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HOW PRICE STABILIZATION WOULD WORK IN BELIZE

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EXECUTIVE SUMMARY

Price stabilization for staple commodities such as rice, red kidney beans, and corn would work in Belize if the necessary support and resources were provided to the price stabilizing agency. Price stabilization is an integrated marketing approach that allows commodity producer prices to freely vary within a target band composed of a floor price and a ceiling price. The floor price and the ceiling price are set in order to protect producers from exceptionally low prices and to protect consumers from exceptionally high prices, respectively. The level of the floor and ceiling prices and the width of the target band dictate to a great extent how much the price stabilization agency will be involved in the market and also how much the necessary budget will need to be for the agency. Price stabilization is generally undertaken by most countries because the direct and indirect benefits to producers, consumers, and the private sector outweigh the costs of the program.

In this concept paper, the mechanics of how price stabilization in Belize would work for rice, red kidney beans, and corn is given a thorough discussion and analysis using data and information collected and evaluated over the past few months and years. An application of price stabilization techniques to Belize using various scenarios is made for each of the three commodities using a realistic target band with floor prices and ceiling prices based on projected supply/demand relationships and historical and border (international) prices, respectively. Benefits to producers and consumers and costs to the Belize Marketing Board (BMB), the price stabilizing agency are calculated along with overall benefit/cost ratios that indicate how economically feasible the price stabilization programs are. The benefits of a price stabilization program for rice in Belize would exceed the costs of the program given the two scenarios provided in this paper. The benefits of a price stabilization program for red kidney beans would outweigh the costs of such a program given the scenario of an oversupply of red kidney beans and the BMB's need to maintain producer prices near the floor price. When the scenario of a sharp drop in red kidney bean production in Belize is followed through, however, the price stabilization program does not provide greater benefits to producers and consumers than it does costs to the BMB. For corn, since there is no export market from Belize, price stabilization can become a very costly program if the BMB ends up with stocks of corn it cannot market. The two scenarios described in this paper for corn price stabilization do indicate, however, that the benefits outweigh the costs of such a program.

SECTION I

INTRODUCTION

Purpose

The purpose of this paper is to give a conceptual view of how price stabilization in basic grains would work in Belize. The Government of Belize (GOB) has decided that the Belize Marketing Board's (BMB) role in the marketing of basic grains should be solely one of price stabilization and not one of direct price intervention. At present, BMB buys, imports, stores, mills, and sells basic grains. This merchandising of grain using controlled prices is carried out at a relatively high cost to the government.

SECTION II

PRICE STABILIZATION

Price stabilization is an integrated marketing approach whereby market prices are allowed to freely vary within a target band composed of a floor price and a ceiling price. The approach is integrated in that once the free market price for a particular basic grain is projected, for example, to fall below the floor price, the price stabilizing agency stands ready to buy the necessary quantities to bring the market price back to or above the floor price. The price stabilizing agency then stores and/or exports the grain depending on projected grain supplies for the crop year and inter-year food security needs. If the free market price is projected to rise above the ceiling price, the price stabilizing agency stands ready to sell or inject into the market the necessary quantities to bring the market price back to or below the ceiling price.

In a price stabilization program, there are two basic mechanisms for accomplishing quantity adjustments in the marketplace. These mechanisms are the price stabilizing agency's (BMB's) storage operations and stabilizing trade adjustments. In storage operations, storage stocks are built from market withdrawals when market prices are depressed and released from storage into the market when prices are high. With stabilizing trade adjustments, additional exports are made from domestic market withdrawals to maintain the floor price and additional imports are made for injection into the market to maintain ceiling prices. National price stabilization agencies in most countries of the world use both mechanisms to achieve domestic price stabilization.

SECTION III

PRICE STABILIZATION IN OTHER COUNTRIES

All countries have some policy and form for price stability, ranging from centrally controlled economies (such as that found in socialist countries) to more liberalized systems (such as that found in capitalist countries). The Belizean economy has a more liberalized economic system similar to that found in many underdeveloped capitalist countries. Countries like Belize with a relatively small gross national product (GNP) and resource base have implemented price stabilization programs similar in both institutional design and in the actual commodities marketed. For example, the Dominican Republic, Costa Rica, and Panama have price stabilizing agencies similar in function to the restructured BMB in Belize. In these countries, rice is a dominant staple commodity receiving a great deal of attention. The challenge in any country is to find the right policy and approach for that country that will (1) give the highest social return for the least cost, and (2) encourage private sector participation by creating the right legal, regulatory, and social environment.

SECTION IV

SUPPORT AND RESOURCES NEEDED FOR IMPLEMENTING PRICE STABILIZATION

To implement price stabilization, the understanding, support, and cooperation from various government ministries (including the Ministry of Agriculture (MOA), Ministry of Commerce, Industry and Transport (MOCIT), Ministry of Finance (MOF), and Ministry of Economic Development (MED)), BMB, District Agriculture Officers, private grain growers, the grain storage private sector, grain exporters, and other influential organizations or people will be needed. Since international trade is a very important part of any price stabilization program, all those government ministries and agencies involved in regulation and management of commodity imports and exports must interact continuously to insure that the public functions in international trade are done systematically, efficiently, and effectively. Those public functions (including registration of traders, licensing of grain and grain product import (export) traders, issuing import (export) orders, issuing import (export) permits, issuing custom inspection and clearance reports, and issuing foreign exchange clearance reports), if viewed as a system, would each be located in one government ministry or agency with clear and direct lines of interaction to those performing the other functions. This would permit clear accountability with authority and responsibility, and would provide the basis for prompt response and consistent regulatory action at all levels in the system.

The system for management of regulatory functions for commodity imports and exports as it might operate to support price stabilization is illustrated in Table 1. The illustration shows rather clear separation of regulatory functions and linkages at each step among ministries and agencies. The system illustrated represents relatively small changes in existing ministerial jurisdiction in Belize, but the linkages are more clear and straight forward.

The resources needed by BMB for carrying out price stabilization would include access to (1) either or both public and private grain storage and rice milling facilities, (2) direct communication lines to current domestic and international market information, and (3) financial resources for supporting the price stabilization buying, storing, and selling activities as well as administration costs. The projected financial support needed by the BMB must be clearly expressed to MOA and the MOF well in advance of the release of the support funds.

TABLE 1

ILLUSTRATION OF GRAIN IMPORT (EXPORT) REGULATION IN BELIZE

AGENCY RESPONSIBLE	REGULATORY FUNCTION	COORDINATING AGENCY
MOCIT	Registration	MED, MOF
MOF	Trader License	MOC, MOA
MOA (BMB)	Import (Export) Orders	MOC, MOF
MOC[1]	Import (Export) Permits	MOA, MOF
MOF (Customs)	Custom Clearance	MOA - Quarantine MOH[2], Central Bank
MOF	Foreign Exchange Clearance	MOC, MED (CSO)

[1] Ministry of Commerce

[2] Ministry of Health

SECTION V

EFFECTS OF PRICE STABILIZATION ON PRODUCER AND CONSUMER PRICES

Price stabilization involves explicitly setting a floor on producer prices of the staple commodity that protects producers from exceptionally low producer prices and setting a ceiling on producer prices (implying a maximum consumer price) that protects consumers from exceptionally high prices that could otherwise result in excessive food expenditures. The floor price is determined using historical prices (if available) and the projected market price after harvest derived from supply and demand relationships. Since the role of the price stabilizing agency is not to become a competitor with other buyers, the floor price should be set lower than the projected price. A reasonable method for deciding on a floor price would be to set it at approximately 85 percent of the projected price. The price stabilizing agency would stand by to buy at approximately the floor price the staple commodity when the agency expects the market price to fall below the floor price.

A ceiling price on producer prices is also set when price stabilization is implemented. The ceiling price plus the gross marketing margin (including storage costs) would reflect the maximum consumer price. For a price stabilizing agency, one way of selecting the ceiling price is to use the highest producer price in the market in the past 5 years. That price must not have been so high as to create economic hardships for the consumers. That price must also not be lower than border (international) prices, otherwise the price stabilizing agency would be subsidizing the consumer when it imported the commodity to maintain the ceiling price. In the case of corn, the highest producer price for corn in the past 5 years has been about $0.25/lb, while border (international) corn prices have been considerably below $0.25/lb during that same period.

SECTION VI

FINE TUNING BMB'S PRICE STABILIZATION ACTIVITIES

In order to implement a price stabilization program, BMB must have a data management system that is capable of providing BMB management with current and future domestic supply and demand projections, up-to-date nationwide inventory levels, projected import requirements of the Caribbean Community (CARICOM) countries, current CARICOM countries' border prices, milling schedules and capacity changes, shipping schedules and rates, etc.

The supply data included in this management system would include (for basic grains by District and by farming system):

1. Production data
2. Harvesting pattern
3. Storage pattern
4. Marketing pattern
5. Inventory levels
6. Producer prices - domestic and border
7. Supply response

The demand data included in this management system would include:

1. Household expenditure data
2. Macroeconomic data
3. CARICOM importing needs
4. Wholesale and retail prices
5. Demand response - price elasticities

The data available in Belize and supplied to the BMB needs to be scrutinized, cross-checked and validated whenever possible in order to make sure of its accuracy, reliability, and consistency. BMB management will utilize this data management system to assist them in determining appropriate floor and ceiling prices for paddy.

