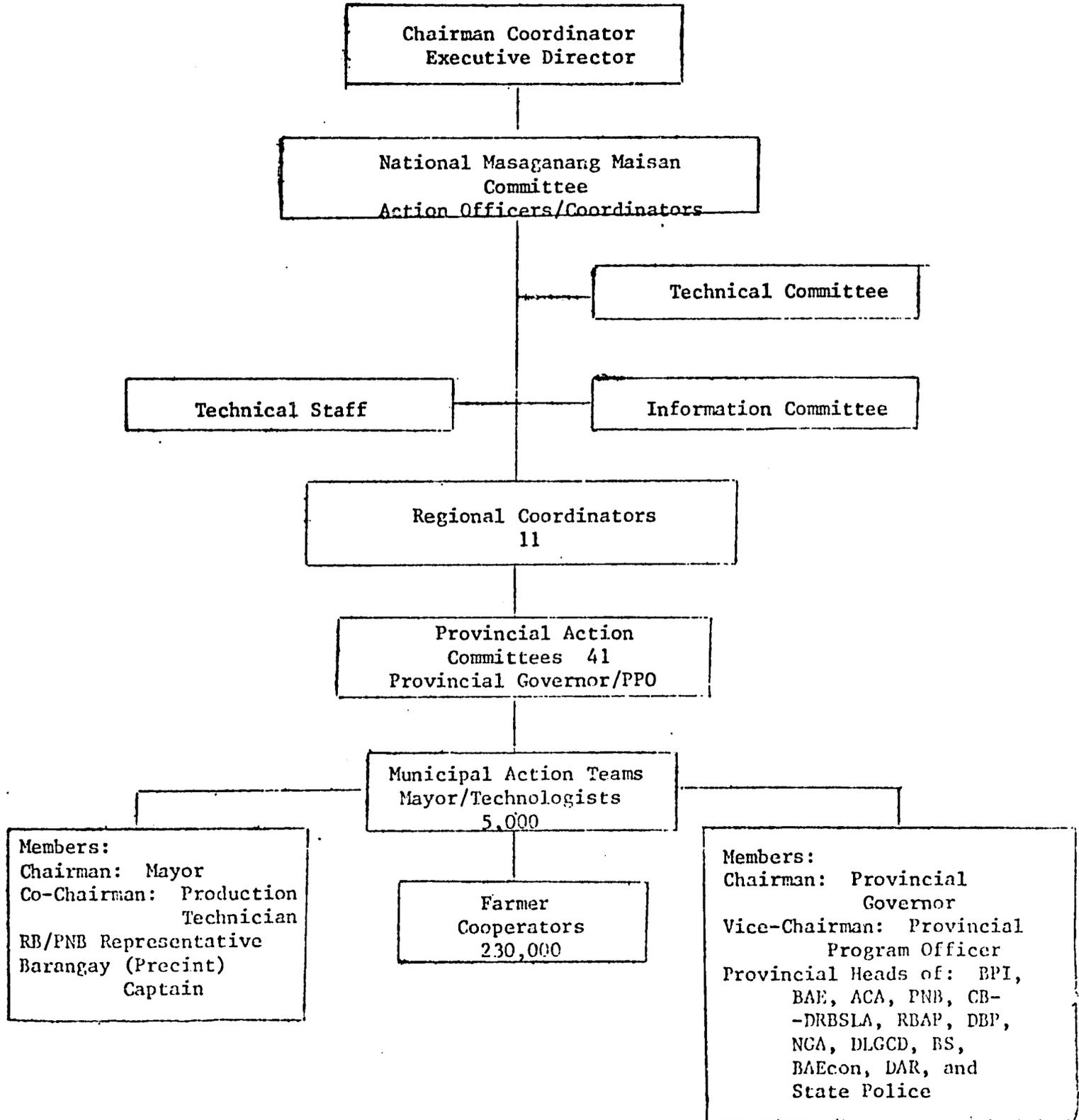
Figure G presents the organizational set-up and management of Masaganang Maisan.

#### Summary of Past Performance

The planting performance in July 1972-June 1973 VS July 1973 to June 1974 period is summarized next page .

Figure 2

Organizational Set-Up, Masaganang Maisan



| <u>Crops</u> | <u>July '72</u><br><u>to</u><br><u>June '73</u><br><u>(000 hectares)</u> | <u>July '73</u><br><u>to</u><br><u>June '74</u><br><u>(000 hectares)</u> | <u>Percent</u><br><u>Increase</u><br><u>(Decrease)</u> |
|--------------|--|--|--|
| White Corn   | 620.1  | 536.3  | (13.0)   |
| Yellow corn  | 85.0   | 112.2  | 32   |
| Sorghum      | 5.4  | 6.2  | 14   |
| Soybeans     | 1.3  | 6.0  | 347  |

Appendix Table 44 presents the cumulative area planted to white corn with and without credit.

Harvest Performance, July 1972-June 1973 VS  
July 1973-June 1974 Period

| <u>Crops</u> | <u>July '72</u><br><u>to</u><br><u>June '73</u><br><u>(000 hectares)</u> | <u>July '73</u><br><u>to</u><br><u>June '74</u><br><u>(000 hectares)</u> | <u>Percent</u><br><u>Increase</u><br><u>(Decrease)</u> |
|--------------|--|--|--|
| White corn   | 9,086.0  | 15.43  | 20%  |
| Yellow corn  | 1,042.1  | 1.21   | 16%  |
| Sorghum      | 121.4  | 62.0   | (49)   |
| Soybeans     | 13.6   | 16.6   | 22   |

Number of farmers supervised

From March 1974 to October 1974 a total of 399,930 farmers were supervised by 857 technicians. This means an average of 467 farmers per technician per crop season, Appendix Table 45.

**Total area served, March 1974-October 1974**

During the eight months period, total area served was 467,435 hectares. This means an effective technologist/area ratio of 552 hectares per technologist/season. This also indicates an average corn area of 1.24 hectares per farmer, Appendix Tables 44 and 45.

**Amount of Credit Granted:**

In 1972, only ₱14.8 million were channeled to corn and feedgrains. In March 1974-October 1974 (8 months period) the credit input amounted to ₱109.56 million. This means a 640% increase over 1972.

PNB registered unprecedented increase of more than 302% in loans for corn and feedgrains (from a mere P292,000 in 1972 to ₱88.1 million in March 1974-October 1974 period).

PNB took the lion's share of 80% of the total loans (₱88.1 million) injected into intensified corn and feedgrains program.

**M. The Board of Investments Incentive Program for Corn Enterprises**

The Investment Incentives Act, which the Board of Investments (BOI) implements, became a law on September 16, 1967. This law prescribed the incentives and guarantees offered by the Philippine Government to domestic and foreign enterprises in preferred areas

of investment in the country. For export-oriented firms, the Export Incentives Act gave additional inducements. Both laws were revised by Presidential Decree No. 92 in line with the government policy of encouraging foreign investments. Consequently, certain new rules were adopted to liberalize foreign investments in selected business activities.

The BOI annually prepares an Investment Priorities Plant (IPP) which sets forth the different activities in the agricultural, mining and manufacturing sectors to be accorded preferred status as fields of investment for purposes of enjoying the incentives and guarantees offered by the Government.

Corn production has been listed in the Sixth IPP as a preferred non-pioneer venture with a measured capacity of 358,000 metric tons of corn for domestic consumption needs. Corn production has been denationalized through Presidential Decree No. 194 and as such is an area open for foreign investments.

The incentives provided by the government for BOI-registered enterprises engaged in corn production are the following:

1. Deduction of organizational and pre-operational expenses from taxable income over a period of not more than 10 years from start of operation;
2. Deduction of labor training expenses from taxable income equivalent to 1/2% of expenses but not more than 10% of direct labor wage;

3. Accelerated depreciation;
4. Carry-over as deduction from taxable income, of net operating losses incurred in any of the first 10 years immediately following the year of such loss;
5. Exemption from tariff duties and compensating tax on importations of machinery, equipment and spare parts;
6. Tax credit equivalent to 100% of the value of compensating tax and customs duties that would have been paid on machinery, equipment, and spare parts (purchased from a domestic manufacturer) had these items been imported;
7. Tax credit for tax withheld on interest payments on foreign loans, provided such credit is not enjoyed by lender-committee in his country and registered enterprise has assumed liability for tax payment;
8. Right to employ foreign nationals in supervisory, technical or advisory positions within five years from registration;
9. Deduction from taxable income in the year reinvestment was made of a certain percentage of the amount of undistributed profits or surplus transferred to capital stock for procurement of machinery and equipment and other expansion;
10. Anti-dumping protection;

11. Protection from government competition;
12. Tax credits equivalent to sales, compensating and specific taxes and duties on supplies, raw materials and semi-manufactured products used in the manufacture, processing or production of export products;
13. Additional deduction from taxable income of direct labor cost and local raw materials utilized in the manufacture of export products;
14. Preference in grant of government loans;
15. Employment of foreign nationals within five years from operation or even after said period in exceptional cases.

N. Recent Reforms in Government Programs and Machinery

1. Reorganization of Executive Agencies

a) The National Grains Authority

On September 26, 1972, the National Grains Authority (NGA) replaced the Rice and Corn Administration to serve as the basic instrument for the development of the grains industry pursuant to the "National Grains Industry Development Act."

The NGA has been empowered to determine the floor price for grain crops which would assure a fair return on the investment of producers. The floor price has been set at a sum of the season's anticipated cost of production.

plus five pesos. During the first five years of NGA's operations, the floor price for corn grains shall not be lower than 60 centavos per kilo,

Meanwhile, retail price control has been instituted for both rice and corn. The NGA Act provides that the retail prices for the approved variety of milled rice and for corn grits should not be more than ₱1.25 per kilo and ₱0.90, respectively over the first five years of NGA. Adjustments, however, can be made on the price ceilings based on the Consumer Price Index periodically prepared by the Central Bank.

Another responsibility of NGA is to procure, maintain and manage buffer stocks sufficient to stabilize consumer prices. Implementation strategies include massive procurement during harvest time, cereal importation when local production cannot meet the needs, and distribution of buffer stocks during the lean months at regulated prices.

The NGA is also encharged with introducing more efficient methods and facilities for harvesting, threshing or shelling, drying, storage, milling, packaging, transporting and post-harvest handling of rice, corn and other grains to minimize grain losses, reduce marketing costs, and bridge the seasonal gaps in supply.

b) Department of Agriculture and Natural Resources

During the second quarter of 1974, the then Department of Agriculture and Natural Resources has been divided into two cabinet-level agencies: the Department of Agriculture and the Department of Natural Resources. The new Department of Natural Resources is composed of the Bureaus of Fisheries, Mines, Lands, and Forest Development.

The major agricultural programs on food production remain under the jurisdiction of the Department of Agriculture. The separation of the two agencies is considered long overdue because the old span of responsibility has overburdened the administrative capabilities of the old Department of Agriculture and Natural Resources. Now, the efforts of one department would be concentrated on food production.

c) Department of Highways

The infrastructural program of the government regarding roads and highways got the needed administrative capabilities by the elevation of the former Bureau of Public Highways to a higher bureaucratic level: Department of Highways.

Admittedly, it would be presumptuous to pontificate progress as a result of creating the above new agencies.

In fact, one criticism of public administration in the Philippines is that it has too many separate institutions responsible for interrelated problems. It has been facetiously said that the first solution to any problem is to create an agency.

Nevertheless, mission-oriented bureaucratic creations and reorganizations have not been tried before in the Philippines. In the past, institutional proliferation was more employment-oriented rather than mission-defined. The old Congress used to create bureaucracies that would employ their proteges and constituents. But now, it seems that administrative agencies are created or reorganized because the development tasks have to be institutionalized, decentralized and continuous.

Furthermore, there is now more observable coordination among institutions doing related functions than during the pre-Martial Law era, when every locus of administrative authority and responsibility seemed to be isolated and trapped into the narrowness of the legal fine prints embodied in the enabling legislation.

## 2. Better Enforcement of Warehouse Laws

Since Martial Law the warehousing laws and policies have been enforced more strongly to promote quality storage and minimize grain losses.

