PN-AAZ-499
15427

AGRICULTURAL POLICY ANALYSIS PROJECT

Under contract to the Agency for International Development, Bureau for Science and Technology, Office of Agriculture
Project Office 4250 Connecticut Avenue, N.W., Washington, D.C. 20008 • Telephone: (202) 362-2800

Analysis of Selected Agricultural Policies Affecting Production and Marketing of Fruits and Vegetables in Jordan

January, 1988

Prepared by:
Luther Tweeten
Rolando Jiron
Bechir Rassas

With the Collaboration of:
Mary Gabay

Prime Contractor: **Abt Associates Inc.,** 55 Wheeler Street, Cambridge, Massachusetts 02138 • (617) 492-7100
Subcontractors: **Robert R. Nathan Associates, Inc.** 1301 Pennsylvania Avenue, N.W., Washington, D.C 20004 • (202) 393-2700
Abel, Daft & Earley, 1339 Wisconsin Avenue, N.W., Washington, D.C. 20007 • (202) 342-7620
Oklahoma State University, Department of Agricultural Economics, Stillwater, Oklahoma 74078 • (405) 624-6157

EXECUTIVE SUMMARY

These papers are drawn from a study on prices and incentives in the horticultural sector in Jordan. Of the many policies examined in the study four stand out by virtue of their broad impact on the production and marketing of fruits and vegetables. These four are policies relating to: international trade, the wholesale market, retail price controls and cropping pattern regulations. The highlights of their analysis are presented here.

Review of available data indicates that the national income foregone due to government monopoly of imports through AMPCO is within tolerable limits. This should not, however, be taken as a reason for complacency. The costs and detriment of this and other government controls and regulations are bound to grow over time and subsequently be more difficult to correct.

We reached some conclusions which are at variance with commonly held views on the Jordanian economy. One of them is that the Jordanian Dinar is overvalued. We found no indications that the exchange rate is misaligned. Importers face no problem obtaining foreign currency, and the exchange rate charged by money dealers differs only a few fils from the official rate. The exchange rate of an economy must necessarily reflect its structure and resource potential. Jordan is a service economy and the exchange rate of the Dinar is largely determined not by merchandise trade but by the flow of remittances and grants into the country.

It is true that the high value of the Dinar places agriculture and all Jordanian exports at a disadvantage when compared to countries with cheaper currencies. But the Jordanian economy is not principally agricultural. Hence, Jordan's foreign exchange rate policies should not be driven by the sole objective of making agricultural exports more competitive.

It is also a common belief in Jordan that the Amman Wholesale Market is at the root of the marketing problem in the fruit and vegetable sector. However, discussions on this topic fail to consider the numerous functions that this market performs. The wholesale market facilitates the price discovery process by bringing together in one place many buyers and sellers. It helps control the flow of fruits and vegetables and thus reduces produce losses. The wholesale market offers convenience to retailers by assembling in one point most of their needs and the advantage to producers of meeting congregated buyers. There are also reasons to believe that in the absence of an adequately-functioning wholesale market, price swings would be more pronounced, the flow of supplies less organized and producers denied the important source of credit that commission agents provide.

Price controls in Jordan have improved price stability in the horticultural sector. This policy, however, has some costs which may not have been considered by policymakers. The most important of these is that at the retail level the degree to which quality is valued is inadequate. There are presently deep concerns about Jordanian produce being of poorer quality in overseas markets. This is to be expected when controls prevent the market form rewarding better quality with higher prices.

Projection estimates for the 1987-92 period show that Jordan will increasingly depend increasingly on exports to market its future production of fruits and vegetables. For instance, under the most likely projection scenario, the exportable surplus is as high as forty percent of the production of tomatoes and twenty percent of all fruits and vegetables combined. Jordan must continue to emphasize the exportability of its fruits and vegetables. Part of this emphasis should be to make important changes in domestic policies, such as retail price controls and cropping pattern regulations, which directly affect its position in the world market.