SECTION VII

BENEFITS AND COSTS OF PRICE STABILIZATION

Most countries of the world have price stabilization programs for staple commodities because they expect the benefits to exceed the costs. When the price stabilizing agency maintains floor prices for staple commodities, the incomes of producers are supported particularly during the peak harvest period. When the price stabilizing agency maintains ceiling prices, the food expenditures for consumers does not become excessive. When these direct benefits are achieved, indirect benefits also occur through support to economic development, improved marketing systems, and general welfare.

Implementing a price stabilization program involves administrative costs and also direct costs to the price stabilizing agency in the following activities:

1. Commodity analysis
2. Procuring and receiving
3. Selling and shipping
4. Maintenance of buffer stocks, and
5. Import (export) trade adjustments

These costs are associated with activities necessary for maintaining domestic market prices within a target band. If the target band is kept relatively wide so that most sales clear through private channels, the price stabilizing agency would likely be involved in only modest procurement and/or selling activities. If floor prices are narrowed and/or ceiling prices lowered to narrow the target band the price stabilizing agency may be procuring and/or selling much larger volumes of commodities.

Since the price stabilizing agency is involved in selling and exporting, the agency is able to generate revenue that may be sufficient to cover or even exceed all costs (variable and fixed).

Price stabilization also involves storing and maintaining inter-year stocks of staple commodities for the purpose of having food reserves in years of shortages. If most of the risk of price fluctuations because of unforeseen year-to-year changes in supply or demand quantities is borne by the producers, consumers, and the private sector, then the costs to the price stabilizing agency are minimized.

SECTION VIII

MECHANICS OF PRICE STABILIZATION BY COMMODITY

The three grain commodities in Belize that have been identified as staple commodities to be included in the price stabilization program of the BMB are rice, red kidney beans, and corn. Each of these commodities will be discussed in the context of a relevant price stabilization program.

RICE

Present Prices

Producer prices for paddy. The price for paddy bought by the BMB is controlled. A maximum of $0.24/lb is paid to producers that bring the paddy to either the Punta Gorda or the Big Falls-Toledo buying offices of the BMB. This producer price has remained the same since the 1982/83 crop year even though costs of production have changed and the domestic supply of paddy has fluctuated from year-to-year. Producers in Toledo have been able to sell their paddy to the BMB regardless of the quantity produced. In terms of quality, the producers need only keep the percentage foreign matter down below 4 percent and the percentage moisture content below 14 percent to receive $0.24/lb for the paddy.

The Mennonites pay their producers in Blue Creek Village and other areas of Orange Walk District a cif (rice mill) price of about $0.21/lb of paddy. The rice after milling is sold to private distributors who come to the mill for pick-up or sold door-to-door in various cities and towns in Belize, Cayo, Orange Walk, and Corozal Districts. Since the Mennonites have their own storage facilities and rice mills they are able to streamline their production, processing, and marketing thereby cutting costs and remaining highly efficient.

In Dangriga, a private producer, named Duquesney, produces mechanized rice on 500 acres of land. Since he has adequate storage capacity (for over 1.5 million pounds of rice) and a small rice mill he is also able to streamline his production, processing, and marketing operations. He estimates his cost of production at about $0.15/lb of paddy. He values his inventory of paddy (not including storage costs) at $0.25/lb.

Wholesale prices of milled rice. BMB sells its milled rice directly from its warehouses at both Belize City and at Big Falls-Toledo. The rice is predominantly the long type (although many varieties are represented), 1/2 to full grain, fairly clean, with about 30 percent brokens, and is sold at $50/cwt.

The Mennonites have three rice mills each producing long-grain ungraded milled rice. Two mills located in Shipyard produce different qualities of milled rice. One small miller having a milling capacity of 0.5 tons/hour produces milled rice with a high percentage foreign material and brokens. He markets his rice by selling the rice door-to-door in various cities, towns, and villages, or by selling to distributors that pick up the rice at the mill. When he sells door-

to-door the price is $48/cwt. A second miller having a milling capacity closer to about 1 ton/hour produces milled rice that is ungraded and very low in foreign material. He sells most of his milled rice to a distributor for $45/cwt, and if the rice is of higher quality with less broken rice the price reaches $47/cwt. To other buyers he sells his milled rice for $46/cwt (with higher quality, less broken rice at $48/cwt). The third miller, located in Spanish Lookout, having a mill capacity of about 0.4 tons/hour, sells his milled rice door-to-door in Cayo and Belize Districts at a price of about $50/cwt.

Duquesney in Dangriga sells his rice in Stann Creek District for $47/cwt. His rice is long-grain rice that is partially graded and contains little foreign material.

Paddy Storage Potential

BMB's storage operations are a critical link to the success of a price stabilization program. Upon implementation of price stabilization, BMB will have decided whether to use its own Belmopan storage facilities, lease the Belmopan storage facilities after divestiture, lease storage facilities at the Big Falls-Toledo grain complex, or erect new suitable facilities elsewhere. The pros and cons of each are examined below.

Storing at the Belmopan facility. BMB's Belmopan facility has remained unused for a considerable amount of time. Although the facility was originally constructed as both a feed mill and storage facility for corn, many pieces of equipment have been either transferred out of the facility for use at BMB's Big Falls-Toledo grain complex or have become useless because of being left idle for such a long time. Investors have expressed interest in buying the facility in its present state. If the facility was sold to investors but it was agreed beforehand that BMB could have a long-term lease on a portion of the storage facilities, then it is possible that as much as 3 million pounds of paddy bought by BMB could be stored at this facility. If the facility was held (not sold) by BMB as a storage facility then BMB would be expending for continual maintenance of the facility while only using the storage facilities (an expensive alternative that simply lets valuable assets depreciate without being productively used). Whether the facility was sold or held by BMB, the storage facilities would need to be renovated or replaced before they could be used efficiently for grain storage. Investors in the Belmopan facilities would be able to renovate the mill and the storage facilities cheaper than the BMB/GOB. To that end, such investors would charge BMB for leasing a portion of the storage facilities based on the initial investment cost and the cost of renovation of the facilities.

The biggest drawbacks of BMB's using the Belmopan facility for storage is (1) that the attachments and conveyors to the bins at Belmopan need to be replaced or portable conveyors installed, and (2) paddy would probably have to be transported up from the marketing centers or the Big Falls grain complex in Toledo and then when the paddy is to be milled be sent either back down to Big Falls-Toledo complex for milling or over to the private mill at Spanish Lookout. The additional handling and transport requirements would also be expensive.

Storing at Big Falls-Toledo Grain Complex. BMB's Big Falls-Toledo rice mill and storage facility will be renovated within the next year and may possibly be given additional storage facilities (to bring the complex up to a total storage capacity of 5.6 million pounds). The complex will be renovated so to be capable of milling export quality milled rice. Since BMB has been buying, storing, and milling paddy in the Toledo area for many years, to continue to do these operations in this area in a leasing arrangement with the eventual owners of the complex would be much more practical, economical, and more likely to give success to the price stabilization program.

Erecting new facilities. It is possible that new storage facilities could be built for storing price stabilization stocks of grain. However, the facilities would not necessarily be fully utilized. Furthermore, maintaining the facilities would be expensive and judging from the maintenance of other government facilities not done efficiently.

This alternative should not be high on the priority least until all other alternatives are examined carefully.

Potential For Importing Or Exporting Milled Rice

Price stabilization using quantity controls to impact market prices is very difficult to implement if imports or exports of the grain are not an optional activity. Given a situation where there is a large surplus of paddy produced in Belize, it would be extremely costly for the Government to have the large surplus of grain stored from year-to-year.

BMB has imported milled rice from various countries for many years. The domestic market has responded favorably to both the quality and the price of imported rice. If the need arises in Belize where milled rice prices are projected to exceed the ceiling price due to a shortage of domestically produced rice, BMB would be in a good position to supplement stored stocks of rice by authorizing importer(s) to import milled rice.

Milled rice has not been exported from Belize since the early 1980's. As a member of the CARICOM countries, Belize is in a position to export milled rice to any country within the CARICOM without having any duty imposed on its rice. The market for rice in the CARICOM countries is estimated to be between 150 and 200 million pounds per year. With a rapidly growing population (currently about 5.5 million people), the quantity of rice demanded by the CARICOM countries is likely to continue to grow by 2-3 percent per annum. Belize represents one of only two major rice producing countries in the CARICOM. Belize is a major rice producer in the sense that it was self-sufficient as compared to all other CARICOM countries (except Guyana) being heavy importers of rice. There are a number of constraints that the Government of Belize must deal with before the export of rice can become a viable marketing alternative. The constraints would include the following:

1. The quality of milled rice exported from Belize must be competitive with the quality of milled rice exported from countries such as the USA to the CARICOM countries. The USA exports Grade #2 long-grain rice (with less than 4 percent brokens) to the CARICOM countries. Guyana also exports

milled rice to the CARICOM countries. The quality of its exported rice is not known by the author. The quality of milled rice exported by Belize will need to be a quality much greater than that domestically produced and marketed in Belize these days and in the past. Domestically produced and marketed milled rice is of relatively poor quality having on average about 30-35 percent brokens. To upgrade the quality of milled rice exported, rice mills in Belize will need to be renovated. Better rice cleaners and cylindrical graders will need to be installed and used to mill rice destined for the export market.