The "quedan system" has also been strengthened by policies and restrictions necessary to guarantee its integrity. Some pertinent provisions to maintain the quedan system's integrity are the following:

1. A warehouse receipt issued by a warehouseman for rice, corn or other grains to the depositor thereof shall be on forms provided by the NGA, and its issuance by the warehouseman shall be in accordance with the rules, regulations and procedures prescribed.
2. Any warehouseman who cannot deliver the stock of grains on deposit, upon surrender of the warehouse receipt therefore, shall be liable for estafa.

The NGA has been given confiscatory powers. Warehouses, mills, manufacturing/processing establishments utilizing grains and/or their by-products as ingredients in the manufacture of their finished products, and other grain business establishments can be ordered sealed by the NGA upon violation of the provisions of Presidential Decree No. 4 and the NGA rules and regulations. The grain stocks in those establishments can be confiscated and seized by the NGA for sale to the market. During the rice and corn shortage of 1972-73, stocks were confiscated due to hoarding and overpricing on the part of some wholesalers.

### 3. Denationalization of the Rice and Corn Industries

The rice and corn industries were nationalized in 1960 under R.A. 3018. Only Filipino citizens and enterprises whose capital stock was wholly-owned by Filipinos could then engage in these industries. By 1973, the transfer of control of both these industries to Filipinos has been substantially effected. But due to the cereal shortage that have become chronic in the country, the current administration has decided to open the industry to foreign investors through the issuance of Presidential Decree No. 194.

Accordingly, the decree provided that aliens or enterprises wholly or partly owned by foreigners may engage in the following activities:

1. Acquire by barter, purchase or otherwise, rice and corn and/or by products thereof, to the extent of their raw material requirements when these are used in the manufacture or processing of finished products.
2. Engage in the culture, production, milling, processing and trading, except retailing of rice and corn.

The participation of aliens and foreign enterprises in the rice and corn industries is subject to the following conditions and regulations.

1. The NGA shall certify that there is an urgent need for foreign investment in the undertaking and that the same will not pose a clear and present danger of promoting monopolies or combinations in restraint of trade.
2. The alien or enterprises owned wholly or in part by foreigners shall have the necessary financial capability and technical competence.
3. The alien or enterprise owned wholly or in part by foreigners shall submit a project study or a development plan acceptable to NGA.
4. At least 60% of the foreign equity participation shall be transferred to Filipino citizens over a period to be established by the NGA at the time of approval of its authority to engage in the industry or phase out its operation within the same period.
5. Foreign investment in the culture and production of rice and corn shall be geared towards the development of virgin lands, the area of which shall be determined by the NGA.
6. The area designated for the culture and production of rice and corn shall be fully devoted only to the said crops during the entire period allowed the investors.

7. Foreign investors shall fully develop the land leased to them for rice and corn production and culture over a period established in their development plan, provided such period shall not exceed 4 years; provided further, that the NGA may grant a grace period on a case-to-case basis.
8. In order to render marketable the produce of the foreign investors, they are required to establish rice and/or corn facilities and their accessories solely for their own use in milling, storing and drying their own rice or corn grains; provided, however, that they shall be allowed to trade, except retail their own produce.

Appendix Table 44

Cumulative Area Planted to White Corn With and Without Credit From  
March to November 30, 1974

| Rank | Province            | Cumulative Area<br>Planted from March<br>to November 30, 1974 |                   |                    | Cumulative<br>Target Todate<br>(hectare) | Percent<br>Accom-<br>plishme |
|------|---------------------|---|-------------------|--------------------|--|------------------------------|
|      |                     | Without<br>Credit   | Without<br>Credit | Total<br>(hectare) |  |                              |
| 1    | Maguindanao         | 13,351  | 3,760             | 17,111             | 8,280                                    | 207                          |
| 2    | Misamis Occidental  | 8,750   | 13,454            | 22,204             | 11,000                                   | 202                          |
| 3    | Bohol               | 5,128   | 3,684             | 8,812              | 4,400                                    | 200                          |
| 4    | Negros Occidental   | 3,385   | 4,906             | 8,791              | 4,500                                    | 195                          |
| 5    | North Cotabato      | 15,170  | 30,386            | 45,556             | 24,400                                   | 187                          |
| 6    | Isabela             | 8,763   | 5,270             | 14,033             | 7,500                                    | 187                          |
| 7    | South Cotabato      | 24,325  | 46,447            | 70,772             | 46,295                                   | 153                          |
| 8    | Davao Oriental      | 17,515  | 10,123            | 27,638             | 19,600                                   | 141                          |
| 9    | Davao City          | 4,496   | 5,987             | 10,483             | 9,725                                    | 108                          |
| 10   | Zamboanga del Sur   | 10,850  | 24,085            | 34,935             | 32,810                                   | 106                          |
| 11   | Lanao del Norte     | 19,367  | 3,660             | 23,027             | 22,500                                   | 102                          |
| 12   | Cebu                | 2,760   | 5,986             | 8,746              | 9,000                                    | 97                           |
| 13   | Davao del Sur       | 20,934  | 7,195             | 28,129             | 30,000                                   | 94                           |
| 14   | Misamis Oriental    | 4,712   | 11,858            | 16,570             | 18,445                                   | 90                           |
| 15   | Zamboanga del Norte | 14,989  | 2,988             | 17,977             | 22,000                                   | 82                           |
| 16   | Masbate             | 5,649   | 494               | 6,143              | 8,100                                    | 76                           |
| 17   | Sultan Kudarat      | 1,878   | 4,526             | 6,404              | 8,500                                    | 75                           |
| 18   | Negros Oriental     | 13,835  | 7,668             | 21,503             | 32,200                                   | 67                           |
| 19   | Samar               | 2,117   | 3,932             | 6,049              | 9,500                                    | 64                           |
| 20   | Leyte               | 3,639   | 3,456             | 7,095              | 11,055                                   | 64                           |
| 21   | Bukidnon            | 22,824  | 18,136            | 40,960             | 65,625                                   | 62                           |
| 22   | Pampanga            | 444   | 160               | 604                | 1,000                                    | 60                           |
| 23   | Davao del Norte     | 11,416  | 11,959            | 23,375             | 40,000                                   | 58                           |
| 24   | Agusan del Sur      | 5,356   | 618               | 5,974              | 20,000                                   | 30                           |
| 25   | Capiz               | -   | 1                 | 1                  | 1,000                                    | a/                           |
|      | Total               | <u>242,153</u>  | <u>230,739</u>    | <u>472,892</u>     | <u>467,435</u>                           | <u>101</u>                   |

a/ Less than 1%

Source: National Food and Agriculture Council

Appendix Table 45

Production Technician Workload Analysis  
From March to October 31, 1974

| Rank<br>Order | Province            | No. of Supervised Farmers<br>With and Without Credit |                |               |     | Sorghum | Total No.<br>of Super-<br>vised<br>Farmers | Number of<br>Production<br>Technician | Average No.<br>of SF/PT |
|---------------|---------------------|--|----------------|---------------|-----|---------|--|---------------------------------------|-------------------------|
|               |                     | White<br>Corn  | Yellow<br>Corn | Soy-<br>beans |     |         |  |                                       |                         |
| 1             | North Cotabato      | 27,271   | -              | 111           | -   | 27,382  | 22   | 1,245                                 |                         |
| 2             | Pangasinan          | -  | 20,509         | 3             | 17  | 20,529  | 17   | 1,208                                 |                         |
| 3             | Misamis Occidental  | 13,414   | 35             | 83            | 5   | 18,537  | 21   | 883                                   |                         |
| 4             | Batangas            | -  | 9,180          | 3,989         | -   | 13,169  | 15   | 878                                   |                         |
| 5             | Negros Occidental   | 4,312  | 6,103          | 123           | 27  | 10,565  | 13   | 813                                   |                         |
| 6             | Misamis Oriental    | 14,288   | 199            | 199           | -   | 14,686  | 22   | 668                                   |                         |
| 7             | Negros Oriental     | 17,641   | -              | 124           | 3   | 17,768  | 27   | 658                                   |                         |
| 8             | Bohol               | 9,352  | -              | 578           | 973 | 10,903  | 17   | 641                                   |                         |
| 9             | Zamboanga del Sur   | 18,075   | -              | 107           | 20  | 18,202  | 30   | 607                                   |                         |
| 10            | Ilocos Norte        | -  | 3,902          | 257           | 350 | 4,409   | 8  | 551                                   |                         |
| 11            | Quezon              | -  | 5,960          | 15            | -   | 5,975   | 11   | 543                                   |                         |
| 12            | South Cotabato      | 24,459   | -              | 86            | 330 | 24,875  | 46   | 541                                   |                         |
| 13            | Cebu                | 8,006  | -              | 281           | 60  | 8,347   | 16   | 522                                   |                         |
| 14            | Isabela             | 6,652  | 4,691          | 349           | 129 | 11,821  | 23   | 514                                   |                         |
| 15            | La Union            | -  | 4,501          | 71            | 13  | 4,585   | 9  | 509                                   |                         |
| 16            | Zamboanga del Norte | 12,526   | -              | -             | -   | 12,526  | 25   | 501                                   |                         |
| 17            | Abra                | -  | 3,854          | -             | 23  | 3,887   | 8  | 486                                   |                         |
| 18            | Davao del Sur       | 17,475   | -              | 289           | 166 | 17,930  | 37   | 485                                   |                         |
| 19            | Tarlac              | -  | 1,531          | -             | 403 | 1,934   | 4  | 484                                   |                         |
| 20            | Davao Oriental      | 14,154   | -              | 327           | -   | 14,481  | 31   | 467                                   |                         |
| 21            | Sultan Kudarat      | 4,902  | -              | -             | 72  | 4,974   | 11   | 452                                   |                         |
| 22            | Mindoro Occidental  | -  | 5,536          | 18            | 56  | 5,610   | 13   | 432                                   |                         |
| 23            | Bukidnon            | 27,514   | -              | 19            | 1   | 27,534  | 67   | 411                                   |                         |

Appendix Table 45 (continued)

|    |                  |                |                |               |              |                |            |            |
|----|------------------|----------------|----------------|---------------|--------------|----------------|------------|------------|
| 24 | Ilocos Sur       | -              | 3,673          | 122           | 57           | 3,852          | 10         | 385        |
| 25 | Masbate          | 4,476          | -              | -             | -            | 4,476          | 12         | 373        |
| 26 | Lanao del Norte  | 8,512          | 158            | 84            | -            | 8,754          | 24         | 365        |
| 27 | Maguindanao      | 6,850          | -              | -             | -            | 6,850          | 19         | 361        |
| 28 | Davao City       | 6,455          | -              | 510           | -            | 6,965          | 20         | 348        |
| 29 | Davao del Norte  | 12,526         | -              | 4,463         | 10           | 17,129         | 51         | 336        |
| 30 | Leyte            | 7,571          | -              | -             | -            | 7,571          | 23         | 329        |
| 31 | Albay            | -              | 7,910          | 4             | 158          | 8,072          | 25         | 323        |
| 32 | Samar            | 5,841          | -              | -             | -            | 5,841          | 22         | 266        |
| 33 | Agusan del Sur   | 5,052          | -              | 10            | -            | 5,062          | 20         | 253        |
| 34 | Mindoro Oriental | -              | 3,231          | 27            | -            | 3,258          | 13         | 251        |
| 35 | Nueva Ecija      | -              | 1,042          | 1             | 32           | 1,075          | 5          | 215        |
| 36 | Sorsogon         | -              | 2,137          | 103           | 501          | 2,741          | 13         | 211        |
| 37 | Iloilo           | -              | 4,777          | 70            | 620          | 5,467          | 26         | 200        |
| 38 | Camarines Sur    | -              | 6,571          | 5             | 10           | 6,586          | 32         | 206        |
| 39 | Cagayan          | -              | 2,972          | 140           | 84           | 3,196          | 21         | 152        |
| 40 | Capiz            | 1              | 1,637          | 21            | 223          | 1,932          | 13         | 149        |
| 41 | Pampanga         | 336            | 27             | 2             | 38           | 403            | 7          | 58         |
| 42 | Bulacan          | -              | -              | 3             | 68           | 71             | 8          | 9          |
|    | TOTAL            | <u>282,661</u> | <u>100,086</u> | <u>12,594</u> | <u>4,589</u> | <u>399,930</u> | <u>857</u> | <u>467</u> |