The policy of regulating retail prices for fruits and vegetables was rescinded between December 1985 and February 1986. This attempt at allowing the interplay of supply and demand to determine

prices was, however, shortlived. We studied the behavior of prices during the uncontrolled period and compared it with prices during the same period the year before and with a five year average (1980-85). The results indicate that retail prices increased for some commodities but decreased for most fruits and vegetables. More importantly, a basket representing the main fruits of vegetables consumed in Jordan was less expensive during the liberalization period.

After 17 years of regulation, we would expect prices for fruits and vegetables to swing more drastically than they actually did during the uncontrolled period. Had the market been allowed more time to accommodate to the open environment, prices for consumers would have remained low. Producers would have had to move to other more profitable crops, and surpluses would have been smaller. Cheaper produce of the right quality may be what will allow Jordan to maintain and expand its export markets. Retail price controls, as presently applied, get in the way of achieving these necessary changes.

Removal of retail price controls deserves another chance. The government could initiate a gradual process of reform by experimenting with select produce items and by monitoring the market to gain some insight into how it behaves without controls. The lessons learned here could be used to prepare the checks and balances that will give the government instruments with which to bring the system under control should things get out of hand. Our analysis of the uncontrolled period indicates that this is very unlikely. Still, it is necessary to plan and prepare for the vagaries that can happen in a freer environment.

Our analysis indicates that if Jordan is losing its export markets it is not due to being a high-cost producer relative to its competitors. Comparative advantage measures how well a country is producing a ton of commodity compared to what it has to pay to import it. The results obtained for Jordan indicate that Jordan is better off producing its own vegetables than importing them.

Jordan is not able to sell more abroad because its buyers either cannot pay or have turned protectionist. Cropping pattern regulations were implemented to manage the difficulties caused by the

TABLE OF CONTENTS

Title | Page Number

EXECUTIVE SUMMARY.....i to iv

A. Overview of Macroeconomic, Trade and Wholesale Market Policies.....A-1 to A-22

B. Retail Prices and the Reference Price System for Fruits and Vegetables in Jordan.....B-1 to B-17

C. The Cropping Pattern Policy in Jordan A Study of its Approach and Achievements, and some Proposals for Reform.....C-1 to C-36

TECHNICAL ANNEXES

I. Welfare analysis of the Impact of Market Interventions on Producers, Consumers, and the Nation.....I-2 to I-10

II. Projections of Exportable Surplus of Fruits and Vegetables 1987-1992.....II-2 to II-24

III. Estimation of the Comparative Advantage of Jordan in the Production of Tomatoes, Cucumber, Squash, Eggplant, Potatoes and Onions.....III-1 to III-48

sudden disappearance of important foreign markets. In the three years that the policy has been in effect, the adjustments made by Jordanian producers are remarkable. This situation leads us to believe that the original objectives of the policy have been met and that continuation of the policy in its present form is not necessary.

The horticultural sector needs to be more responsive to consumer demand locally and abroad. To stay competitive, Jordan must diversify its vegetable production and be able to respond quickly to changes in consumer tastes in importing countries. The cropping pattern policy impedes the sector's responsiveness to these conditions.

That the cropping pattern policy has outlined its usefulness is further supported by the data and farmers' behavior. During the last two years, the area planted to tomatoes, squash, cucumber and eggplant has been lower than the area the government allowed farmers to plant. Even the area farmers requested for approval shows a declining trend. All of this clearly indicates that a new version of the policy is necessary.

The reforms proposed are to convert the cropping pattern licensing system into a system for effective monitoring of cropping intentions, actual plantings and production. This change will take advantage of the institutional and administrative systems which are already in place for administering the present policy.

DRAFT 3: January 11, 1988

AGRICULTURAL PRICING AND INTERVENTION ANALYSIS FOR JORDAN:

Overview of Macroeconomic, Trade and Wholesale Market Policies

OBJECTIVES

This paper examines macroeconomic and trade policies and their implications, including a list of market distributions and impacts on producers, economics, and the national economy. A second major section of this paper examines the wholesale markets. Options are suggested for changes in trade policies and wholesale markets to improve the economy of agriculture and the Kingdom as a whole.