2. BMB must have its own or private sector contracted storage space for buffer stocks and export destined rice. While BMB is still milling its own purchased paddy at Big Falls-Toledo, getting milled rice ready in-house for export in a timely fashion will not present major problems. However, when BMB divests itself of its milling facilities, BMB could find itself "waiting in line" to have its paddy milled by the private sector. Waiting in line could mean waiting as long as a couple of months since there is such a glut of paddy at harvest time. BMB could either:

   A. Make an arrangement with the Big Falls-Toledo mill owner (which is foreseen to be the GGA) to have first priority at getting paddy milled if it is destined for export. Such an arrangement could result in problems with maintaining an adequate domestic supply of milled rice, especially if a large amount of paddy has to be milled in a short period of time for export purposes. A temporary shortage in domestic milled rice could be prevented if other millers were able to supply milled rice on the domestic market. But they may not have the milling capacity (at present, the milling capacity of the private sector's four operating rice mills is about 2.5 tons per hour) or in the case of other millers prefer to store paddy (keep milled rice off the market) until prices are expected to peak or at least become more favorable, or

   B. Hold on to its Big Falls-Toledo facility until such time that it was certain that other millers had sufficient milling capacity and the willingness to mill enough rice to meet domestic rice demands even during those postharvest days when rice is being milled for export.

An Application Of Price Stabilization In Belize

An example of the methods used for price stabilization for rice in Belize would include (1) projecting supply/demand quantities of paddy at harvest and determining the demand curve for rice in Belize, (2) setting a target band, (3) estimating necessary storage stock and trade adjustments, and (4) determining the benefits and costs of the program.

Projecting supply/demand quantities of paddy and determining the demand curve for rice in Belize. Determining how much paddy will be marketed must be anticipated well before harvest time. Using data such as planting acreage, current crop reports, and historical yields, harvesting, storage, marketing and utilization patterns should allow the BMB management to project the quantity of paddy to be produced and marketed. In such a way, the amount of surplus paddy

or the amount of deficit paddy at harvest can be dealt with in a timely fashion using the storage and trade mechanisms discussed earlier. The actual quantity adjustment that may be needed by BMB will be a function of the demand curve for rice in Belize and the implicit price flexibilities of demand. Since historically paddy prices have been controlled regardless of the supply, the demand curve for rice in Belize is difficult to determine. As a proxy, the demand curve for basic (staple) grains in developing countries is illustrated in Figure 1. At each point along this demand curve (DD) a price flexibility of demand can be determined. The price flexibility would be equal to the ratio of the percentage change in prices expected with a 1 percent change in quantity supplied. If the price flexibility were known, and if the market price was, for example, expected to be $0.24/lb soon after harvest, and BMB's floor price was $0.28/lb, BMB could determine how much paddy would need to be withdrawn from the market to maintain prices at approximately the floor price.

Setting a target band. To set a target band both a floor and a ceiling price are needed. If a market price for paddy (delivered to Big Falls-Toledo rice complex at less than 4 percent foreign matter, less than 14 percent moisture, and long-grain) was projected using supply/demand relationships to be $0.33/lb at the time of harvest, and the floor price would be set at 85 percent of that projected price, the floor price would be $0.28/lb. The price of $0.28/lb would serve as an incentive for additional domestic rice production because it would eliminate downside price risk while serving as the minimum guaranteed producer price.

If the ceiling price for paddy was based on (1) the highest historical, wholesale, milled rice price (for clean, less than 4 percent brokens, long-grain rice) in Belizean markets in the past 5 years minus the gross marketing margin, or (2) the projected border (international) price (minus the gross marketing margin), as long as that border price was higher than the highest Belizean wholesale price figured in (1), that ceiling for producer prices would be about $0.41/lb. The gross marketing margin assumed a milling yield of 62 percent, a milling cost of $0.10/lb and a transport cost of $0.035/lb.

Estimating necessary storage and trade adjustments. In Figure 1, if BMB expects the market price for paddy to fall just after harvest below the floor price, $0.28/pound, because supply quantities of paddy on the market are greater than its projection, BMB would need to withdraw (and store and export) some quantity of paddy (in this illustration, 2 million pounds over a 2-month period) from the market at approximately $0.28/pound to get the price stabilized at or above the floor price.

On the other hand, assume BMB expects the market price for milled rice to rise to approximately $0.91/lb, i.e., well above the maximum consumer price of $0.78/lb (equivalent to a producer ceiling price of $0.41/lb), in August or sometime before the end of the crop year because projected market quantities are expected to be short. BMB, then, would inject a quantity of milled rice into the market to maintain market prices of milled rice at approximately the maximum consumer price ($0.78/pound).

Benefits and costs. Two scenarios are developed and benefits and costs are determined for each. In Scenario 1, suppose 15 million pounds is projected to

be harvested between September and December. Let us also assume that BMB projects a domestic demand of 7.5 million pounds of milled rice (equivalent to about 13 million pounds of paddy). BMB projects, then, 2 million pounds of surplus paddy. Suppose that BMB projects the market price to be $0.33/lb at harvest. In that event, it would set the floor for producer prices at $0.28/lb. If, at harvest, BMB saw producer prices falling and expected the prices to fall below the floor price, BMB would buy that quantity of paddy that would stabilize prices at or above the floor price. In this scenario, the quantity BMB would buy would be approximately 2 million pounds of paddy (Figure 1). The paddy BMB buys would then be stored as paddy and/or exported as milled rice. Not all would be exported as a portion of the 2 million pounds of paddy must be stored as a food security measure. Food security measures must be considered in the event some of the paddy becomes damaged or the milled rice discolored before the end of the crop year and cannot be marketed. Let us say 1 million pounds of paddy is kept for food security purposes in the Big Falls-Toledo storage facilities, that would leave 1 million pounds of paddy available immediately for export as milled rice. The to-be-exported paddy would probably be contracted out for milling to the Big Falls-Toledo mill. The contract would specify the date when the million pounds of paddy would have had to have been milled and delivered to the BMB's warehouse in Belize City. Once the contract has been agreed on, BMB would authorize an exporter to export the milled rice (approximately 620,000 pounds) to a CARICOM country that imports rice.

BMB would continue to store the 1 million pounds of paddy for food security until such time before the next crop year that BMB knows there will be more than enough milled rice to meet the domestic demand until the next crop is milled and ready for market. A reasonable time for BMB's decision to be made would be late May. If its stored paddy is not needed domestically (though 250,000 pounds of paddy would be kept in storage until the next crop is ready for the market), BMB would contract out in June the milling of its paddy stored in the Big Falls-Toledo storage complex to probably the Big Falls-Toledo mill. The arrangements for exporting the milled rice in July would also be made in June. July being a better month for exporting the crop as it is the month preceding the harvest in competing countries like the US, therefore, prices received typically include the costs of storage.

In Scenario 2, suppose BMB projected a sharp decline in domestic paddy production to about 10 million pounds due to weather related problems during the growing season. Also, suppose the world supply quantities were also rather tight resulting in relatively high border prices. Assume BMB projects a domestic demand of about 7.5 million pounds of milled rice (about 13 million pounds of paddy equivalent). A shortage of about 3 million pounds would be projected. Suppose BMB decides the ceiling price to be $0.41/lb (based on the highest consumer price (paddy equivalent price) in Belize in the past 5 years). If, in May, 7 months after the rice is harvested in Belize, BMB expects producer prices to reach $0.48/lb (due possibly to hoarding of paddy in Belize), BMB then authorizes enough milled rice to be imported at border prices (projected to be a paddy equivalent price of $0.38/lb) to keep domestic producer prices well below the ceiling price and much closer to the border price. Over 4 months, suppose then that 2.015 million pounds of milled rice (equivalent to 3.25 million pounds of paddy) is imported, with 155,000 pounds of milled rice (250,000 pounds of paddy) kept for food reserve until the end of the crop year. Domestic market

prices during the last 5 months of the crop year are assumed to remain at approximately the border price (paddy equivalent price of $0.38/lb).

Estimated Direct Benefits to Producers

The direct benefits of the price stabilization program in Scenarios 1 and 2 are given in Table 2. In Scenario 1, producers who marketed their paddy in October-November clearly benefited when BMB withdrew paddy supplies from the market, since producer prices were maintained at $0.28/pound, when otherwise prices would have fallen to $0.24/pound. The total producer benefits were $412,000.

In Scenario 2, producers who marketed their paddy in May-August had negative benefits (totaling $-140,000) when BMB had milled rice imported and injected into the market. When imported rice was supplied to the market, producer prices stabilized at about $0.38/lb. Had rice not been injected into the market, prices would have reached (according to BMB's projection) $0.48/lb.

Estimated Direct Benefits to Consumers

Estimated direct consumer benefits in Scenarios 1 and 2 are given in Table 3. In Scenario 1, consumers experienced negative benefits in October-November as the price of paddy was $0.04/lb higher than the market price would have been had BMB not bought paddy. This Scenario assumes the millers pass on the $0.04/lb to the consumers of milled rice. The total negative benefits to consumers were $-86,660.

In Scenario 2, consumers received positive benefits (totalling $433,200) in May-August as BMB stabilized the price of milled rice at the border price (a paddy equivalent price of $0.38/lb). Had supplies of paddy not been injected into the market, producer prices would have reached $0.48/lb, according to BMB's estimate.

Direct Costs Of Price Stabilization

Following Scenario 1 of price stabilization for rice, the costs of such a program to the BMB would be estimated from the quantities of paddy purchased and sold or exported (Table 4). The BMB would need to purchase 1 million pounds of paddy monthly in October and November to maintain a floor of approximately $0.28/lb on producer prices. One million pounds of paddy would be milled in November and exported to a CARICOM country. One million pounds of paddy would be stored until a portion is exported in August. The ending stock of paddy would be 250,000 pounds. If storage costs are $0.0025/lb for the first month of storage and $0.0015/lb for the each of the following months, the total storage costs would be $16,750. If other variable costs including handling, transport, and merchandising were estimated at 10 percent of purchasing costs, then total variable costs would be $72,750.