Source: NFAC

Appendix Table 46

White Corn Financing by Credit Source from March - November 30, 1974

| Rank      | Province            | TOTAL                     |                              |                         | RURAL BANK                |                              |                         | PHILIPPINE NATIONAL BANK  |                              |                         | A C A                     |                              |                         |
|-----------|---------------------|---------------------------|------------------------------|-------------------------|---------------------------|------------------------------|-------------------------|---------------------------|------------------------------|-------------------------|---------------------------|------------------------------|-------------------------|
|           |                     | No. of Farmers with Loans | Amount of Approved Loans (P) | Area Financed (Hectare) | No. of Farmers with Loans | Amount of Approved Loans (P) | Area Financed (Hectare) | No. of Farmers with Loans | Amount of Approved Loans (P) | Area Financed (Hectare) | No. of Farmers with Loans | Amount of Approved Loans (P) | Area Financed (Hectare) |
| 1         | South Cotabato      | 16,658                    | 21,176,140                   | 42,697                  | 484                       | 967,000                      | 1,934                   | 15,732                    | 19,810,412                   | 39,602                  | 442                       | 398,728                      | 1,161                   |
| 2         | Bukidnon            | 11,419                    | 11,590,400                   | 30,272                  | 4,551                     | 3,763,150                    | 9,279                   | 6,868                     | 7,827,250                    | 20,993                  | -                         | -                            | -                       |
| 3         | North Cotabato      | 13,363                    | 9,457,468                    | 25,225                  | 4,359                     | 3,205,814                    | 9,392                   | 8,117                     | 5,453,650                    | 14,387                  | 887                       | 798,004                      | 1,446                   |
| 4         | Misamis Oriental    | 10,973                    | 8,968,282                    | 26,550                  | 3,302                     | 2,175,087                    | 9,461                   | 7,571                     | 6,793,195                    | 17,089                  | -                         | -                            | -                       |
| 5         | Zamboanga del Sur   | 10,767                    | 8,781,200                    | 18,100                  | -                         | -                            | -                       | 10,585                    | 8,658,200                    | 17,854                  | 182                       | 123,000                      | 246                     |
| 6         | Misamis Occidental  | 9,912                     | 6,746,169                    | 13,453                  | 246                       | 135,469                      | 306                     | 9,666                     | 6,610,700                    | 13,147                  | -                         | -                            | -                       |
| 7         | Davao del Sur       | 7,053                     | 6,455,575                    | 13,773                  | 2,300                     | 2,235,325                    | 4,935                   | 4,753                     | 4,220,250                    | 8,838                   | -                         | -                            | -                       |
| 8         | Leyte               | 4,776                     | 5,152,869                    | 13,147                  | 1,714                     | 710,282                      | 2,129                   | 3,062                     | 4,542,587                    | 11,018                  | -                         | -                            | -                       |
| 9         | Negros Oriental     | 4,484                     | 4,481,500                    | 8,956                   | 1,398                     | 1,015,500                    | 2,031                   | 3,086                     | 3,466,000                    | 6,925                   | -                         | -                            | -                       |
| 10        | Davao Oriental      | 4,002                     | 3,873,523                    | 7,876                   | 761                       | 426,273                      | 982                     | 3,241                     | 3,447,250                    | 6,894                   | -                         | -                            | -                       |
| 11        | Cebu                | 5,875                     | 3,452,129                    | 7,108                   | 1,320                     | 492,700                      | 1,127                   | 4,529                     | 2,951,279                    | 5,965                   | 26                        | 8,150                        | 16                      |
| 12        | Samar               | 3,329                     | 2,963,050                    | 3,068                   | 128                       | 69,250                       | 139                     | 3,201                     | 2,893,800                    | 7,929                   | -                         | -                            | -                       |
| 13        | Sultan Kudarat      | 3,911                     | 2,497,882                    | 7,630                   | 1,591                     | 931,656                      | 3,192                   | 2,320                     | 1,556,226                    | 4,438                   | -                         | -                            | -                       |
| 14        | Davao City          | 3,725                     | 2,490,700                    | 6,188                   | 414                       | 336,700                      | 719                     | 3,312                     | 2,154,000                    | 5,469                   | -                         | -                            | -                       |
| 15        | Davao del Norte     | 3,207                     | 2,500,503                    | 5,980                   | 443                       | 344,750                      | 690                     | 2,764                     | 2,155,753                    | 5,290                   | -                         | -                            | -                       |
| 16        | Zamboanga del Norte | 2,433                     | 1,928,680                    | 3,790                   | -                         | -                            | -                       | 2,400                     | 1,309,500                    | 3,723                   | 33                        | 19,180                       | 67                      |
| 17        | Isabela             | 2,117                     | 1,910,792                    | 4,149                   | 903                       | 791,900                      | 1,611                   | 1,214                     | 1,118,892                    | 2,538                   | -                         | -                            | -                       |
| 18        | Negros Occidental   | 1,812                     | 1,558,570                    | 3,320                   | 109                       | 46,740                       | 108                     | 1,703                     | 1,511,830                    | 3,212                   | -                         | -                            | -                       |
| 19        | Bohol               | 3,750                     | 1,521,657                    | 3,341                   | 1,498                     | 732,563                      | 1,513                   | 2,235                     | 780,344                      | 1,810                   | 17                        | 8,750                        | 18                      |
| 20        | Lanao del Norte     | 1,827                     | 1,121,016                    | 4,490                   | 373                       | 240,700                      | 615                     | -                         | -                            | -                       | 1,454                     | 880,316                      | 3,875                   |
| 21        | Masbate             | 502                       | 380,950                      | 766                     | 457                       | 344,250                      | 688                     | 19                        | 9,500                        | 19                      | 26                        | 27,200                       | 59                      |
| 22        | Agusan del Sur      | 848                       | 367,025                      | 1,134                   | 437                       | 155,025                      | 714                     | 411                       | 212,000                      | 420                     | -                         | -                            | -                       |
| 23        | Maguindanao         | 236                       | 139,098                      | 519                     | -                         | -                            | -                       | 88                        | 71,200                       | 209                     | 148                       | 67,898                       | 310                     |
| 24        | Pampanga            | 84                        | 46,650                       | 161                     | 7                         | 6,650                        | 10                      | 77                        | 40,000                       | 151                     | -                         | -                            | -                       |
| 25        | Capiz               | 1                         | 546                          | 1                       | 1                         | 546                          | 1                       | -                         | -                            | -                       | -                         | -                            | -                       |
| T O T A L |                     | <u>127,075</u>            | <u>109,562,374</u>           | <u>256,694</u>          | <u>26,796</u>             | <u>19,127,330</u>            | <u>51,576</u>           | <u>97,064</u>             | <u>88,103,818</u>            | <u>197,920</u>          | <u>3,215</u>              | <u>2,331,226</u>             | <u>7,198</u>            |

Source: NFAC



**CHAPTER X. TECHNOLOGICAL GENERATION AND DELIVERY SYSTEM:  
AGRIBUSINESS EDUCATION AND RESEARCH**

CHAPTER X. TECHNOLOGICAL GENERATION AND DELIVERY SYSTEM:  
AGRIBUSINESS EDUCATION AND RESEARCH

A. Trends in General Education

The Philippines supports a fairly developed educational system. Although the country has a low per capita income of about \$200, it ranks second to the United States in terms of enrolment in higher education per 100,000 population. Indeed, the Philippines educates as high a proportion of its population as the other advanced countries, as shown by the international education ratios for selected countries in Appendix Table 47.

Approximately one-third of the total government budget is allotted for education. When the expenditures of the private sector for education are included, the total inputs may be around 6.7% of the gross national product. This ratio would again place the country's investment on education comparable with those of advanced economies.

However, while the government commits a large portion of its resources to education, it has a very uneven responsibility among the three broad levels of education (see Appendix Table 48). Government participation in higher education is minimal as over 80% of the national education budget goes to the support of public elementary education.

There has been a rapid rise of enrolment in Philippine schools. From 1960 through 1970, enrolment practically doubled at each broad

educational level (See Appendix Table 48-49) at higher levels of education, the growth rate of enrolment is even higher.

With respect to survival rates, statistics show that in 1966 to 1967, 55.8% of those who enrolled in Grade I reached Grade VI, 25.3% reached fourth year high school and 11.5% finished college. Survival rates are on the uptrend when compared to previous years, Appendix Table 50.

Education inputs in the coming years are expected to increase. This is based on the high rate of population growth of 3.3% annually and on the assumption that the average Filipino's desire and ability to pay for education will not diminish.

The pressure, however, on the rapid expansion of the educational system creates imbalances especially the sacrifice of quality. At the higher education level, there is already an oversupply of college trained manpower especially in some disciplines such as law and accounting. Appendices Tables 51 and 52 show the manpower stock and employment by educational attainment, and the employed manpower classified by educational attainment and nature of employment, respectively.

In terms of educational attainment, 17% of the total manpower stock of the Philippines received high school education, 44% reached grades IV-VI, and 32% had no education or education up to Grade III only.<sup>1/</sup>

In terms of employment, agriculture is still the largest employer, accounting for 57% of the total employment. Many of those with low

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<sup>1/</sup> Education for National Development, p. 41.

educational attainment derive their income from agriculture. An estimated 33% of those in agriculture work unpaid in family farms. The proportion of part-time employment is also relatively higher for agriculture due to the seasonality of demand for labor.<sup>2/</sup>

B. Agribusiness Education and Research

B.1 Agribusiness Programs, Courses and Seminars in Selected Educational Institutions

Agribusiness programs, courses and seminars in educational institutions are offered currently in six schools, namely -- the University of the Philippines, Asian Institute of Management, Ateneo University, De la Salle College, Central Luzon State University and Central Mindanao State University.

The University of the Philippines (UP) has an Agribusiness Management Program which is a joint undertaking of its Colleges of Business Administration and Agriculture. The Program offers a Bachelor of Science in Agribusiness (BSAB) and a Master of Agricultural Business Management (MAB), Appendix 53 and 54.

As of the second semester of school year 1973-74, 110 students were enrolled in the undergraduate program and 15 in the graduate program. Most of the MAB students were staff members of the member institutions of the Association of Colleges of Agriculture in the

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<sup>2/</sup> Ibid., pp. 38-39.

Philippines (ACAP) which sponsored their scholarships. For a description of the BSAB and the MAB program, see

At the Asian Institute of Management (AIM), two agribusiness subjects are offered as elective courses in its Master of Business Management (MBM) program. These courses are patterned after the Harvard Business School program for MBA's.

The first semester course is introductory in nature. It has two objectives: (1) to familiarize students with the problems, structures and logic of selected agribusiness industries and (2) to develop among students an appreciation of the agribusiness concepts in formulating public policies and strategies toward the viability of agribusiness industries.

The second semester course is designed for students who have taken the first semester course. The course aims to give students an appreciation for the use of future markets in the agribusiness area, and at developing trading skills in those markets. It is particularly concerned with the preparation and evaluation of projects for the development of agriculture and with sharpening the students' skills in implementing strategies for firms in the agribusiness area.

AIM, in cooperation with SEARCA, has also established a yearly, four-week seminar entitled "Program for Agricultural Project Development, Evaluation and Management" (PAPDEM). This intensive management development course is designed for men and women throughout Asia whose functions involve or close influence decision-making in government programs dealing with agricultural development or agribusiness project of the private

sector. The primary objective of the course is to develop general management attitudes and skills required to identify national agricultural objectives, select primary areas for investment, identify opportunities, develop alternative schemes of utilizing these opportunities, evaluate proposals and implement projects in the agricultural sector.

At the De la Salle College, a 3-unit agribusiness management elective course is offered in the MBA program.