Policy Guidelines and Principles

Before turning to macroeconomic and trade and wholesale market policies we briefly review the principles used for selecting the particular policy problems and options for reforms. A point of departure for policy in Jordan is to improve the level, distribution, and stability of real income of the economy. We view agriculture as a very important basic industry serving to improve the economy of Jordan. Policies for agriculture that improve the level, distribution, and stability of national income are preferred over other policies. Current policies that fail to meet this test are candidates for reform.

Worldwide experience indicates that markets work for agriculture to guide production and allocate resources efficiently but that the public sector also plays a critical role. Major responsibilities of the public sector include providing (1) sound macroeconomic policies avoiding overvalued currencies and inflation; (2) agricultural research, extension, education, and market information; (3) sanitary and safety standards for food; (4) infrastructure such as roads, bridges, and irrigation systems; (5) workable competition in the private sector; and (6) a secure environment in which property rights and contracts are respected and long-term plans can be formulated and carried out.

Given these conditions, considerable reliance can be placed on markets to determine the size and structure of the food and agricultural industry in Jordan. Terms of trade have moved against Jordanian agriculture

in recent years because of expanding domestic production and because of deteriorating foreign demand: Saudi Arabia and other Gulf oil producers have subsidized production, Turkey has subsidized exports, Iran and Iraq have lacked buying power due to the drain of military conflict, and Syria has lacked foreign exchange. Entrance of Spain and Portugal into the European Economic Community has created additional competition for markets in Europe. The value of the JD is high by developing country standards but as noted later there is no reason to conclude the JD is overvalued. Subsidizing agriculture to maintain its size and structure in the face of declining demand or high value of the JD would reduce Jordan's income, would constitute a drain on the national treasury, and would be inconsistent with the policy framework outlined above. An exception to the above policy of avoiding market distortions and income transfers to agriculture is when changes in supply-demand balance are transitory or when an adjustment policy is essential to ease the transition to new economic realities. Care must be taken in the latter cases so that transitory adjustment policies do not become permanent. Jordan's farmers are innovative and adaptable as demonstrated by past performance, and they have the capacity to adjust to changing markets. It is doubtful whether the GOJ could afford a policy isolating agriculture from supply-demand realities of the market for extended periods.

Macroeconomic Policies and Their Influence on Farmers

Agriculture is an important basic industry in the Jordanian economy, but it contributes a smaller share of income to the national economy than is typical in developing countries. The future of the Jordanian economy will depend not only on the performance of agriculture but especially on sectors such as domestic nonfarm industry and services, and on loans, grants, and labor remittances from abroad.

The Jordanian economy is dominated by the service sector. In addition to contributing to close to 61 percent of GDP, this sector employs two-thirds of the labor force and one-third of imported labor. In 1985, government services, defense, and trade accounted for 30 percent of the gross

product of the service sector. Financial services concentrate on financing trade, especially imports. Import financing accounted for 24 percent of all credit facilities. Export of services made up 60 percent of the total value of exports of goods and services in 1985. Commodity imports constituted 75 percent of the total value of imports.

Jordan's exports are concentrated on commodities and destinations. Phosphates and potash made up 50 percent of all commodity exports in 1984. Citrus and other fruits and vegetables amounted to 12 percent. In 1985, 51.5 percent of all exports from Jordan went to the Gulf states and 26.2 percent to India and socialist countries. Since Jordanian exports have generally a low domestic value-added component, any increase in exports necessarily results in parallel increases in imported raw materials and intermediate goods.

In 1985, agriculture contributed 20.4 million JD or 8.5 percent of the 829.9 million JD GDP of Jordan at 1975 market prices. This compares with agriculture's contribution of 68.0 million JD (at 1975 prices) or 10.5 percent to the GDP of Jordan in 1980. Although the real GDP contributed by agriculture is expected to increase in the future, it likely will increase more slowly than the Kingdom's GDP. Hence, agriculture's share of GDP will gradually fall.

Foreign laborers constituted 57.6 percent of total workers in the sector in 1984. Agriculture absorbed 14.1 percent of the entire labor force of the country.

The value added in mining and manufacturing represents 16.4 percent of GPD. These sectors absorb 9.9 percent of the total labor force. The manufacturing sector suffers from weak forward and backward linkages and is heavily dependent on imported raw materials. These factors result in a relatively low rate of values added to gross output of the sector.