The merchandising margin would amount to the total sales revenue ($505,000) plus the value of the carryover inventory ($70,000) minus the total purchasing costs ($560,000). BMB has earned a merchandising margin of $15,000, which would cover a portion of the total variable costs.

Other expenses to the BMB would include fixed costs for administration, maintenance of facilities, insurance, interest, depreciation, etc. These fixed costs are estimated at $100,000 per year. Total direct costs to the BMB in Scenario 1 would be approximately $157,750.

In Scenario 2, the costs of the price stabilization program would be estimated from the quantities of rice imported and injected into the market (Table 5). Each month from May-August, BMB would have injected 465,000 pounds of milled rice (750,000 pounds of paddy equivalent) into the market in order to stabilize prices at the border price. Variable costs would include storage costs ($0.0025-/lb/first month of storage and $0.0015/lb/each month following the first month) for the 155,000 pounds of milled rice stored from August-September would be about $1000. Other variable costs ($123,500) would include handling, transport, and merchandising estimated at 10 percent of total purchasing costs. Total variable costs would then be estimated at $124,500. These variable costs are then adjusted by the merchandising margin and the fixed costs.

The merchandising margin would amount to the total sales revenue ($1,140,000) plus the value of the carryover inventory ($95,000) minus the total purchasing costs ($1,235,000). The merchandising margin would in this case be equal to $0.

Other expenses to the BMB would include fixed costs for administration, maintenance of facilities, insurance, interest, depreciation, etc. These fixed costs are estimated at $100,000 per year. Total direct costs to the BMB in Scenario 2 would be approximately $224,500.

Estimated Benefit Cost Ratio

In Scenario 1, total direct benefits to producers and consumers were $325,340 and the total direct costs to the BMB were $157,750. The benefit/cost ratio then becomes 2.06, implying that the benefits are over twice as great as the costs for such a scenario.

In Scenario 2, total direct benefits to producers and consumers were $273,200 and the total direct costs to the BMB were $224,500.

The benefit/cost ratio then becomes 1.22, implying that the price stabilization program was economically feasible.

Stabilization of Belize paddy prices within the target band in both Scenario 1 and 2 would have generated indirect benefits to producers, consumers, and private industry. Although the magnitude of such benefits would be difficult to quantify without further research, the sources of these indirect benefits can be mentioned. If producers have assurance that BMB will maintain reasonable floor prices for paddy, then these producers will be responsive to agricultural development programs designed by the Government and BMB to improve agricultural income in Belize. If consumers have confidence that BMB will maintain adequate supplies of rice at reasonable prices in the marketplace, the consumers will be responsive to and invest in public programs to enhance living standards and public welfare. If the private sector involved in the grain processing and marketing industry has confidence that reasonable market stability of basic grain

and grain products will be maintained, the private sector will respond to investment and development incentives to improve the total food system in Belize. Furthermore, a strong agricultural based economy is the foundation for a strong industrial nation.

RED KIDNEY BEANS

Present Prices

Producer prices. The price for red kidney beans bought by BMB is controlled. A maximum of $65/cwt is paid to producers that bring red kidney beans (clean with no more than 14 percent moisture content) to various BMB centers in Belize. This producer price has remained the same since the 1982-83 crop year even though costs of production have changed and the domestic supply of red kidney beans has fluctuated from year-to-year. The current cost of production for red kidney beans has been estimated at about $0.56/lb ($255/acre/450 lb/acre) by the Mennonites in Spanish Lookout. The production of red kidney beans in the past 3 years, 1986-1989 has been approximately 5 million lb, 4.9 million lb, and 6.7 million lb, respectively. BMB has not bought red kidney beans in recent years since producers have been able to get up to $90/cwt (the controlled price) selling direct to the private sector.

The Mennonites in the Cayo, Corozal, and Orange Walk Districts produce about 95 percent of the red kidney beans grown in Belize and marketed domestically and internationally. Mennonite producers are presently paid $90/cwt for their red kidney beans sold domestically to retail shops in towns and cities in Belize. This year (1989) Grace, Kennedy Inc. and two other exporters bought much of the Mennonites' red kidney beans for export at reportedly the controlled price.

Other producers of red kidney beans, including many of the Mayan Indians in various Districts, receive much less than $90/cwt for their red kidney beans. Middlemen between these producers and the retailers in cities such as Belize City and Corozal have reportedly grossed as much as $30/cwt on red kidney bean marketing.

Consumer prices. Consumer prices for domestically produced red kidney beans sold in bags or loose are controlled at $1.10/pound by GOB. For imported red kidney beans, the controlled retail price is $1.25/pound. Consumers require beans to be pink or red, if the beans are darkened the consumer will not buy the beans, regardless of the price.

Storage Potential For Red Kidney Beans

Red kidney beans have been stored for 2-3 years in hot and dry conditions without becoming dark in places such as California. Belize, however, is forever humid, consequently, red kidney beans have only been stored successfully in Belize for approximately 6 months after being harvested. Within those 6 months all red kidney beans are either sold domestically or exported. Red kidney beans are stored in 100-lb sacks in warehouses and storage compartments by BMB, the Mennonites, Grace Kennedy Belize Ltd., and other private importers and exporters.

BMB has yet unused aluminum storage containers (8 ft. diameter x 6 ft. high), originally constructed to store red kidney beans at its Belmopan facility. BMB, as the price stabilizing agency, will possibly be buying and storing domestically produced red kidney beans in the near future. It is recommended that BMB either store red kidney beans in its Belmopan warehouse or Belize City warehouse or contract out the storage of red kidney beans to the private sector.

Potential For Importing And Exporting Red Kidney Beans

International trade of red kidney beans in Belize is not a new procedure for BMB and the private sector. Every year, red kidney beans are imported into Belize from the US after the storage time limits on red kidney beans expire or the domestically produced supply is consumed. Unless storage technology and facilities are upgraded or consumers are willing to substitute away from red kidney beans after the local supply is exhausted, yearly, predictable imports of red kidney beans will continue. The harvest months for red kidney beans in Belize is from late February until early April, whereas in the US (where red kidney beans are imported from) the harvest months are from September-October. Border prices in August are, consequently, expected to be higher than border prices in October. Red kidney beans are typically imported from October until March.

Importing red kidney beans from the US requires about a month notice to the exporter before the beans are shipped from the US and takes another 10 days before the shipment arrives and is ready for the market in Belize. Red kidney beans have been exported every year throughout the mid to late 1980's. About 1.75 million pounds of red kidney beans in 100-lb sacks in 20-ft containers were exported from Belize to Jamaica and Trinidad in the months of April-June, 1989. Red kidney beans are exported at international market prices which have been quite volatile over the past 4-5 years. In 1989, the price (before shipping costs are added in) of exported red kidney beans averaged about $1.05/lb.

An Application Of Price Stabilization For Red Kidney Beans

As with price stabilization for rice, the methods used for price stabilization for red kidney beans would include (1) projecting supply/demand quantities of red kidney beans and determining the demand curve for rice in Belize, (2) setting a target band, (3) estimating necessary storage and trade adjustments, and (4) determining the benefits and costs of the program.

Projecting supply/demand quantities of red kidney beans and determining the demand curve for red kidney beans in Belize. Projecting the quantity of red kidney beans that will be harvested and marketed is accomplished using such data as stored quantities of seed, seed imports, planting acreage, current crop reports, historical yields and prices, and harvesting, storage, marketing and utilization patterns. A heavy rain before harvesting red kidney beans could damage the crop to such an extent that projections would need to be extensively revised. In recent years, the private sector has handled the majority of the production, marketing, and trade of red kidney beans.

The quantity of red kidney beans demanded is steady throughout the year, even when imported red kidney beans are sold at prices considerably higher than

domestically produced red kidney beans. Efforts have been made to determine whether Belizean consumers would substitute other beans for red kidney beans during times of red kidney bean shortages. However, consumers prefer paying higher prices for red kidney beans rather than substituting other beans into their diet. The demand curve for red kidney beans is expected to continue to be relatively inelastic.

Setting a target band. To set the floor price for red kidney beans at harvest requires projecting the market price based on supply/demand relationships. If the market price for red kidney beans (cleaned and less than 14 percent moisture) was projected to be $0.90/lb at harvest, the floor price, based on 85 percent of the projected price, would be $0.76.5/lb. Such a floor price would serve as an incentive for additional domestic red kidney bean production because it would eliminate downside price risk while serving as the guaranteed producer price.

Placing a ceiling price on red kidney beans below the border (international) price will encourage continued consumption of red kidney beans even when millions of pounds must be imported each year. If a concerted effort was made at getting Belizean consumers to substitute other beans into their diet it would be reasonable (if a ceiling price on red kidney beans was desired to prevent price gouging or hoarding) to place a ceiling price on red kidney beans at the highest producer price in the past 5 years or at the projected level of the border price, if the projected border price were above the highest producer price. Since other types of beans (easier and less riskier to produce than red kidney beans) are readily available on the Belizean market, consumers of red kidney beans should not be protected from high priced red kidney beans when world supply quantities lag behind demand quantities. In the past 5 years, the highest producer price for red kidney beans has been about $1.25/lb (a 1987 price offered to producers by exporters operating in Belize).

Estimating necessary storage and trade adjustments. Suppose BMB expects the market price for red kidney beans to fall after harvest below the floor price because supply quantities of red kidney beans on the market are greater than its projection. BMB would then need to purchase (and store and export) some quantity of red kidney beans from the market at approximately the floor price to get the price stabilized at or above the floor price. A portion of the purchased red kidney beans would then be stored for food security measures and a portion would likely be exported to other CARICOM countries.