The Ateneo University, which does not offer any agribusiness courses in its graduate business program conducted a seminar in September, 1973 entitled "Agribusiness: Modern Farm and Plantation Management" under its Business Leadership Program. Offered in the cities of Manila, Bacolod and Davao, the seminar had around 200 participants. The seminar's objective was to give the participants the fundamentals of farm and plantation management within the framework of the Philippine agricultural situation. The course was addressed especially to farm and plantation managers, agribusiness managers, agricultural analysts and to agricultural programmers in the government and private sectors. The seminar involved lectures and case studies on various agribusiness industries, i.e., rice, corn, coconut, fruits and vegetables, feedgrains, poultry and livestock farming, and fisheries.

Other universities are following what has been started by U.P., AIM, Ateneo and De la Salle. In 1973, two agribusiness curricular programs were instituted by two other universities: Central

Luzon State University (CLSU) in Nueva Ecija, and General Mindanao State University (CMSU) in Bukidnon (Mindanao Island), Appendix 55.

The increasing number of colleges and universities offering agribusiness curriculum is a response to the dearth of agriculture graduates who engage in farming occupations. Agriculture graduates normally enter the teaching profession and government service. A minority is employed in private industry. Very few become entrepreneurs in the agribusiness field.

#### B.2 Agribusiness Research in Educational Institutions

Most of the recent agribusiness research projects are conducted by AIM. These research projects are financed by the Asian Productivity Organization (APO) and the Ford Foundation.

In 1970, AIM received a modest grant from the APO to conduct an agribusiness case writing project in Southeast Asia. Eleven cases were developed in this project.

In 1972, AIM conducted a study on the fisheries industry in the Philippines. The output of the study consists of seventeen (17) cases on various sectors, namely, deep sea and municipal fishing, fishpond management, fish brokerage, and processing and distribution. A seminar in connection with the industry study was conducted in April 1973, which was attended by AIM faculty members and industry participants.

In 1970, with a grant from the Ford Foundation, the Inter-University Steering Committee for Agribusiness Programs conducted an agribusiness study on the corn industry in the Philippines dubbed as "Project Cornelius." The project developed 10 cases and some notes on the corn industry. The research work ended in May 1970 with a seminar among the industry participants and coordinators. The participating institutions were UP, AIM, Ateneo University and De la Salle College.

A number of graduate theses and cases on agribusiness have been written at UP<sup>3/</sup>, AIM, Ateneo University and De la Salle College (see Appendix 56 for case list. The subject coverage on the macro and micro levels is varied. The majority of the theses, however, are either macro-level and descriptive studies or feasibility-oriented, rather than introspective analyses of existing enterprises. There is a reason for this imbalance in focus. The small proportion of theses which

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<sup>3/</sup> The theses were developed at the U.P. Graduate School of Economics. At UP, the MBA and MAB are non-thesis curricula. Since UP operates on a special charter, it has the option of instituting thesis or non-thesis graduate degree programs. Private institutions, however, fall under the Bureau of Private Schools, which pegs a thesis requirement for degree programs at the graduate level.

deals with the micro level business management areas of existing firms in agribusiness is caused by a feeling of secrecy, suspiciousness and extreme caution on the part of the majority of business firms in the country. These firms suspect that the project might be an "intelligence work" supported by competitors. In addition, financial data are kept confidential due to the relatively high rate of tax evasion and misdeclaration. As a consequence, many companies in the Philippines have established very restrictive policies regarding access to information on even the most neutral and harmless data about their operations and plans.

### B.3 Government Agribusiness Research and Training Programs

The government sector, through the National Food and Agriculture Council (NFAC), has spearheaded a number of research and training programs in agriculture. In 1970-71, NFAC sponsored training programs in poultry, livestock, fishery, cooperative organization and management, feedgrains marketing, and grain processing and storage. In cooperation with the UP Colleges of Agriculture and Business Administration, NFAC conducted seminars on the poultry, livestock and fishery industries. Recognizing the need for cooperatives organization management education, a number of technicians, farmer/members and officers of various cooperatives in the country were trained. Training for technicians in feedgrains marketing was also conducted. As a joint undertaking with the United Nations Development Program (UNDP), a yearly training program in grain processing and storage was established and continues to the present.

In 1971-72, training programs centered on rice production for technicians in major rice-producing provinces. In 1972-73, the training programs were geared to technicians of the Bureaus of Fishery and Animal Industry in production and marketing. The training program for the Bureau of Fisheries personnel was conducted in Laguna, Iloilo, Pangasinan and Bicol provinces. The training program for the Bureau of Animal Industry technicians involved beef cattle and poultry production.

Short training programs were held in January 1974, one of which was the "Rice Direct Seeding and Crop Diversification Centered on Rice as the Main Crop," participated in by technicians and specialists from the Bureaus of Plant Industry and Agricultural Extension.

In conjunction with NFAC's Intensified Corn Production Program, the training programs lined up for 1973-74 are the following:

1. Specialist training for 10 white corn feedgrain technicians for a period of 3 months at UP in Los Baños.
2. Technician training for 60 white corn and feedgrain technicians for a period of one month at UP in Los Baños.
3. Training of 400 production technicians and farmer leaders for a period of 5 days in the regional and provincial level.
4. Training of 400 farmer leaders and farmers for a period of 5 days at the provincial and municipal levels.

A "Middle Management Training for Regional Coordinators and Provincial Officers for Rice and Corn" is also planned in 1974.

Aside from training projects, NFAC has supported several research projects at the UP College of Agriculture. In 1971-72, the projects involved the following:

1. National Cooperative Pasture Resources Development Program
2. Rice Research Project
3. National Unified Rice Applied Research, Training and Information Project
4. Corn Research Project
5. Intensified Corn Production Program
6. Downy Mildew Project
7. Advanced Training and Research for Corn, Sorghum and Other Upland Crops
8. Research and Extension Program in Vegetable Crops

C. Towards Market-Oriented Agribusiness Programs

C.1 A Concept of Market-Oriented Agribusiness Programs

The objectives of agribusiness commodity systems are stated in terms of a market orientation. Accordingly, the goals of a coordinating mechanism in the system, i.e., agribusiness education and research, must be in similar terms.

The agribusiness education and research activity mix consists of elements which should be reoriented, modified or even expanded in accordance with the needs of its clientele sectors and market forces. These mix elements include applied research, degree-oriented programs, short modular training programs, apprenticeship of students, and consultation programs.

The close relationship of institutions engaged in such programs with the public and private sectors is imperative. This is based on a conviction that effective agribusiness programs must meet the needs of the primary clientele. Accordingly, close linkages with the market or the clientele sectors would enable the educational and research thrusts to be adapted or improved in content.

The relationship of agribusiness educational institutions with their clientele sectors may be conceptualized as a two-way flow of mutual benefits. For their part, the clientele sectors may demand the following from institutions offering agribusiness programs.

1. Management skills embodied in Agribusiness graduates;
2. Applied research results on agribusiness problems;
3. Short modular training programs for agribusiness executives; and
4. Consultancy services at the technical and managerial levels.

On the other hand, education and research institutions need the cooperation of the clientele sectors for:

1. Market of their "products and services";
2. Financial support;
3. Sources of insights and data for agribusiness teaching cases and research activities;
4. "Testing arena" for their academic hypotheses and findings, to determine their "business sense" via consultation and workshops; and
5. Apprenticeship or training grounds for agribusiness students,

To foster good working relationships between educators and businessmen, business executives are invited to serve as member of school boards or working committees. On the other hand, school directors and faculty members may be involved in professional associations such as the Philippine Council of Management, the Philippine Marketing Association, the Personnel Management Association of the Philippines. Aside from fostering better relations with business managers, such linkage would serve to make the academicians more aware of the mundane needs and problems of the business community.

Inviting leaders in the agribusiness field to lecture before a particular class about their business, specialization or experiences is also being practised. This would create and strengthen ties with the agribusiness industry leaders.

Corollary to a market-oriented educational and research program is the need to monitor its strengths and deficiencies. Thus, educational institutions need to follow-up on their outputs and their clients' perceptions to improve program content and to maintain the quality of its outputs.

Through the foregoing mechanisms, educational and research institutions should be able to:

- a) Enjoy and enthusiastic and continuing support for its programs by the clientele sectors,
- b) Identify and respond to the problems and opportunities posed by the agribusiness sector,

- c) Improve the content and delivery of their agribusiness programs,
- d) Enhance the market acceptability and opportunities of their agribusiness graduates and research outputs, and finally,
- e) Parallel their activities with the interests of their clientele sectors.

#### C.2 The Market for the Outputs of Agribusiness Programs

An analysis of the trend of international economic conditions and the directional thrusts of national government policies concerning agribusiness indicates an increasing demand for the outputs of agribusiness education and research.

In the international scene, certain trends are foreboding. Production shortfalls, the energy crisis, deficits in agricultural inputs, acute food shortages, galloping world-wide inflation, and increasing population suggest an urgent need for high-level system coordination.

On the local scene, the Philippine government strives for the immediate development of agribusiness industries, especially in food and agricultural exports. A national policy of export promotion and import substitution has called for the development of processing industries, especially those based on fruits, vegetables, livestock products, and a wide range of other food products. Adequate financial support and other infrastructures are being channeled toward agricultural

programs and projects with the end in view of increasing overall productivity, meeting the food needs of the population, and hiking the per capita income of the fast-growing population.

Cashing in on the trends in the international food commodity markets as well as the incentives provided by the Philippine government, many existing commercial and industrial firms are seriously considering agribusiness as an avenue for diversification. New ventures in agribusiness are also common topics in loan appraisals of financial institutions, especially the more interesting ventures such as hydroponics and shrimp farming.

D. Coordinative Linkage Organizations in Agribusiness Education and Research

There are many coordinative organizations involved in the development of agribusiness education and research in the Philippines. Linkage organizations that continue to play increasingly roles in the near future include the following:

1. Interuniversity Agribusiness Program,
2. Association of Colleges of Agriculture in the Philippines (ACAP),
3. Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA),
4. Philippine Council for Agricultural Research (PCAR),
5. National Food and Agriculture Council (NFAC),
6. Educational Development Projects Implementing Task Force of the Department of Education and Culture (EDPITAF-DEC),

7. Asian Productivity Organization (APO),
8. Ford Foundation,
9. Rockefeller Foundation,
10. U.S. Agency for International Development, and
11. Harvard University

The University of the Philippines, AIM, Ateneo University, and De la Salle College formed an Interuniversity Agribusiness Program in the later part of the 1960's. Coordinated through a steering committee, the Interuniversity Program was designed to provide leadership and initiative in agribusiness research, teaching and extension activities.

So far, a good number of technical and industry notes and management cases on agribusiness firms have been developed. The research work is undertaken by faculty members, full time researchers and students.

In 1964, a linkage organization was established and known as the Association of Colleges of Agriculture in the Philippines (ACAP) to coordinate the various educational programs and activities of major agriculture colleges and universities. Areas for cooperation and coordination among the ACAP members include curriculum development, research programs, extension services and manpower development. On research matters, ACAP achieves coordination through a Research Council composed of the research directors of the member-institutions.

SEARCA was established in 1969 by the Ministers of Education of eight Southeast Asian nations<sup>4/</sup> to:

1. Alleviate the current problem of high-level manpower shortage in Southeast Asia through its graduate study program,
2. Promote research geared to the solution of common agricultural problems in the region,
3. Undertake regional research projects, and
4. Act as a clearinghouse for agriculture in member countries.

To date, 206 scholars have been admitted to SEARCA's graduate study program. As of December 1974, 79 scholars had earned their advanced degrees in agriculture and related fields.

Non-degree training courses for specialists were also undertaken by SEARCA in 1972-73. These courses included:

1. A short-term training course on swine and poultry (Philippines),
2. A workshop-cum-training on agribusiness management for farmers' associations (in Malaysia),
3. A Post-harvest rice technology training course (Philippines), and
4. A seminar on agricultural project development, evaluation and management (with AIM, Philippines).