Characteristics of the Jordanian economy reduce ability of the Kingdom's agriculture to compete in international markets. The major difficulty is high exchange rates resulting from inflow of funds from abroad. Twelve percent of GNP is from workers' remittances. External budget support to the government was 143.7 million JDs and external loans totaled

4

160.4 million JDs in 1986. These large inflows of funds from abroad contributed substantially to the national economy of Jordan but hurt exports. Without the inflow of funds, the foreign exchange value of the JD would be much lower and agriculture would find export markets economically more attractive. A second disadvantage to Jordan's agriculture is relatively high labor cost because the Kingdom is a rather "developed" developing economy. This is partly offset by use of foreign labor, accounting for up to 60 percent of hired farm workers.

The JD is not overvalued, given the current inflow of funds from abroad. On the whole, the macroeconomy of Jordan has been managed well in recent years. The rate of inflation, approximately 15 percent in 1979, has been reduced to near zero. Foreign exchange reserves have increased modestly in recent years. With allowances for some adjustments, the exchange value of the JD is tied to the Special Drawing Rights (SDR) of the International Monetary Fund. The JD fell against major currencies in 1986 and 1987. Adjustments were not large and are expected in response to changing international macroeconomic conditions. Discussions with agricultural importers indicated no serious problems in obtaining foreign exchange. The parallel market for foreign exchange in late 1987 did not indicate serious misalignment of currency value. The conclusion is that the JD is not overvalued in international exchange.

The future macroeconomic situation in Jordan is impossible to forecast, especially given the influence of unpredictable political factors on loans, grants, and remittances from abroad. If the foreign inflow of funds remains strong and inflation is controlled by continuing sound monetary and fiscal policies, no major realignment of the JD with major foreign currencies is anticipated. This outcome for the overall economy of Jordan is not necessarily good news for agriculture. Devaluation of the JD in terms of foreign currency that would attend poorer performance of the kingdom's economy and less funds received from abroad would improve the terms of trade and international comparative advantage for agriculture. This advantage to exports of agricultural products would be partly but not fully offset by higher prices of imported agricultural inputs. Also less foreign inflow of funds would reduce consumers' income and domestic demand for farm output.

5

There are reasons not to intervene in markets to change the exchange rate of the JD. Intervention to devalue the JD would reduce living standards for consumers and increase inflation by raising import prices but would improve terms of trade for industries including agriculture that compete for export markets or with imports. Consumers would lose more than agriculture and other traded goods sectors would gain from interventions to lower the exchange value of the JD. On the other hand, arbitrarily raising the value of the JD in international exchange would hurt agriculture more than it would benefit consumers. A properly valued exchange rate helps agriculture by avoiding undue competition from agricultural imports and promotes a more vigorous domestic economy.

Political factors that influence the inflow of foreign funds from loans, grants, and worker remittances are impossible to predict, hence, only broad scenarios are possible. The inflow of funds from abroad may increase in the future. However, it seems unlikely that such funds will become a significantly larger proportion of the economy of Jordan.

Public Interventions that Raise Income

Proper public attention to agriculture calls for government investments in infrastructure such as irrigation and roads and in agricultural research, extension, education, and market information. These investments benefit the national economy as well as agriculture. The government strategy should be to intervene in agriculture to tax and spend in ways that increase rather than decrease the nation's income. For example, the fee on agricultural imports of 7.2 percent, while not a serious distortion, could be replaced by similar revenue from increasing the fee for irrigation water. This substitution of one "tax" for the other would assist the economy by improving allocation of irrigation water and by lowering costs of imported inputs used in farming.