On the other hand, suppose BMB expects the market price for red kidney beans to rise above the ceiling price in August or sometime before the new crop is harvested in the US, BMB, then, would inject some quantity of red kidney beans into the market (by authorizing imports of red kidney beans) to maintain market prices of red kidney beans at approximately the ceiling price.

Benefits and costs. Two scenarios are developed and benefits and costs are determined for each. In Scenario 1, suppose production of red kidney beans soared in Belize after other exporting countries had only a mediocre crop the previous October-November. If BMB projected domestic producer prices to be $0.90/lb at harvest (projecting much of the surplus red kidney beans to be exported soon after harvest), the floor price would be set at 85 percent of that price or $0.765/lb. BMB would be standing by to purchase red kidney beans from

domestic market if market prices were expected to fall below the floor price. If the BMB did expect market prices to fall below the floor price (because of unforeseen failure of exporters to find sufficient markets for the beans in April and May) to $0.695/lb, BMB would determine the quantity it would need to buy to maintain market prices at or above the floor price. Suppose BMB bought at the floor price a total of 1 million pounds of red kidney beans in April and May. The red kidney beans would be stored until export markets could be found and as a food security measure. BMB would be assuming the risk, however, that the beans could turn dark before they could be marketed.

Suppose that an export market for 750,000 pounds of red kidney beans is identified in August. BMB would then authorize export of the red kidney beans as long as the domestic red kidney bean supply were sufficient until October when the new crop of red kidney beans in the US is available for importing into Belize.

In Scenario 2, suppose there was a sharp decline in the production of red kidney beans in Belize to 4 million pounds due to weather related problems suffered early in the growing season. If the BMB had projected the demand for red kidney beans to be 5 million pounds from April through September, the BMB would need to prevent any red kidney beans from being exported. Suppose BMB had projected the market price at harvest to be $1.15/lb and set the ceiling price at $1.25/lb. But by July, BMB saw market prices rapidly approaching the ceiling price which, let us say, was at the same level as the border price. It is important to realize that the border price for red kidney beans would not be a function of the supply of red kidney beans in Belize. That is, the supply of red kidney beans in Belize has no impact on the international market price of red kidney beans. Suppose BMB expected market prices in July to reach $1.35/lb (to exceed the ceiling price) as a result of price gouging or hoarding of red kidney beans by suppliers. BMB, anticipating the possibility of price gouging or hoarding of red kidney beans by suppliers, would need to authorize the importation of that amount of red kidney beans (approximately one million pounds in Scenario 2) that would stabilize prices at or below the ceiling price and at the same time supply the market with red kidney beans enough for the 6 month period. Once sufficient red kidney beans are available in Belize for the 6 month period, producer prices would tend to fall to a level equivalent to the projected world market price in October, the harvest month for red kidney beans in the US. From October until the next crop is harvested in March in Belize, border prices and domestic prices would not be as likely to exceed the ceiling price.

Suppose also that market prices remained below the ceiling price through September and that starting in October through the end of the crop year, red kidney bean imports by the private sector (and authorized by the BMB) kept prices within the target band. No further price stabilization activities would be needed on the part of the BMB that crop year.

Estimated Direct Benefits To Producers

Estimated direct producer benefits in Scenario 1 and 2 are given in Table 6. In Scenario 1, producers who marketed their red kidney beans in April and May benefitted (by $186,620) from BMB having stabilized market prices at or above the floor price. In Scenario 2, producers who marketed their red kidney beans

in July through September had negative benefits ($-150,000) from BMB having stabilized market prices at or below the ceiling price.

Estimated Direct Benefits To Consumers

Estimated direct consumer benefits in Scenarios 1 and 2 are given in Table 7. In Scenario 1, consumers who bought red kidney beans in April and May had negative benefits (of $-116.62) when BMB stabilized market prices at or above the floor price. In Scenario 2, consumers who bought red kidney beans in July through September had positive benefits (of $250,000) when BMB stabilized market prices at or below the ceiling price.

Indirect benefits of such a price stabilizing program would also have been generated to producers, consumers, and the private sector. The magnitude of these benefits depends upon how long the stabilization program has been in operation and how much confidence Belize citizens have in the program. The subsection on estimated benefit cost ratio for rice gives a general idea of the sources of such benefits.

Direct Costs Of Price Stabilization

The costs of price stabilization for red kidney beans in Scenarios 1 and 2 are estimated from the quantities of red kidney beans purchased and sold (Tables 8 and 9, respectively). In Scenario 1, the total variable costs would be $6250 for storage ($0.0025/lb/first month of storage and $0.0015/lb/each of the following months), and $76,400 for handling, transporting, and merchandising (10 percent of total purchases), totalling $82,650. These variable costs would be adjusted by the merchandising margin on the beans and by the fixed costs for BMB's storage and administrative facilities.

The merchandising margin would amount to $138,000, i.e., the total sales revenue ($900,000) minus the total purchasing costs ($764,000). The merchandising margin would cover total variable costs and a portion of the fixed costs.

Fixed costs represent those expenses for maintenance of facilities, labor, insurance, interest, depreciation, taxes, etc. These costs would be spread over all commodities price stabilization activities. An estimate of such costs prorated for red kidney bean price stabilization activities would be $100,000.

In Scenario 2, the total variable costs would be $3880 for storage of beans (at $0.0025/lb/first month of storage and $0.0015/lb/each of the following months), and $156,250 for handling, transporting, and merchandising (about 10 percent of total purchasing costs), giving total variable costs of $160,230.

The merchandising margin would amount to $0, i.e., the total sales revenue ($1,250,000) plus the value of the carryover inventory ($312,500) minus the total purchasing costs ($1,562,500). If fixed costs were $100,000, the total direct costs to BMB for carrying out this price stabilization program would be $260,230.

Estimated Benefit Cost Ratio

In Scenario 1, the total net benefits were $70,000 and the total costs to the BMB were $44,650, giving a benefit/cost ratio of 1.57. The ratio, although not impressively high, nonetheless, indicates that price stabilization under Scenario 1 is economically feasible.

In Scenario 2, the total net benefits were $100,000 and the total direct costs to BMB were $260,230. The benefit cost ratio would be -.38, an infeasible program. This result further emphasizes the point that a ceiling on producer prices for red kidney beans may not be a good approach.

CORN

Present Prices

Producer prices. Since producer prices were decontrolled in 1985, BMB has not bought any corn from producers, meanwhile, prices have ranged from as low as $0.07/lb to as high as $0.25/lb. Producer prices have been mostly a function of the quantity of corn supplied to the market at any one time, plus the quantity of corn demanded by the feed mills (ultimately the poultry and other livestock producers) and tortilla factories. In 1988, milpa farmers grew about 28 percent of the total corn produced in Belize. Mennonite farmers in the Cayo, Corozal, and Orange Walk Districts produced about 72 percent of the total corn on about 56 percent of the total corn acreage in production in Belize. Corn is also planted in January by about 30 percent of corn producers and harvested in April/May. Corn production has increased from about 35.6 million pounds in 1984 to over 40 million pounds in each of the past two years. Corn also is brought across the border from Guatamala and Mexico and sold in Belizean markets.

The quantity of livestock feed demanded in Belize has risen dramatically in the past 2 years. Feed mills in Spanish Lookout have experienced a 21 percent and 17 percent increase in the quantity of feed sold in the past 2 crop years. About 98 percent of the broilers and layers and 100 percent of the turkeys were raised in the Cayo, Corozal, and Orange Walk Districts. The poultry growers in these Districts tend to buy from feed mills in their respective Districts. These feed mills, which are run by the Mennonites, buy the corn from local District producers. The Mennonite feed mills buy their corn first from Mennonite producers. If the feed mills do not have enough corn they'll buy corn from other producers. Mennonite producers also contract out their corn production to the tortilla factories in various towns. When the tortilla factories' and these feed mills' own supplies are estimated to be sufficient other corn producers have no good outlet for their corn. Milpa farmers, who supply only about 20 percent of the total corn they produce to the market, have had problems obtaining a reasonable price for their corn. If they have no storage facility for the corn (to be marketed) they must sell the corn sometimes at a very low price (as low as $0.07/lb in December, 1988). Mennonites with excess storage capacity will buy the corn when prices reach such low levels. Mennonites in Spanish Lookout have as much as 14 million pounds of storage space for corn. The feed mills buy enough corn to fill their storage facilities immediately after harvest.

Consumer prices. Corn is principally used for tortilla making, as a feed grain, and as a main ingredient in mixed feeds for livestock. Corn prices are reflected in the consumer's budget by the cost of tortillas and by the cost of poultry and livestock products. Tortilla prices do not tend to fluctuate much even when corn prices vary from below $0.10/lb to above $0.20/lb. Livestock mixed feeds do fluctuate in price as corn prices vary.

Storage Potential For Corn

Corn is stored after it has been dried either on the stock or with dryers. If corn is high in moisture when harvested it should be dried within about 24 hours. Milpa producers do not have dryers and must rely on the feed mill operators to dry their corn if it is high in moisture. It costs the feed mills about $3.50/cwt to dry wet corn sufficiently to be stored. Under warehouse conditions in Belize, corn can be successfully stored for over a year when periodically fumigated. Storage costs and inevitable shrinkage, however, must be taken into consideration when such long-term storage is undertaken. According to corn producers who store corn primarily in galvanized bins in Spanish Lookout, storage costs run $0.25/cwt/first month (includes dumping the corn and filling the bin) and $0.10-15/cwt for each month after the first month. The Mennonites in Cayo have the capacity to store about 14 million pounds of corn, other Mennonite communities in Orange Walk and Corozal have storage facilities, at least six other mechanized corn producers have storage facilities. Belize Mills Ltd. has recently erected corn storage bins in Belize, and BMB has the Belmopan facility that could store over two million pounds in its warehouse and 3 million pounds in its bins if the conveyors and attachments (badly rusted) were replaced.