SEARCA's major publications include the following training manuals and book manuscripts:

1. Training Manual for Poultry Production

2. Training Manual for Swine Production
3. Post-Harvest Physiology, Handling and Utilization of Tropical and Sub-Tropical Fruits and Vegetables
4. All in a Grain of Rice
5. Statistical Methods and Procedures for Southeast Asian Agriculture
6. A Strategy for Agricultural and Rural Development in Asia
7. Agribusiness Management Resource Materials, Volumes I and II

The two volumes of agribusiness management resource materials and an introductory text were authored and edited by Agriculture Undersecretary J. D. Drilon, Jr. under the auspices of APO.

In the government sector, PCAR, NFAC and EDPITAF-DEC are some of the important linkage organizations.

Established in 1972 by a presidential decree, PCAR serves as a coordinating agency and clearinghouse for all government agricultural research programs involving the production, processing and marketing aspects of farm, forest and fishery products. The organization seeks to prevent wasteful duplication of research and gear research projects towards relevancy in terms of the current and future priorities in agricultural development. Its major functions include the following.

- a. Define goals, purposes and scope of research necessary to support progressive development of agriculture, forestry, and fisheries for the nation on a continuing basis,

- b) Use the basic guidelines of relevance, excellence, and cooperation, and develop the national agricultural research programs based on a multidisciplinary, inter-agency, and systems approach for the various component commodities,
- c) Establish a system of priorities for agriculture, forestry and fisheries research and provide meaningful mechanisms for updating these priorities, and
- d) Develop and implement a fund-generating strategy for supporting agricultural research.

Meanwhile, NFAC as a coordinating council spearheads the production of crops of economic importance to the country. In this Council, agricultural bureaus and offices, as well as research and training institutions, the government financing agencies engaged in agriculture, and the price stabilization agencies for the staple cereals, are represented to rationalize policy formulation and implementation. As previously described, NFAC has undertaken training programs for the strengthening of the capabilities of agricultural agency personnel as well as supported relevant research projects at UP in Los Baños.

Still, another government agency active in the development of agricultural education is EDPITAF-DEC. This agency has appropriated a major portion of its \$12.5 million loan from the World Bank for the Development of agricultural education in the country. For a start,

it has engaged the services of SEARCA and PCAR to survey agricultural manpower in the Philippines.

The Ford Foundation has greatly contributed to Philippine agribusiness education and research through a grant in 1966 which brought to the Philippines a group of faculty members from the Harvard Business School (Harvard Advisory Group, or HAG). The HAG developed an inventory of teaching materials which dealt specifically with Philippine business and administrative problems in agribusiness and other subject-matter areas. Their work, together with those of the agribusiness education pioneers in the Philippines, became the foundation of a continuing effort to establish in the Philippines professional leadership for the region.

E. Some Empirical Indicators of Demand for the Outputs of Agribusiness Programs

The markets for agriculture graduates in the Philippines consists of the following sectors in their order of importance:

1. School system,
2. Government agencies
3. Private firms.

In a Ph.D. dissertation entitled "High Level Manpower Needs in Agriculture as Reported by Employers", the pattern of sectoral demand for agriculture graduates from 1967-1973 was shown to have the following salient features:

1. The school system had the largest number of vacancies for agriculture graduates . . .

The school system was expected to absorb 46% of the E.S. graduates; 81% of the M.S. graduates; and 80% of the Ph.D. holders.

2. The government agencies, second in sectoral demand, was expected to employ 42% of the B.S. graduates; and 20% of the Ph.D. holders.
3. The private firms was expected to hire the smallest number of agriculture graduates. This sector employed 12% of the B.S. graduates and 7% of the M.S. graduates.

Ignorance of job opportunities, limited size of many agribusiness firms, restraining attitudes of graduates (i.e., refusal to engage in rural jobs), and substitutability of skills (i.e., general management business for agribusiness graduates) seem to hinder the assimilation of agriculture and agribusiness management graduates, especially in the B.S. level, into the private business sector.

Some empirical indications on the acceptability of agribusiness courses, motivations of course participants and employment opportunities for graduates may be gleaned from the AIM experience. At AIM, the agribusiness courses are popular electives with about 70% of the second year students enrolled in one or both of them. Many theses were also undertaken in the agribusiness field. However, out of 212 MBM graduates from 1970 to 1972, only 24 landed jobs in agriculturally-oriented

organizations; and out of 61 graduates for the same period with theses in agribusiness, only 9 were employed immediately after graduation in agribusiness firms (see Appendix Table 57).

The apparent popularity of agribusiness courses stems primarily from the perceived entrepreneurial opportunities in the field and only secondarily for employment flexibility, according to an AIM agribusiness professor. He added that students are very much aware of the present concern over food commodities in the world markets, the government support in terms of incentives to agribusiness ventures, the national export drive for agricultural products, and of course, the rich but relatively untapped natural resources of the country.

In the immediate future, the demand for technical and managerial skills in agribusiness will be a function of several major determinants, one of which is the emerging structural transformation of the agricultural and industrial sectors of the economy. Philippine agriculture has always been traditional and home consumption-oriented. However, the agricultural sector is currently undergoing meaningful transformation due largely to a widespread desire to exploit the potentials of the new high-yielding varieties of crops and livestock. More and more farmers are shifting their planning and operational strategies from home consumption to the cash markets. In the rural areas, there are cash surpluses where none existed before.

Another impetus for transformation of Philippine agribusiness is expected to come from certain dynamic global shifts that occur due

to the structural interdependence of the world's food and fiber systems. For example, there is an evolving trend among the Japanese food processors to derive their raw material supplies by contract farming and/or actually leasing lands in Indonesia and the Philippines. In fact, the two biggest corn plantations in Indonesia have Japanese equity participation.<sup>5/</sup> Apparently, this move is partly a reaction to the unpredictable behavior of supply and prices of agricultural crops in the international markets in 1972 and 1973. Such trends, transformations, and adjustments in strategies and orientations of agribusiness participants should increase the need for managerial and technical skills in the developing countries. The Philippines is greatly affected because it prides itself in having the most sophisticated pool of agribusiness managers and technicians in the Southeast Asian region. The Asian Institute of Management and the University of the Philippines, because of their area of expertise and regionally-perceived excellence, might as well be the training ground for a cadre of agribusiness professionals to serve the needs of developing the agribusiness systems in the region.

Appendix 5S shows the estimated high level manpower requirements in agriculture and related sciences.

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<sup>5/</sup>Mitsugoro (a joint-venture corporation of the Japanese Mitsui and the Indonesian Kosgoro corporations) has a 5,100-hectare corn farm in Lampung, South Sumatra. Another big farm is operated by C. Itoh, Inc.

Appendix Table 47

International Comparative Education Ratios  
(For Selected Countries and for Selected Years)

| <u>Countries</u><br>(Listed in Order of<br>Higher Education<br>Ratios) | A. Higher Education<br>(Enrolment per<br>100,000 Popu-<br>lation) |                  | B. First and Second Level<br>Education (Adjusted School<br>Enrolment Ratios)* |             |
|--|---|------------------|---|-------------|
|  | <u>1950</u>   | <u>1965-1966</u> | <u>1950</u>   | <u>1965</u> |
| United States  | 1,500   | 2,840            | -   | -           |
| Philippines  | 902   | 1,560            | 70  | 83          |
| Israel   | 1,400   | 1,488            | 92  | 82          |
| Australia  | 441   | 1,159            | 93  | 92          |
| Japan  | 471   | 1,140            | 91  | 93          |
| Sweden   | 241   | 903              | 80  | 85          |
| Taiwan   | 87  | 637              | 74  | 77          |
| Germany, Republic  | 216   | 632              | 83  | 90          |
| England (and Wales)  | 242   | 579              | 102**   | 93          |
| Italy  | 310   | 583              | 59  | 70          |
| Spain  | 193   | 417              | 70  | 75          |
| Mexico   | 136   | 312              | 58  | 66          |
| India  | 113   | 235              | 34  | (1963) 44   |
| Thailand   | 141   | 166              | 54  | 44          |

\* Ratio of Enrolment to Population for Corresponding Age-Groups

\*\* Ratios above 100 indicate enrolment of over-age children.

Source: UNESCO Statistical Yearbook, 1968: Education for National Development, p. 31.

Appendix Table 48

Secondary and Collegiate Enrolment in Public and Private Schools and State  
Colleges and Universities, School Year 1962-1963 to 1972-1973

| <u>School Year</u> | <u>Total</u> | <u>S e c o n d a r y</u>                |  |   | <u>Total</u> | <u>C o l l e g i a t e</u>              |  |   |
|--------------------|--------------|---|--|---|--------------|---|--|---|
|                    |              | <u>Bureau of<br/>Public<br/>Schools</u> | <u>Bureau of<br/>Private<br/>Schools</u> | <u>U.P. &amp; State<br/>Colleges &amp;<br/>Universities</u> |              | <u>Bureau of<br/>Public<br/>Schools</u> | <u>Bureau of<br/>Private<br/>Schools</u> | <u>U.P. &amp; State<br/>Colleges &amp;<br/>Universities</u> |
| 1962-1963          | 824,677      | 289,728                                 | 527,002                                  | 7,947   | 358,770      | 7,913                                   | 313,308                                  | 37,549  |
| 1963-1964          | 939,404      | 341,275                                 | 592,872                                  | 5,257   | 385,468      | 7,784                                   | 345,030                                  | 32,654  |
| 1964-1965          | 1,024,115    | 375,655                                 | 643,061                                  | 5,399   | 430,715      | 8,545                                   | 388,780                                  | 33,390  |
| 1965-1966          | 1,157,083    | 420,794                                 | 730,831                                  | 5,458   | 517,751      | 8,899                                   | 469,038                                  | 39,814  |
| 1966-1967          | 1,276,564    | 486,119                                 | 784,587                                  | 5,858   | 544,913      | 8,961                                   | 495,836                                  | 40,116  |
| 1967-1968          | 1,354,196    | 535,696                                 | 812,906                                  | 5,504   | 590,476      | 8,830                                   | 539,210                                  | 42,436  |
| 1968-1969          | 1,421,031    | 536,267                                 | 884,764                                  | 7,165   | 615,461      | 7,047                                   | 565,035                                  | 43,379  |
| 1969-1970          | 1,590,479    | 669,280                                 | 915,516                                  | 5,683   | 620,097      | 5,200                                   | 574,020                                  | 40,877  |
| 1970-1971          | 1,692,280    | 728,788                                 | 956,402                                  | 7,090   | 629,770      | 3,518                                   | 584,171                                  | 42,081  |
| 1971-1972          | 1,793,260    | 773,485                                 | 1,012,708                                | 7,067   | 647,822      | 2,807                                   | 601,835                                  | 43,180  |
| 1972-1973          | 1,878,425    | 842,679                                 | 1,028,820                                | 6,926   | n.a.         | n.a.                                    | n.a.                                     | n.a.  |

n.a. - Data not available.

<sup>1/</sup> Technical and normal schools only.

<sup>2/</sup> U.P. and 16 State Colleges and Universities that reported.

Sources: Division of Evaluation Research and Statistics, Bureau of Private Schools  
Office of State Colleges and Universities, Department of Education and Culture  
U.P. Office of the Registrar

Appendix Table 49  
 Projected Enrolment  
 1970-1980

| <u>School Year</u> | <u>Elementary</u> | <u>High School</u> | <u>College</u>   | <u>T o t a l</u>  |
|--------------------|-------------------|--------------------|------------------|-------------------|
| <u>PROJECTED:</u>  |                   |                    |                  |                   |
| 1970-71            | 7,338,970         | 2,163,820          | 795,310          | 10,298,100        |
| 1971-72            | 7,628,700         | 2,339,560          | 889,940          | 10,908,200        |
| 1972-73            | 7,876,960         | 3,611,400          | 1,005,940        | 11,494,300        |
| 1973-74            | 8,127,450         | 2,301,170          | 1,146,260        | 12,074,880        |
| 1974-75            | 8,342,330         | 3,007,000          | 1,302,960        | 12,652,790        |
| 1975-76            | 8,520,990         | 3,258,210          | 1,431,530        | 13,210,730        |
| 1976-77            | 8,694,210         | 3,490,220          | 1,556,910        | 13,741,340        |
| 1977-78            | 8,861,110         | 3,735,950          | 1,661,690        | 14,258,750        |
| 1978-79            | 9,030,880         | 3,962,560          | 1,775,810        | 14,769,250        |
| 1979-80            | <u>9,206,510</u>  | <u>4,164,910</u>   | <u>1,016,440</u> | <u>15,287,860</u> |
| T o t a l -        | 33,628,610        | 31,584,800         | 13,483,790       | 128,696,200       |

Source: Education for National Development, p. 225.