Jordan's greatest resource is its people. Remittances from earnings abroad from skilled workers and growth of selected service industries provide evidence of comparative advantage in service industries. A service economy

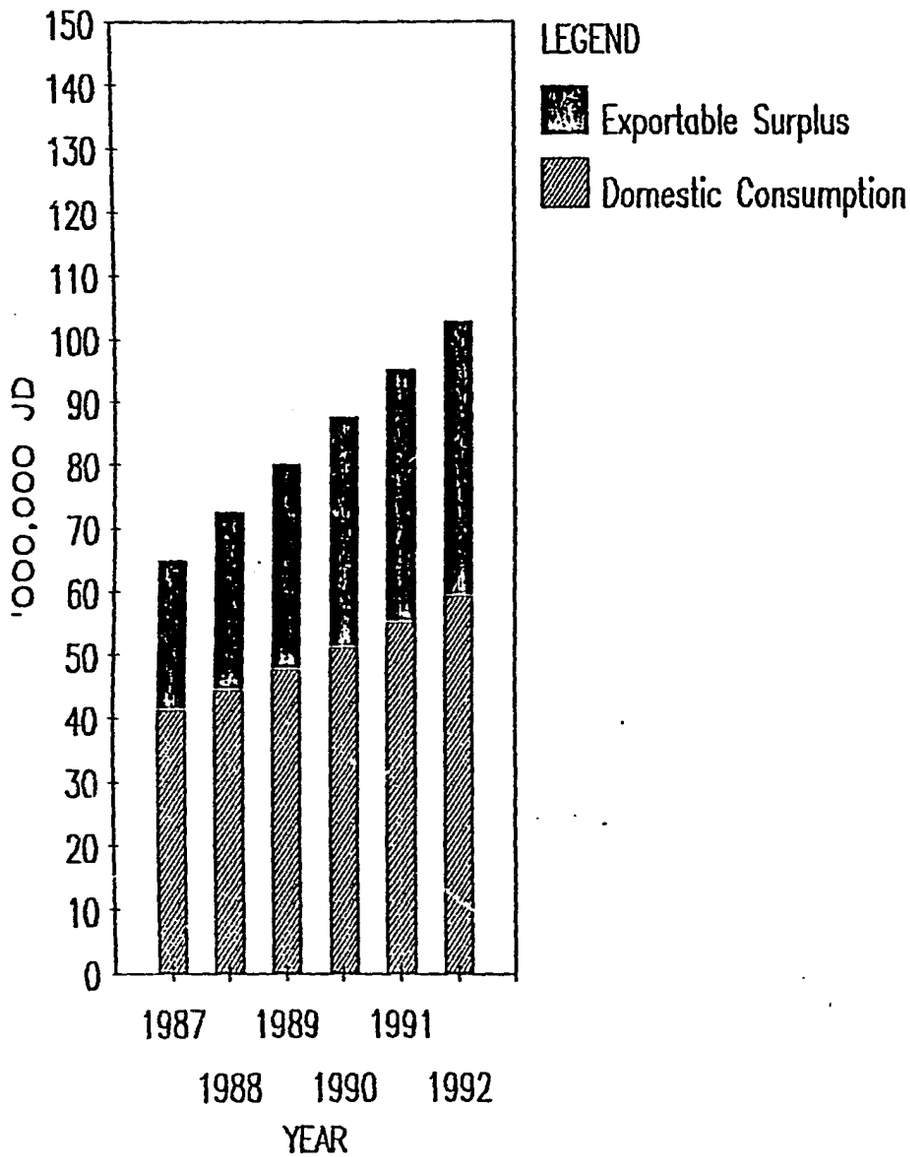
depends heavily on the quality of human resources. The future of the economy will depend on improving human resources through public and private investments in education and health services. Jordan's comparative advantage in developing people and service industries to compete in Middle East markets and hence its future economic progress can be retarded by using public resources for transfer payments (subsidies) to agriculture or other industries rather than for investments in capital with a high payoff -- human capital, farm infrastructure, and technology.

Projections of Agricultural Export Potential as Measured by Trends in Production Compared to Domestic Utilization

To determine the future role farm exports in Jordan's economy, domestic production and domestic consumption are projected to 1990 in Figures 1 and 2. Future production is projected based on yield trends and official estimates of expanded and improved irrigated areas. Future consumption is projected based on the GNP growing 5.8 percent per year, an income elasticity of demand of .65, and population growing 3.7 percent per year. These generous demand assumptions provide the minimum projections of production available for export. (Maximum and average projections are shown in Annex 1.) The results in Figures 1 indicate not only that Jordan is likely to have a growing exportable surplus of individual agricultural commodities, it is also likely to be a net overall exporter. More resources will be available to agriculture than needed to serve the domestic market. Hence, appropriate policies need to be examined regarding enhanced capacity to compete in export markets. If the surplus is not exported, the agricultural plant will need to be sealed down by using fewer resources.