Potential For Importing And Exporting Corn

Price stabilization using quantity controls to impact producer or consumer prices is very difficult to implement if imports or exports of the grain are not an optional activity. Corn has been imported in recent years primarily in the form of processed feed for livestock from the US. Yellow corn is readily available on the world market from the US and various South American countries.

Since the cost of production for corn for feed and mixed feed is high in Belize relative to other corn exporting countries, Belize is not able to compete with other corn or feed exporting countries, namely, the US and various South American countries. Without an export market for Belize corn, storing corn by BMB could become a very expensive proposition, especially if the corn spoils or becomes infested before it's consumed in Belize.

An Application Of Price Stabilization For Corn

As with price stabilization for rice and red kidney beans, the methods used for price stabilization for corn would include (1) projecting supply/demand quantities of corn and determining the demand curve for corn in Belize, (2) setting a target band, (3) estimating necessary storage stock and trade adjustments, and (4) determining the benefits and costs of the program.

Projecting supply/demand quantities of corn and determining the demand curve for corn in Belize. Projecting how much corn will be marketed must be done well

before harvest time. Using data such as corn inventories, corn seed sales, planting acreage, current crop reports, and historical yields and prices, and harvesting, storage, marketing and utilization patterns should allow the BMB management to project the quantity of corn to be produced and marketed. The actual quantity adjustment that may be needed by BMB would be a function of the amount of corn actually put on the market for sale at a given point in time, the demand curve for corn in Belize and the implicit price flexibilities (Figure 2).

Since corn prices have not been controlled by the GOB, corn prices have been free to fluctuate with the existing market conditions. Since the trough of $0.07/lb for corn in October-December, 1988, and the subsequent buying of much of that low priced corn by the feed mills, prices have reached a price higher than $0.20/lb within 8 months and are projected to reach as high as $0.24/lb later in this crop year. In 1987-88, prices for corn varied from $0.15/lb at harvest to about $0.21/lb near the end of the crop year.

Most large mechanized corn producers have storage facilities for their corn. However, with many milpa farmers about 80 percent of their corn is stored for consumption during the year with the remaining 20 percent of the milpa crop, or about 3 million pounds in 1988-1989, marketed during October-December in order to get needed cash for living expenses. Given more market information, it would be possible to develop price flexibilities to assist in determining what quantity of corn would need to be withdrawn from the market by BMB if prices dropped below a floor price.

Setting a target band. To set a target band both a floor price and a ceiling price are needed. If a market price for corn (not in need of drying) was projected using supply/demand relationships to be $0.15/lb at the time of harvest (October), the floor price could be set at $0.1275/lb (85 percent of $0.15/lb). If market prices were expected to fall below the floor price, BMB would stand by to withdraw sufficient corn supplies from the market to maintain prices at or above the floor price (Figure 2). The price of $0.1275/lb would serve as an incentive for additional corn production because it would eliminate downside price risk while serving as the minimum guaranteed producer price.

A ceiling on producer prices for corn could be set about as high as the highest producer prices experienced within the past few years (about $0.25/lb). At that level, neither tortilla makers and livestock producers nor tortilla and poultry/meat consumers have expressed any economic hardship. If, however, border prices were projected to reach above the highest producer price in the past 5 years, then that projected border price would be used as the ceiling price. If market prices were expected to exceed the ceiling on producer prices of $0.25/lb for corn, BMB would stand by to inject sufficient stored stocks of corn or to authorize sufficient importation of corn into Belize to maintain the price at or below the ceiling price.

Estimating Necessary Storage And Trade Adjustments

If BMB expected market prices to fall below the floor price ($0.1275 in Figure 2) in October-December, BMB would buy, at approximately the floor price, some quantity of corn (approximately 3 million pounds in Figure 2) over that period of time that excessive supplies were being put on the market. The purchased

corn would be stored until a later date when corn was needed on the market to maintain the ceiling price or was needed for inter-year food security measures.

If BMB expected market prices to reach $0.28/lb in August, well above the ceiling price ($0.25/lb), BMB would inject that quantity of corn (from storage stocks or from importation) into the market to maintain market prices at or below the ceiling price. The amount supplied to the market would depend on the price flexibility, the amount of corn stored by the private sector, and the projected quantity of corn demanded by the feed mills, tortilla makers, and livestock producers. Suppose it was determined using the above criteria, that a total of 1.0 million pounds would need to be supplied to the market in August in order to maintain prices at or below the ceiling price. BMB would be left with 2 million pounds of corn in storage at the end of the crop year. That corn would represent an inter-year supply of corn that would be stored until prices again were projected to exceed the ceiling price.

Benefits And Costs

Two scenarios are developed and benefits and costs are determined for each. In Scenario 1, suppose 42 million pounds of corn (winter and spring crops) was projected to be harvested in Belize. World supplies were, however, expected to be tight, with projected border prices at $0.24/lb. Assume also that BMB projects the quantity of corn (cleaned and dried) demanded in Belize to be 40 million pounds. BMB, then, projects there to be a surplus of 2 million pounds of corn. By examining supply/demand relationships, BMB also projects that corn producer prices will be about $0.15/lb just after harvest. BMB would then set a floor price of approximately 85 percent of the projected producer price, or $0.1275/lb. Suppose that after harvest BMB found producer prices drifting down toward the floor price and expected the producer price to fall below the floor price to a level of about $0.07/lb. BMB would then buy a sufficient quantity of corn on the market at approximately the floor price to stabilize the price at or above the floor price. In this scenario, the quantity it would buy on the domestic market would be about 1 million pounds in each month from October through December. BMB would store the 3 million pounds of corn until the domestic market price was expected to exceed the ceiling price ($0.25/lb, i.e., the highest domestic producer price in the last 5 years). In this Scenario, BMB expected the price to reach $0.28/lb so it injected 1 million pounds of corn into the market to stabilize producer prices at about the ceiling price, $0.25/lb. BMB would be left with 2 million pounds of corn in storage at the end of the crop year. That corn would represent an inter-year supply of corn that would be stored until prices again were projected to exceed the ceiling price.

In Scenario 2, suppose BMB projected a sharp decline in domestic corn production to about 35 million pounds due to weather related problems during the growing season. Also, suppose the world supply quantities were also rather tight resulting in relatively high border prices, although the ceiling price set by BMB was $0.25/lb. Assume BMB projected a domestic demand of about 40 million pounds. A shortage of about 5 million pounds would be projected. If, in May, 7 months after the harvest, BMB expected producer prices to reach $0.28/lb (due possibly to hoarding of corn in Belize), BMB then would authorize enough corn to be imported at border prices (projected to be about $0.24/lb) to keep domestic producer prices well below the ceiling price and much closer to the border price.

Over the months of May-September, suppose then that 5.25 million pounds of corn is imported. Domestic market prices during May-September were assumed to remain at approximately the level of the border price (0.24/lb). Ending stocks of corn controlled by the BMB would be 250,000 pounds.

Estimated Direct Benefits to Producers

In Scenario 1, producers benefited when BMB took corn supplies off the market since producer prices were maintained from October-December at approximately $0.1275/lb when otherwise market prices would have reached $0.07/lb. The actual producers benefitting from BMB's maintaining prices near the floor, however, were those who sold to the tortilla factories, those who sold to the feed mills, and those who sold to BMB in October-December. For example, in October, an estimated 200,000 pounds of corn was sold to tortilla factories, about 4 million pounds of corn was sold to the feed mills, and about 1 million pounds was sold to BMB. The producer benefits for October were $299,000 (5,200.000 lb x $0.0575/lb). When BMB supplied corn to the market in August, negative benefits (totaling $6000) were experienced by those producers having sold their corn during that month. The net direct benefits to corn producers in the scenario is $891,000 or approximately $0.022 per lb for 42 million pounds of off-farm sales of corn by milpa and mechanized corn producers (Table 10).

In Scenario 2, producers who marketed their corn in May-September had negative benefits (totaling $-392,000) when BMB had corn imported and injected into the market. When imported corn was supplied to the market, producer prices stabilized at about $0.24/lb. Had corn not been injected into the market, BMB projected prices would have risen to $0.28/lb (Table 10).

Estimated Direct Benefits to Consumers

Estimated direct consumer (feed mills, tortilla producers, and livestock producers) benefits for Scenarios 1 and 2 are given in Table 11. In Scenario 1, consumers were negatively impacted in October-December when prices were stabilized at the floor price by BMB. Consumer's benefited from BMB's stabilizing of prices at the border price in May-August. The net benefit to the corn consumers was $-451.02 or about $-0.011 per pound for the domestic utilization of corn in Belize of 40 million pounds.

In Scenario 2, consumers received positive benefits (totaling $633,400) in May-September as BMB stabilized the price of corn at the border price (Table 11). Had imported corn (or processed feed) not been injected into the market starting in May, producer prices would have reached $0.28/lb, according to BMB's projection.