Appendix Table 50

College Graduates of Private Schools by Selected Major Fields of Study  
School Year 1962-63 to 1971-72

| <u>School Year</u> | <u>Total</u> | <u>Commerce<br/>and<br/>Business<br/>Adminis-<br/>tration</u> | <u>Liberal<br/>Arts and<br/>Sciences</u> | <u>Teacher<br/>Training</u> | <u>Engineering<br/>and<br/>Technology</u> | <u>Medical<br/>Science</u> | <u>Law and<br/>Foreign<br/>Service</u> | <u>Music<br/>and<br/>Fine Arts</u> | <u>Food<br/>Nutrition<br/>and<br/>Dietetics</u> | <u>Nautical<br/>Science</u> | <u>Agri-<br/>culture</u> | <u>Chemistry</u> |
|--------------------|--------------|---|--|-----------------------------|---|----------------------------|--|------------------------------------|---|-----------------------------|--------------------------|------------------|
| 1962-1963          | 43,686       | 12,906  | 5,021                                    | 18,442                      | 3,606                                     | 3,737                      | 2,398                                  | 169                                | 1,116   | 352                         | 398                      | 541              |
| 1963-1964          | 51,945       | 11,878  | 4,996                                    | 23,725                      | 3,062                                     | 3,519                      | 1,470                                  | 215                                | 1,325   | 728                         | 502                      | 525              |
| 1964-1965          | 65,996       | 11,550  | 5,271                                    | 34,577                      | 4,785                                     | 5,339                      | 835                                    | 532                                | 1,164   | 365                         | 798                      | 780              |
| 1965-1966          | 81,327       | 15,211  | 7,985                                    | 44,859                      | 4,564                                     | 4,692                      | 1,288                                  | 182                                | 1,003   | 526                         | 464                      | 553              |
| 1966-1967          | 86,075       | 14,665  | 8,132                                    | 46,868                      | 5,767                                     | 5,435                      | 1,493                                  | 583                                | 1,346   | 552                         | 548                      | 686              |
| 1967-1968          | 84,033       | 14,800  | 9,375                                    | 46,831                      | 4,588                                     | 4,269                      | 1,363                                  | 527                                | 910   | 393                         | 724                      | 253              |
| 1968-1969          | 83,127       | 24,199  | 7,724                                    | 39,616                      | 4,442                                     | 2,948                      | 1,261                                  | 619                                | 786   | 652                         | 523                      | 357              |
| 1969-1970          | 96,642       | 27,702  | 13,825                                   | 41,151                      | 5,465                                     | 3,756                      | 1,643                                  | 724                                | 872   | 695                         | 589                      | 220              |
| 1970-1971          | 82,469       | 28,075  | 12,505                                   | 27,902                      | 4,287                                     | 5,218                      | 2,150                                  | 488                                | 695   | 390                         | 438                      | 321              |
| 1971-1972          | 81,651       | 30,648  | 11,765                                   | 21,896                      | 4,263                                     | 8,093                      | 2,356                                  | 613                                | 583   | 424                         | 688                      | 322              |

Sources: Department of Education and Culture, Statistical Data and Information 1972  
Bureau of Private Schools, Statistical Bulletin 1953-1954.

Appendix Table 51

Manpower Stock and Employment by Educational Attainment:  
1965, 1969 and 1974\*

| Educational Attainment                                    | 1965        |            |      | 1969        |            |      | 1974        |            |      |
|---|-------------|------------|------|-------------|------------|------|-------------|------------|------|
|   | Total Stock | Employed   | %    | Total Stock | Employed   | %    | Total Stock | Employed   | %    |
| Total Manpower<br>(Population<br>From 14-65<br>Years Old) | 16,200,000  | 10,101,000 | 62.4 | 19,164,000  | 12,465,000 | 65.0 | 21,512,000  | 14,253,000 | 66.3 |
| 4-5 Years<br>College                                      | 672,116     | 494,949    | 73.6 | 1,007,133   | 610,785    | 60.6 | 1,724,214   | 698,397    | 40.5 |
| 1-3 Years<br>College                                      | 911,249     | 323,232    | 35.5 | 1,041,004   | 398,880    | 38.3 | 1,187,328   | 456,096    | 38.4 |
| 4 Years High<br>School                                    | 1,041,033   | 656,565    | 63.1 | 1,038,306   | 810,225    | 78.0 | 1,237,585   | 926,445    | 74.9 |
| 1-3 Years High<br>School                                  | 1,422,369   | 838,393    | 58.9 | 1,687,583   | 1,034,595  | 61.3 | 2,110,114   | 1,182,999  | 56.1 |

\* Based on Manpower Enrolment Projections of the Human Resources and Manpower Development Special Area Group, Chapter IV and the Bureau of Census and Statistics - Philippine Statistical Survey of Household (BCS-PSSH Report on Labor by Educational Attainment, 1965.)

Source: Education for National Development, p. 42.

Appendix Table 52

Employed Persons, By Class, By Highest Grade Completed: 1965  
(in thousands)

|                    | AGRICULTURE |                       |                       |                       | NON-AGRICULTURE |                       |                       |                       |
|--------------------|-------------|-----------------------|-----------------------|-----------------------|-----------------|-----------------------|-----------------------|-----------------------|
|                    | TOTAL       | Wage & Salary Workers | Self Employed Workers | Unpaid Family Workers | TOTAL           | Wage & Salary Workers | Self Employed Workers | Unpaid Family Workers |
| Total              | 5,725       | 2,906                 | 2,909                 | 1,910                 | 4,376           | 2,776                 | 1,253                 | 305                   |
| Percent            | 100.00      | 100.00                | 100.00                | 100.00                | 100.00          | 100.00                | 100.00                | 100.00                |
| No Grade Completed | 19.7        | 15.4                  | 22.1                  | 17.9                  | 8.1             | 4.2                   | 17.0                  | 8.0                   |
| Elementary         | 71.1        | 75.6                  | 67.6                  | 74.3                  | 50.8            | 46.9                  | 55.6                  | 64.5                  |
| 1                  | 4.2         | 3.6                   | 4.4                   | 4.3                   | 1.5             | 1.4                   | 1.9                   | 2.2                   |
| 2                  | 7.5         | 8.3                   | 7.5                   | 7.0                   | 4.2             | 3.4                   | 5.9                   | 4.7                   |
| 3                  | 10.3        | 12.1                  | 9.9                   | 10.1                  | 6.1             | 5.3                   | 7.2                   | 8.5                   |
| 4                  | 18.4        | 18.4                  | 18.7                  | 17.9                  | 9.9             | 8.6                   | 12.3                  | 10.6                  |
| 5                  | 10.4        | 10.2                  | 9.2                   | 12.4                  | 8.3             | 7.9                   | 7.8                   | 12.3                  |
| 6 or 7             | 20.2        | 22.9                  | 17.9                  | 22.5                  | 20.8            | 20.4                  | 20.6                  | 26.1                  |
| High School        | 8.4         | 8.3                   | 9.0                   | 7.4                   | 23.3            | 24.8                  | 20.4                  | 21.6                  |
| 1                  | 2.4         | 2.3                   | 2.3                   | 2.6                   | 4.3             | 3.8                   | 5.5                   | 4.1                   |
| 2                  | 2.0         | 1.5                   | 2.3                   | 1.9                   | 4.5             | 4.5                   | 4.1                   | 6.2                   |
| 3                  | 1.4         | 1.2                   | 1.7                   | 1.2                   | 2.8             | 2.7                   | 2.9                   | 3.7                   |
| 4                  | 2.5         | 3.3                   | 2.8                   | 1.7                   | 11.7            | 13.8                  | 8.0                   | 7.7                   |
| College            | 0.9         | 0.7                   | 1.3                   | 0.3                   | 17.8            | 24.1                  | 7.0                   | 5.9                   |
| 1                  | 0.2         | (c)                   | 0.2                   | 0.1                   | 1.6             | 2.0                   | 1.0                   | 1.2                   |
| 2                  | 0.4         | 0.3                   | 0.5                   | 0.1                   | 3.5             | 4.6                   | 1.4                   | 1.8                   |
| 3                  | 0.1         | 0.1                   | 0.2                   | 0.1                   | 1.5             | 1.9                   | 0.8                   | 0.9                   |
| 4                  | 0.2         | 0.3                   | 0.3                   | 0.1                   | 9.3             | 13.2                  | 2.6                   | 1.6                   |
| 5 or higher        | (c)         | -                     | (c)                   | -                     | 1.9             | 2.4                   | 1.3                   | 0.4                   |

(c) Less than 0.05 percent

Source: Bureau of the Census and Statistics Survey of Households Bulletin, Series No. 19.  
Education for National Development, p. 43.

## Appendix Table 52 (continued)

## Employed Persons By Major Occupation Group: 1965 to 1973

(In thousands)

| <u>Major Occupation Group</u>                                  | <u>1965</u>   | <u>1966</u>   | <u>1967</u>   | <u>1968</u>   | <u>1971</u>   | <u>1972</u>   | <u>1973</u>   |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| ALL OCCUPATION GROUPS  | <u>10,101</u> | <u>10,936</u> | <u>10,867</u> | <u>10,471</u> | <u>12,543</u> | <u>12,582</u> | <u>13,865</u> |
| Professional & technical workers                               | 375           | 441           | 441           | 511           | 699           | 595           | 701           |
| Proprietors, managers & administrators                         | 432           | 420           | 393           | 457           | 174           | 136           | 131           |
| Clerical workers   | 352           | 364           | 357           | 386           | 449           | 457           | 518           |
| Sales workers  | 675           | 723           | 695           | 666           | 1,419         | 1,314         | 1,357         |
| Farmers, farm laborers, fishermen<br>loggers & related workers | 5,677         | 6,246         | 6,299         | 5,598         | 6,286         | 6,829         | 7,707         |
| Workers in mines & quarries                                    | 14            | 18            | 34            | 28            | 33            | 20            | 28            |
| Transport & communication workers                              | 272           | 280           | 281           | 290           | 517           | 507           | 504           |
| Craftsmen & production process workers                         | 1,270         | 1,384         | 1,351         | 1,420         | 1,578         | 1,471         | 1,499         |
| Manual workers & laborers, n.e.c.                              | 151           | 176           | 159           | 183           | 229           | 226           | 249           |
| Service & related workers                                      | 840           | 860           | 847           | 905           | 1,136         | 1,019         | 1,139         |
| Occupation not reported  | 42            | 24            | *             | 26            | 24            | 7             | 30            |

(In Percent)

|  |              |              |              |              |               |              |              |
|--|--------------|--------------|--------------|--------------|---------------|--------------|--------------|
| ALL OCCUPATION GROUPS  | <u>100.0</u> | <u>100.0</u> | <u>100.0</u> | <u>100.0</u> | <u>100.00</u> | <u>100.0</u> | <u>100.0</u> |
| Professional & technical workers                               | 3.7          | 4.0          | 4.1          | 4.9          | 5.6           | 4.7          | 5.0          |
| Proprietors, managers & administrators                         | 4.3          | 3.8          | 3.6          | 4.4          | 1.4           | 1.1          | 0.9          |
| Clerical workers   | 3.5          | 3.3          | 3.3          | 3.7          | 3.6           | 3.6          | 3.7          |
| Sales workers  | 6.7          | 6.6          | 6.4          | 6.4          | 11.3          | 10.4         | 9.8          |
| Farmers, farm laborers, fishermen<br>loggers & Related workers | 56.2         | 57.1         | 58.0         | 53.5         | 50.1          | 54.3         | 55.6         |
| Workers in mines & quarries                                    | 0.1          | 0.2          | 0.3          | 0.3          | 0.3           | 0.2          | 0.2          |
| Transport & communication workers                              | 2.7          | 2.6          | 2.6          | 2.8          | 4.1           | 4.0          | 3.6          |
| Craftsmen & production process workers                         | 12.6         | 12.7         | 12.4         | 13.6         | 12.6          | 11.7         | 10.8         |
| Manual workers & laborers, n.e.s.                              | 1.5          | 1.6          | 1.5          | 1.8          | 1.8           | 1.8          | 1.8          |
| Service & related workers                                      | 8.3          | 7.9          | 7.8          | 8.6          | 9.0           | 8.1          | 8.2          |
| Occupation not reported  | 0.4          | 0.2          | 0.1          | 0.2          | 0.2           | 0.1          | 0.2          |

\*Less than 9,500.

Source: National Census and Statistics Office.

Appendix Table 52 (continued)

## Employed Persons by Major Industry Group: 1965 to 1973

(In thousands)

| <u>Major Industry Group</u>                                | <u>1965</u>   | <u>1966</u>   | <u>1967</u>   | <u>1968</u>   | <u>1971</u>   | <u>1972</u>   | <u>1973</u>   |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| ALL INDUSTRIES   | <u>10,101</u> | <u>10,936</u> | <u>10,867</u> | <u>10,471</u> | <u>12,543</u> | <u>12,582</u> | <u>13,865</u> |
| Agriculture, forestry,<br>hunting & fishing                | 5,725         | 6,290         | 6,330         | 5,631         | 6,321         | 6,863         | 7,766         |
| Mining & quarrying   | 24            | 26            | 45            | 43            | 59            | 36            | 51            |
| Construction   | 295           | 283           | 276           | 342           | 420           | 432           | 350           |
| Manufacturing  | 1,101         | 1,229         | 1,223         | 1,234         | 1,439         | 1,323         | 1,396         |
| Electricity, gas, water<br>& sanitary services             | 22            | 37            | 30            | 36            | 49            | 44            | 37            |
| Commerce   | 1,114         | 1,126         | 1,078         | 1,130         | 1,559         | 1,478         | 1,537         |
| Transport, storage & communication                         | 339           | 384           | 375           | 363           | 529           | 467           | 504           |
| Government, community, business<br>& recreational services | 708           | 788           | 769           | 903           | 1,196         | 1,071         | 1,198         |
| Domestic services  | 500           | 502           | 502           | 503           | 666           | 617           | 725           |
| Personal services other than domestic                      | 227           | 242           | 229           | 252           | 278           | 246           | 271           |
| Industry not reported                                      | 47            | 30            | 10            | 33            | 27            | 4             | 30            |

(In Percent)

|  | <u>100.0</u> |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| ALL INDUSTRIES   | <u>100.0</u> |
| Agriculture, forestry, hunting & fishing                   | 56.7         | 57.5         | 58.3         | 53.8         | 50.4         | 54.5         | 56.0         |
| Mining & quarrying   | 0.2          | 0.2          | 0.4          | 0.4          | 0.5          | 0.3          | 0.4          |
| Construction   | 2.9          | 2.6          | 2.5          | 3.3          | 3.4          | 3.4          | 2.5          |
| Manufacturing  | 10.9         | 11.2         | 11.3         | 11.8         | 11.5         | 10.5         | 10.1         |
| Electricity, gas, water & sanitary services                | 0.2          | 0.3          | 0.3          | 0.3          | 0.4          | 0.4          | 0.3          |
| Commerce   | 11.0         | 10.3         | 9.9          | 10.8         | 12.4         | 11.8         | 11.1         |
| Transport, storage & communication                         | 3.4          | 3.5          | 3.4          | 3.5          | 4.2          | 3.7          | 3.6          |
| Government, community, business<br>& recreational services | 7.0          | 7.2          | 7.1          | 8.6          | 7.5          | 8.5          | 8.6          |
| Domestic services  | 5.0          | 4.6          | 4.6          | 4.8          | 5.3          | 4.9          | 5.2          |
| Personal services other than domestic                      | 2.2          | 2.2          | 2.1          | 2.4          | 2.2          | 2.0          | 2.0          |
| Industry not reported                                      | 0.5          | 0.3          | 0.1          | 0.3          | 0.2          | 0.0          | 0.2          |

Source: National Census and Statistics Office.

Appendix 53

The Bachelor of Science in Agribusiness at  
the University of the Philippines

The Bachelor of Science in Agribusiness is a five-year program offered as a joint undertaking by the Colleges of Agriculture and Business Administration, designed to prepare the student to undertake not only the usual business administrative-oriented jobs, but also such jobs as food processing management, agricultural market research and analysis, farm management, and others.

The curriculum is shown below:

FIRST YEAR

| <u>First Semester</u>             | <u>Hours</u> | <u>Units</u> |
|-----------------------------------|--------------|--------------|
| Ag. Bot. 1, General Botany        | 5            | 3            |
| Ag. Chem. 11, Basic Ideas of Chem | 9            | 5            |
| English 1, Freshman English       | 3            | 3            |
| Math. 11, College Algebra         | 3            | 3            |
| Zool. 1a, General Zoology         | 5            | 3            |
|                                   | <u>25</u>    | <u>17</u>    |

| <u>Second Semester</u>       | <u>Hours</u> | <u>Units</u> |
|------------------------------|--------------|--------------|
| Ag. Bot. 2, General Botany   | 5            | 3            |
| Ag. Chem. 12, Chem. of Elem. | 9            | 5            |
| English II, Freshman English | 3            | 3            |
| Math. 14, Plane Trigonometry | 3            | 3            |
| Zool. 1b, General Zoology    | 5            | 3            |
|                              | <u>25</u>    | <u>17</u>    |

SECOND YEAR

| <u>First Semester</u>             | <u>Hours</u> | <u>Units</u> |
|-----------------------------------|--------------|--------------|
| Ag. Educ. 10, Elem. Psychology    | 3            | 3            |
| Ag. Econ. 2, General Economics    | 4            | 4            |
| English III, Introd. to Lit.      | 3            | 3            |
| Math. 52, Anal. Geometry & Cal. 1 | 3            | 3            |

Appendix 53 (continued)

|                                   |              |              |
|-----------------------------------|--------------|--------------|
| Physics 21, General Physics       | 5            | 3            |
| Soils 1, Prin. of Soil Science    | 5            | 3            |
|                                   | <u>23</u>    | <u>19</u>    |
| <br>                              |              |              |
| <u>Second Semester</u>            | <u>Hours</u> | <u>Units</u> |
| Ag. Bot. 30, Elem. Plt. Physiol.  | 5            | 3            |
| Ag. Educ. 20, Elem Sociol.        | 3            | 3            |
| Agron. 1, Fund. of Crop Prod.     | 5            | 3            |
| An. Husb. 1, Fund. of An. Husb.   | 5            | 3            |
| Entom. 1, Introd. to Econ. Entom. | 5            | 3            |
| Physics 22, Gen. Physics          | 5            | 3            |
|                                   | <u>28</u>    | <u>18</u>    |

THIRD YEAR

|   |              |              |
|---|--------------|--------------|
| <u>First Semester</u>                                     | <u>Hours</u> | <u>Units</u> |
| Ag. Econ. 21, Ag. Econ. Stat. or<br>Stat. 11, Elem. Stat. | 5            | 3            |
| Agron. 5, Gen. Horticulture                               | 5            | 3            |
| An. Husb. 2, Livestock Pro'dn.                            | 5            | 3            |
| Micro 10, Microbiology                                    | 5            | 3            |
| English 10, Scientific Writing                            | 3            | 3            |
| Spanish 1, Elem. Course                                   | 3            | 3            |
|   | <u>26</u>    | <u>18</u>    |

|  |              |              |
|--|--------------|--------------|
| <u>Second Semester</u>                 | <u>Hours</u> | <u>Units</u> |
| Ag. Econ. 109a, Farm Mgt.              | 5            | 3            |
| Ag. Eng'g. 40, Irrig. & Drain.         | 5            | 3            |
| Agron. 10, Prin. of Field Crop Prod'n. | 5            | 3            |
| An. Husb. 3, Introd. Poultry Prod'n.   | 5            | 3            |
| Plt. Pathology 11, Prin. of Plt. Path. | 5            | 3            |
| Spanish 11, Elem. Course               | 3            | 3            |
|  | <u>28</u>    | <u>18</u>    |

|                                    |              |              |
|------------------------------------|--------------|--------------|
| <u>Summer</u>                      | <u>Hours</u> | <u>Units</u> |
| Accounting 1, Fund. of Mgt. Acctg. | 3            | 3            |
| Free Elective <sup>a</sup>         | -            | 3            |
|                                    | <u>3</u>     | <u>6</u>     |

FOURTH YEAR

|   |              |              |
|---|--------------|--------------|
| <u>First Semester</u>                               | <u>Hours</u> | <u>Units</u> |
| Mgt. 101, Bus. Org. & Behav.                        | 3            | 3            |
| Mgt. 115, Managerial Econ. &<br>Accounting Analysis | 3            | 3            |

Appendix 53 (continued)

|                                  |             |           |
|----------------------------------|-------------|-----------|
| Phil. Hist. & Institution 1      | 3           | 3         |
| Spanish 12, Intermed. Course     | 3           | 3         |
| Speculative Thought <sup>d</sup> | 3           | 3         |
| Agric. Elective <sup>b</sup>     | -           | 3         |
| Agric. Elective <sup>b</sup>     | -           | 3         |
|                                  | <u>15 +</u> | <u>21</u> |

| <u>Second Semester</u>                           | <u>Hours</u> | <u>Units</u> |
|--|--------------|--------------|
| Mgt. 105, Prod. Mgt.                             | 3            | 3            |
| Mgt. 181, Quantitative Methods<br>& Applications | 3            | 3            |
| Humanities I, Introd. to the Humanities          | 3            | 3            |
| Spanish 13, Intermed. Course                     | 3            | 3            |
| Social & Pol. Thought <sup>d</sup>               | 3            | 3            |
| Bus. Adm. Elective <sup>c</sup>                  | -            | 3            |
|  | <u>15 +</u>  | <u>18</u>    |

FIFTH YEAR

| <u>First Semester</u>           | <u>Hours</u> | <u>Units</u> |
|---------------------------------|--------------|--------------|
| Mgt. 141, Business Finance      | 3            | 3            |
| Mgt. 170, Marketing Mgt.        | 3            | 3            |
| Mgt. 160, Law and Business      | 3            | 3            |
| Introd. to Asian Civilization   | 3            | 3            |
| Bus. Adm. Elective <sup>c</sup> | -            | 3            |
| Bus. Adm. Elective <sup>c</sup> | -            | 3            |
|                                 | <u>12 +</u>  | <u>18</u>    |

| <u>Second Semester</u>                         | <u>Hours</u> | <u>Units</u> |
|--|--------------|--------------|
| Mgt. 190, Business Policy                      | 3            | 3            |
| Ag. Econ. 190, Sp. Problem<br>in Ag. Economics | 3            | 3            |
| Ag. Eng'g. 60, Farm Mech.                      | 8            | 4            |
| P.I. 100, Life & Works of Rizal                | 3            | 3            |
| Speech 1, Fund. of Speech                      | 3            | 3            |
| Agric. Elective <sup>b</sup>                   | -            | 3            |
|  | <u>20 +</u>  | <u>19</u>    |

TOTAL UNITS ..... 189

- 
- \*Required of all male students
  - \*\*Required of all female students
  - a Elective from either the College of Agriculture or Business Adm.
  - b Elective from the College of Agriculture
  - c Elective from the College of Business Administration
  - d Students may take Social Change in place of Speculative Thought or Pol. Thought.

Appendix 54

**The Master of Agricultural Business Management Program  
at the University of the Philippines**

The Master of Agricultural Business Management is designed for students wishing to develop professional competence in the business and managerial aspects of agricultural operations.

The program stresses the unique features of agribusiness decision-making and the identification of major commodity systems. It provides training in the special decision-making situations facing agribusiness executives and the opportunity to apply managerial tools and concepts to agribusiness problems.

The degree program is being offered with the active participation of the College of Agriculture of the University of the Philippines at Los Baños, particularly of its Department of Agricultural Economics. It is related to the Agricultural Business Management Program which is a joint undertaking of the Colleges of Agriculture and Business Administration.