Direct Costs Of Price Stabilization

A price stabilizing agency incurs direct costs when maintaining a price stabilization program. Fixed investment costs are needed to plan, develop, and maintain grain storage, processing and handling facilities and to develop technical and managerial human resources to operate stabilization programs. Variable costs are incurred to purchase, transport, handle, process, store,

merchandise, and finance the corn acquired for stabilization stocks and later released into the market.

In Scenario 1 of price stabilization for corn, the costs of such a program to the BMB would be estimated from the quantities of corn purchased and sold (Table 12). The BMB would need to purchase 3 million pounds of corn during the months of October-December to maintain a floor of approximately $0.1275/lb on producer prices. The 3 million pounds of corn would be stored until August when 1 million pounds would be injected into the market in order to maintain the market prices at about the ceiling price.

The ending stock of corn would be 2 million pounds. If storage costs are $0.0025/lb for the first month of storage and $0.0015/lb for each of the following months, the total storage costs for the year would be $49,500. If other variable costs for handling, transporting, and merchandising total about 10 percent of total purchasing costs, then the total variable costs would be $87,700. These variable costs would need to be adjusted by the merchandising margin on the corn and by the fixed costs for the BMB's storage and administrative facilities.

The merchandising margin would amount to the total sales revenue ($240,000) plus the value of the carryover inventory ($255,000) minus the total purchasing costs ($382,500). In this application of price stabilization, the BMB has earned a merchandising margin of $112,500, sufficient to cover total variable costs ($91,000) and leave $21,500 for paying fixed costs.

Fixed costs represent those expenses for maintenance of facilities, labor, insurance, interest, depreciation, taxes, etc. These costs would be spread over all commodities price stabilization activities. An estimate of such costs prorated for corn price stabilization activities could be approximately $100,000.

In Scenario 2, BMB would need to authorize the importation of 5 million pounds of corn into Belize and inject the corn into the market between May and September to stabilize producer prices below the ceiling price (Table 13). Storage costs for the 250,000 pounds of corn would amount to about $625 (based on $0.0025/lb/-first month of storage and $0.0015/lb/each following month of storage). Other variable costs for handling, transport, and merchandising would amount to $126,000 based on 10 percent of the total purchasing cost of the corn. Total variable costs would then be $126,625.

The merchandising margin would amount to the total sales revenue ($1,200,000) plus the value of the carryover inventory ($60,000) minus the total purchasing costs ($1260,000). The margin would equal $0 in this scenario.

Other expenses to the BMB would include fixed costs for administration, maintenance of facilities, insurance, interest, depreciation, etc. These fixed costs are estimated at $100,000 per year. Total direct costs to the BMB in Scenario 2 would be approximately $226,625.

Estimated Benefit Cost Ratio

The economic feasibility of price stabilization programs can be estimated using a benefit cost ratio. In Scenario 1, the total direct benefits were $439,980 and the total direct costs to the BMB were $79,200. The benefit/cost ratio then is 5.60, meaning the program is economically feasible.

If, however, BMB were unable to get rid of the corn before it spoiled, the BMB would lose the value of the corn ($255,000). That would put total direct costs to the BMB at 333,500 and leave a benefit to cost ratio of 1.32. Without an export market for corn, the BMB could find itself buying millions of pounds of corn each year without any chance of selling it. BMB's price stabilization program for corn could be very expensive if large quantities of corn are left without a buyer.

In Scenario 2, the total direct benefits were $241,400 and the total direct costs to the BMB were $226,625. The benefit/cost ratio then is 1.07, meaning the program is economically feasible by only a slim margin.

Indirect benefits of such a price stabilizing program would also have been generated to producers, consumers, and the private sector. The magnitude of these benefits depends upon how long the stabilization program has been in operation and how much confidence Belize citizens have in the program. The estimated benefit cost ratio subsection gives a general idea of the sources of such benefits.

TABLE 2

PRODUCER BENEFITS FOR RICE, SCENARIOS 1 AND 2

MONTH	QUANTITY MARKETED (1000 lb)		PRICE EFFECT ($/lb)		NET BENEFIT (1000$)	
	Scenario		Scenario		Scenario	
	1	2	1	2	1	2
Oct	5150	3000	0.04	0	206	0
Nov	5150	3000	0.04	0	206	0
Dec	2000	1000	0	0	0	0
Jan	700	400	0	0	0	0
Feb	500	400	0	0	0	0
Mar	500	400	0	0	0	0
Apr	500	400	0	0	0	0
May	250	400	0	-0.10	0	-40
Jun	250	400	0	-0.10	0	-40
Jul	0	400	0	-0.10	0	-40
Aug	0	200	0	-0.10	0	-20
Sep	0	0	0	0	0	0
Totals	15000	10000	0.08	-0.40	412	-140

TABLE 3

CONSUMER BENEFITS FOR RICE, SCENARIOS 1 AND 2

MONTH	QUANTITY CONSUMED (1000 lb)		PRICE EFFECT ($/lb)		NET BENEFITS ($1000)	
	Scenario 1	2	Scenario 1	2	Scenario 1	2
Oct	1083	1083	0.04	0	-43.33	0
Nov	1083	1083	0.04	0	-43.33	0
Dec	1083	1083	0	0	0	0
Jan	1083	1083	0	0	0	0
Feb	1083	1083	0	0	0	0
Mar	1083	1083	0	0	0	0
Apr	1083	1083	0	0	0	0
May	1083	1083	0	-0.10	0	108.3
Jun	1083	1083	0	-0.10	0	108.3
Jul	1083	1083	0	-0.10	0	108.3
Aug	1083	1083	0	-0.10	0	108.3
Sep	1083	1083	0	0	0	0
Totals	13000	13000	0.08	-0.40	-86.66	433.2

TABLE 4

ESTIMATED PRICE STABILIZATION PROGRAM COSTS TO BMB FOR RICE, SCENARIO 1

MONTH	QTY BOUGHT (1000#)	MARKET PRICE ($/#)	PURCHASE COST ($1000)	QTY SOLD (1000#)	MARKET PRICE ($/#)	SALES REVENUE ($1000)	END STOCK (1000#)
Oct	1000	0.28	280	0		0	1000
Nov	1000	0.28	280	1000	0.28	280	1000
Dec	0		0	0		0	1000
Jan	0		0	0		0	1000
Feb	0		0	0		0	1000
Mar	0		0	0		0	1000
Apr	0		0	0		0	1000
May	0		0	0		0	1000
Jun	0		0	0		0	1000
Jul	0		0	0		0	1000
Aug	0		0	750	0.30	225	250
Sep	0		0	0		0	250
Totals	2000		560	1750		505	10500

TABLE 5

ESTIMATED PRICE STABILIZATION PROGRAM COSTS TO BMB FOR RICE, SCENARIO 2

MONTH	QTY BOUGHT (1000#)	MARKET PRICE ($/#)	PURCHASE COST ($1000)	QTY SOLD (1000#)	MARKET PRICE ($/#)	SALES REVENUE ($1000)	END STOCK (1000#)
Oct	0		0	0		0	0
Nov	0		0	0		0	0
Dec	0		0	0		0	0
Jan	0		0	0		0	0
Feb	0		0	0		0	0
Mar	0		0	0		0	0
Apr	0		0	0		0	0
May	750	0.38	285	750	0.38	285	0
Jun	750	0.38	285	750	0.38	285	0
Jul	750	0.38	285	750	0.38	285	0
Aug	1000	0.38	380	750	0.38	285	250
Sep	0		0	0		0	250
Totals	3250		1235	3000		1140	500

TABLE 6

PRODUCER BENEFITS FOR RED KIDNEY BEANS, SCENARIOS 1 AND 2

MONTH	QUANTITY MARKETED (1000 lb)		PRICE EFFECT ($/lb)		NET BENEFIT ($1000)	
	Scenario		Scenario		Scenario	
	1	2	1	2	1	2
Oct	0	0	0	0	0	0
Nov	0	0	0	0	0	0
Dec	0	0	0	0	0	0
Jan	0	0	0	0	0	0
Feb	0	0	0	0	0	0
Mar	0	0	0	0	0	0
Apr	1333	833	0.07	0	93.31	0
May	1333	833	0.07	0	93.31	0
Jun	833	833	0	0	0	0
Jul	833	750	0	-0.10	0	-75
Aug	833	750	0	-0.10	0	-75
Sep	833	0	0	-0.10	0	0
Totals	6000	4000	0.14	-0.30	186.62	-150

TABLE 7

CONSUMER BENEFITS FOR RED KIDNEY BEANS, SCENARIOS 1 AND 2

MONTH	QUANTITY BOUGHT (1000 lb)		PRICE EFFECT ($/lb)		NET BENEFITS ($1000)	
	Scenario		Scenario		Scenario	
	1	2	1	2	1	2
Oct	833	833	0	0	0	0
Nov	833	833	0	0	0	0
Dec	833	833	0	0	0	0
Jan	833	833	0	0	0	0
Feb	833	833	0	0	0	0
Mar	833	833	0	0	0	0
Apr	833	833	0.07	0	-58.31	0
May	833	833	0.07	0	-58.31	0
Jun	833	833	0	0	0	0
Jul	833	833	0	-0.10	0	83.3
Aug	833	833	0	-0.10	0	83.3
Sep	833	834	0	-0.10	0	83.4
Totals	10000	10000	0.14	-0.30	-116.62	250.0