The curriculum has been designed for persons with training or experience in commercial farm management and in general, for those who wish to pursue a career in the agribusiness industries which have to do with the production, processing, and distribution of agricultural commodities. The curriculum will be similarly useful for persons involved in formulating public policy for agribusiness matters.

Appendix 54 (continued)

The faculty uses the standard methods of instruction, i.e., lectures, field trips, films, business games, written and oral reports, and so on. The program's objective of training for decision-making, however, leads to a heavy use of the case method.

Classes use Philippine case materials written by the staff of the College's Division of Business Research. Cases available from the Philippine Case Clearing House, Inc. and other resources are also used.

Courses are scheduled on a four trimester basis. The MAB program calls for the completion of nineteen courses credited as forty-two units listed as follows:

Trimester I

Bus. Adm. 201: Economic Analysis. 2 units  
Bus. Adm. 211: Quantitative Methods in Business I. 2 units  
Bus. Adm. 220: Managerial Accounting and Control I. 2 units  
Bus. Adm. 251.1: Human Behavior in Organizations I. 2 units  
Ag. Econ. 209: Advanced Farm Management. 3 units  
Production problems of typical farms; farm business analysis and decision-making; application of research findings to production decisions; development of area agricultural programs.

Trimester II

Bus. Adm. 203: Managerial Economics. 2 units  
Bus. Adm. 212: Quantitative Methods in Business II. 2 units  
Bus. Adm. 221: Managerial Accounting and Control II. 2 units  
Bus. Adm. 251.2: Human Behavior in Organizations II. 2 units  
Bus. Adm. 265: Introduction to Agribusiness. 2 units  
A survey of Philippine agribusiness industries with emphasis on major agricultural commodity systems. The determination and appraisal of agribusiness problems and opportunities.

Trimester III

Bus. Adm. 222: Financial Management I. 2 units  
Bus. Adm. 238: New Enterprise Planning and Management. 2 units

Appendix 54 (continued)

- Bus. Adm. 240: Production and Operations Management I. 2 units  
Bus. Adm. 270: Agribusiness Management. 2 units  
This course deals with the management problems of firms and other agricultural industries in the national and international level. Emphasis is placed on (a) integrative arrangements that relate decisions and operations of the firm to the ultimate market and (b) institutional and other conditions usually encountered in agricultural business.
- Ag. Econ. 215: Economics of Marketing. 3 units  
Situational marketing problems affecting agricultural export and food crops; analysis of the economic factors which influence marketing cost and prices of major Philippine farm products.

Trimester IV

- Bus. Adm. 223: Financial Management II. 2 units  
Bus. Adm. 271: Special Topics in Agribusiness. 2 units  
Ag. Econ. 225: Public Problems in Agriculture. 2 units  
A critical analysis of the past and present programs of government agencies and farmers organization for economic betterment of agriculture. Term papers and reports are required.
- Ag. Econ. 290: Special Topics and Research Problems in Agricultural Economics. 2 to 4 units

Appendix 55

Summary of CLSU's Curriculum in Agribusiness Compared to the  
Traditional Bachelor of Science in Agriculture (BSA)

1. Two years of actual farm business experience (39 units) in contrast to none or very limited practical work in the present BSA curriculum.
2. Integrated production courses (crop production, 18 units; animal production, 18 units; in contrast to many separate 3 unit courses in the BSA curriculum).
3. Inclusion of 12 units of business courses. In most BSA curriculum, only 3 to 6 units are required.
4. Inclusion of only selected relevant general education courses (48 units only for Agribusiness compared to 70 to 95 units for BSA).
5. Six units of the Pilipino language instead of the required Spanish courses.
6. Provision for "earn-as-you-plan" programs in the third and fourth years.
7. Provision for a follow-up placement program.

Appendix 56

Bibliography of Agribusiness Cases and Technical Notes  
Published and Distributed by the Philippine Case  
Clearing House, Inc.

CASES BY:

Harvard Advisory Group

1. Philippine Seeds, Inc. - Integrated Rice Milling Operation, 1969 - integrated rice production
2. Borromeo Integrated Rice Case, 1969 - rice
3. Singer Sewing Machine Company - Farm Machinery Operation, 1969 - agricultural implements

Asian Institute of Management

1. Agro-Industrial Management Co., 1969 - agricultural consultancy
2. Nieves Timber Corporation, 1969 - logging, plywood sawmills
3. Insular Seeds, Inc. 1968 - seeds
4. Cattle Valley Corp. (A), 1970 - corn farming
5. Cebu Manufacturing Corp., 1970 - cornstarch
6. Rice and Corn Administration, 1970 - rice and corn
7. Cattle Valley Corp. (B), 1970 - corn farming
8. Hacienda Hermosa, 1970 - banana industry
9. Zamora Farms (A), 1970 - mango industry
10. Zamora Farms (B), 1970 - mango industry
11. Fleming Stewart Sdn, BHD, 1971 - fertilizer and insecticides
12. Pabrik Gula Brewidjaja, 1971 - sugar in Indonesia
13. Hacienda Vizcaya, 1971 - sugar industry
14. Hacienda Eugkadi, 1971 - sugar industry
15. Hacienda Eloisa, 1971 - sugar industry
16. Grains Marketing Cooperatives of the Philippines, Inc., 1971 - rice and corn distribution
17. Dandan Agricultural Cooperative and Marketing Association, Inc., 1971 - feed processing
18. Janopol Agricultural Cooperative Marketing Association, Inc. 1971 - poultry and livestock
19. Philippine Virginia Tobacco Administration, 1971 - tobacco industry
20. The Palm Oil Case, 1971 - palm oil industry
21. Consolidated Farms Corporation, 1971 - sugar industry
22. Kapitbahay Fisherman's Cooperative, 1973 - deep sea and municipal fishing
23. Topping Fish Dealer, 1973 - fish brokerage

Appendix 56 (continued)

24. Lorenzo Cruz - Fish Broker, 1973 - fish brokerage
25. Panay Fish Producers Cooperative Marketing Association, Inc., 1973 - fish brokerage

Ateneo University

1. Laguna Agro-Industrial Coconut Cooperative, Inc., 1969 - coconut plantation
2. Siasi Development Corporation, 1969 - coconut plantation
3. Imperial Livestock Industries, Inc., 1970 - poultry and livestock
4. Mabuhay Machineries, Inc., 1971 - farm equipment and sales
5. Mermaid Fish Trading Company, 1972 - dried fish industry

De La Salle College

1. La Carlota Sugar Central, 1969 - sugar
2. Victorias Milling Company, 1969 - sugar
3. Sugar Producer's Cooperative Marketing Association, Inc., 1969 - sugar
4. Western Visayas Sugar Central, 1969 - sugar
5. Luzon Sawmills, Inc. (A), 1969 - lumber
6. Luzon Sawmills, Inc. (B), 1969 - lumber
7. Bayanihan Feed Products, Inc., 1970 - feed milling

University of the Philippines

1. Filipino Food Sales, 1969 - food distribution
2. Sanchez Rice Farm, 1969 - rice
3. Makati Supermarket Corporation, 1969 - food distribution
4. Pogi Sons Trading, 1969 - food distribution
5. Cabanatuan City Facoma, 1969 - rice
6. Delta Manufacturing Corporation, 1969 - meat packing, food processing
7. The Integrated Poultry Farm, 1970 - poultry, turkey farm expansion
8. United Commodities Corporation, 1970 - corn milling

TECHNICAL NOTES BY:

Harvard Advisory Group

1. Notes on the Rice Industry, 1969

Asian Institute of Management

1. The Giant Grass Industry, 1969
2. Notes on the Corn Industry, 1970

Appendix 56 (continued)

Ateneo University

1. Reference Note on the Philippine Coconut Industry, 1970
2. Reference Note on the Philippine Fertilizer Industry, 1970

University of the Philippines

1. The Philippine Beef Cattle Industry, 1970

Appendix Table 57

Sectoral Employment Classification of 1970-72 AIM Graduates  
and Agribusiness Majors

|  | Total Graduates |                | Agribusiness Majors |                |
|--|-----------------|----------------|---------------------|----------------|
|  | <u>Number</u>   | <u>Percent</u> | <u>Number</u>       | <u>Percent</u> |
| Industrial Manufacturing                                 | 46              | 21.7           | 20                  | 32.3           |
| Banking and Finance                                      | 33              | 15.6           | 9                   | 14.5           |
| Agribusiness   | 24              | 11.3           | 9                   | 14.5           |
| Consulting Firms   | 22              | 10.4           | 7                   | 11.4           |
| Trading and Commerce                                     | 20              | 9.4            | 6                   | 9.7            |
| Transportation, Communication<br>and Utilities           | 13              | 6.1            | 2                   | 3.2            |
| Educational Institutions                                 | 10              | 4.7            | 2                   | 3.2            |
| Services   | 5               | 2.4            | -                   | -              |
| Construction   | 5               | 2.4            | 2                   | 3.2            |
| Government Agencies (other<br>than agriculture-oriented) | 4               | 1.9            | 1                   | 1.6            |
| Private Foundations                                      | 3               | 1.4            | 1                   | 1.6            |
| Mining   | 2               | 0.9            | 1                   | 1.6            |
| Others <sup>1/</sup>                                     | <u>25</u>       | <u>11.8</u>    | <u>2</u>            | <u>3.2</u>     |
| Total  | 212             | 100.0          | 61                  | 100.0          |

<sup>1/</sup> Twenty-three graduates, thirteen of which came from the Philippines and the rest from other Asian countries, did not report the nature of their employment. Of two graduates who reported the nature of employment, one was a general agent while the other was connected with a religious association.

Source of Basic Data: AIM Alumni Directory

Appendix Table 58

Estimated High-Level Manpower Requirements in Agriculture<sup>1/</sup>  
1967-1973

|                     | <u>No.</u> | <u>%</u> | <u>No.</u> | <u>%</u> | <u>School</u> | <u>Percent<br/>Distribution<br/>Government</u> | <u>Private<br/>Firms</u> |
|---------------------|------------|----------|------------|----------|---------------|--|--------------------------|
| <u>B.S.</u>         |            |          |            |          |               |  |                          |
| Social Sciences     | 1,781      | 70       | 6,933      | 63       |               |  |                          |
| Plant Sciences      | 356        | 14       | 1,761      | 16       |               |  |                          |
| Animal Sciences     | 102        | 4        | 660        | 6        |               |  |                          |
| Physical Sciences   | 51         | 2        | 880        | 8        |               |  |                          |
| General Agriculture | 254        | 10       | 1,101      | 7        |               |  |                          |
| Total               | 2,544      | 100      | 11,005     | 100      | 46            | 42   | 12                       |
| <u>M.S.</u>         |            |          |            |          |               |  |                          |
| Social Sciences     | 43         | 35       | 227        | 31       |               |  |                          |
| Plant Sciences      | 36         | 29       | 219        | 30       |               |  |                          |
| Animal Sciences     | 25         | 20       | 139        | 19       |               |  |                          |
| Physical Sciences   | 19         | 16       | 146        | 20       |               |  |                          |
| Total               | 124        | 100      | 731        | 100      | 81            | 12   | 7                        |
| <u>Ph.D.</u>        |            |          |            |          |               |  |                          |
| Social Sciences     | 1          | 6.5      | 40         | 31       |               |  |                          |
| Plant Sciences      | 1          | 6.5      | 56         | 25       |               |  |                          |
| Animal Sciences     | 4          | 27       | 39         | 22       |               |  |                          |
| Physical Sciences   | 9          | 60       | 36         | 22       |               |  |                          |
| Total               | 15         | 100      | 181        | 100      | 80            | 20   | -                        |

Source of Basic Data: Leonor, Mauricio D. "High-Level Manpower Needs in Agriculture as Reported by Employers," Unpublished Ph.D. dissertation, U.P. College of Agriculture, 1969.

<sup>1/</sup>Taken from J. D. Drilon Jr., "Manpower Development for the Agribusiness Sector," Southeast Asian Quarterly, Central Philippine University, 1970.

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