TABLE 8

ESTIMATED PRICE STABILIZATION PROGRAM COSTS TO BMB FOR RED KIDNEY BEANS, SCENARIO 1

MONTH	QTY BOUGHT (1000#)	MARKET PRICE ($/lb)	PURCHASE COST ($1000)	QTY SOLD (1000#)	MARKET PRICE ($/#)	SALES REVENUE ($1000)	END STOCK (1000#)
Oct	0		0	0		0	0
Nov	0		0	0		0	0
Dec	0		0	0		0	0
Jan	0		0	0		0	0
Feb	0		0	0		0	0
Mar	0		0	0		0	0
Apr	500	0.765	382	0		0	500
May	500	0 765	382	0		0	1000
Jun	0		0	0		0	1000
Jul	0		0	0		0	1000
Aug	0		0	1000	0.90	900	0
Sep	0		0	0		0	0
Total	1000		764	1000		900	3500

TABLE 9

ESTIMATED PRICE STABILIZATION PROGRAM COSTS TO BMB FOR RED KIDNEY BEANS, SCENARIO 2

MONTH	QTY BOUGHT (1000#)	MARKET PRICE ($/lb)	PURCHASE COST ($1000)	QTY SOLD (1000#)	MARKET PRICE ($/#)	SALES REVENUE ($1000)	END STOCK (1000#)
Oct	0		0	0		0	0
Nov	0		0	0		0	0
Dec	0		0	0		0	0
Jan	0		0	0		0	0
Feb	0		0	0		0	0
Mar	0		0	0		0	0
Apr	0		0	0		0	0
May	0		0	0		0	0
Jun	0		0	0		0	0
Jul	250	1.25	312.5	83	1.25	103.75	167
Aug	500	1.25	625	83	1.25	103.75	584
Sep	500	1.25	625	834	1.25	1042.50	250
Total	1250		1562.5	1000		1250.00	1000

TABLE 10

PRODUCER BENEFITS FOR CORN, SCENARIOS 1 AND 2

MONTH	QUANTITY MARKETED (1000 lb)		PRICE EFFECT ($/lb)		NET BENEFIT ($1000)	
	Scenario		Scenario		Scenario	
	1	2	1	2	1	2
Oct	5200	4000	0.0575	0	299	0
Nov	5200	4000	0.0575	0	299	0
Dec	5200	4000	0.0575	0	299	0
Jan	4300	3300	0	0	0	0
Feb	4300	3300	0	0	0	0
Mar	4300	3300	0	0	0	0
Apr	4300	3300	0	0	0	0
May	4300	3300	0	-0.04	0	-132
Jun	4300	3300	0	-0.04	0	-132
Jul	200	1500	0	-0.04	0	-60
Aug	200	1500	-0.03	-0.04	-6	-60
Sep	200	200	0	-0.04	0	-8
Total	42000	35000	0.1425	-0.12	891	-392

TABLE 11

CONSUMER BENEFITS FOR CORN, SCENARIOS 1 AND 2

MONTH	QUANTITY BOUGHT (1000 lb)		PRICE EFFECT ($/lb)		NET BENEFITS $1000	
	Scenario 1	2	Scenario 1	2	Scenario 1	2
Oct	3167	3167	0.0575	0	-182.10	0
Nov	3167	3167	0.0575	0	-182.10	0
Dec	3167	3167	0.0575	0	-182.10	0
Jan	3167	3167	0	0	0	0
Feb	3167	3167	0	0	0	0
Mar	3167	3167	0	0	0	0
Apr	3167	3167	0	0	0	0
May	3167	3167	0	-0.04	0	126.68
Jun	3167	3167	0	-0.04	0	126.68
Jul	3167	3167	0	-0.04	0	126.68
Aug	3167	3167	-0.03	-0.04	95.01	126.68
Sep	3167	3167	0	-0.04	0	126.68
Total	40000	40000	0.1425	-0.16	-451.02	633.40

TABLE 12

ESTIMATED PRICE STABILIZATION PROGRAM COSTS TO BMB FOR CORN, SCENARIO 1

MONTH	QTY BOUGHT (1000#)	MARKET PRICE ($/#)	PURCHASE COST ($1000)	QTY SOLD (1000#)	MARKET PRICE ($/#)	SALES REVENUE ($1000)	END STOCK (1000#)
Oct	1000	0.1275	127.5	0		0	1000
Nov	1000	0.1275	127.5	0		0	2000
Dec	1000	0.1275	127.5	0		0	3000
Jan	0		0	0		0	3000
Feb	0		0	0		0	3000
Mar	0		0	0		0	3000
Apr	0		0	0		0	3000
May	0		0	0		0	3000
Jun	0		0	0		0	3000
Jul	0		0	0		0	3000
Aug	0		0	1000	0.24	240	2000
Sep	0		0	0		0	2000
Totals	3000		382.5	1000		240	31000

TABLE 13

ESTIMATED PRICE STABILIZATION PROGRAM COSTS TO BMB
FOR CORN, SCENARIO 2

MONTH	QTY BOUGHT (1000#)	MARKET PRICE ($/#)	PURCHASE COST ($1000)	QTY SOLD (1000#)	MARKET PRICE ($/#)	SALES REVENUE ($1000)	END STOCK (1000#)
Oct	0		0	0		0	0
Nov	0		0	0		0	0
Dec	0		0	0		0	0
Jan	0		0	0		0	0
Feb	0		0	0		0	0
Mar	0		0	0		0	0
Apr	0		0	0		0	0
May	1000	0.24	240	1000	0.24	240	0
Jun	1000	0.24	240	1000	0.24	240	0
Jul	1000	0.24	240	1000	0.24	240	0
Aug	1000	0.24	240	1000	0.24	240	0
Sep	1250	0.24	300	1000	0.24	240	250
Totals	5250		1260	5000		1200	250

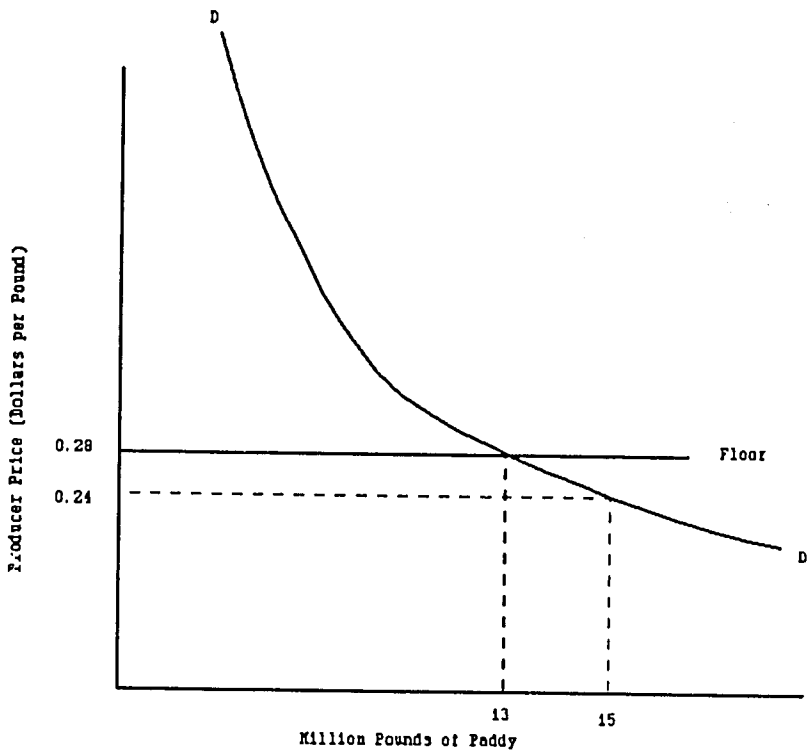

Figure 1. Example Demand Curve for Paddy

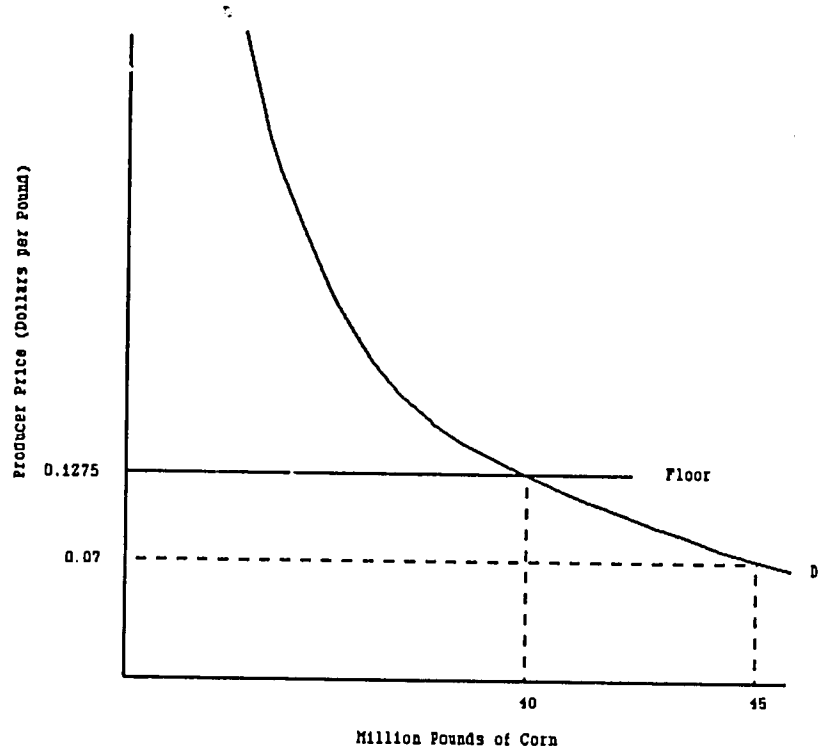

Figure 2. Example Demand Curve for Corn