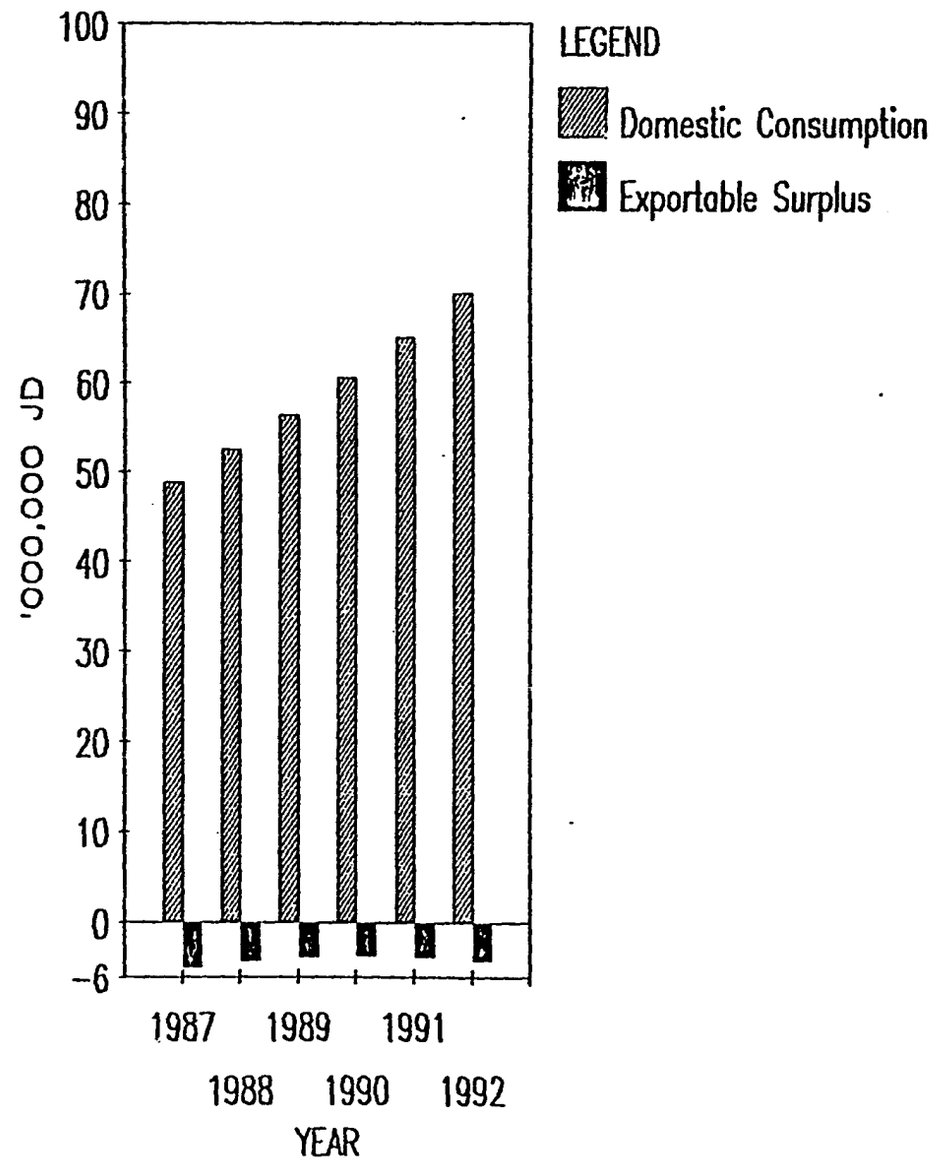
MAIN VEGETABLES

Projections of Domestic Consumption and Exportable Surplus
High Value



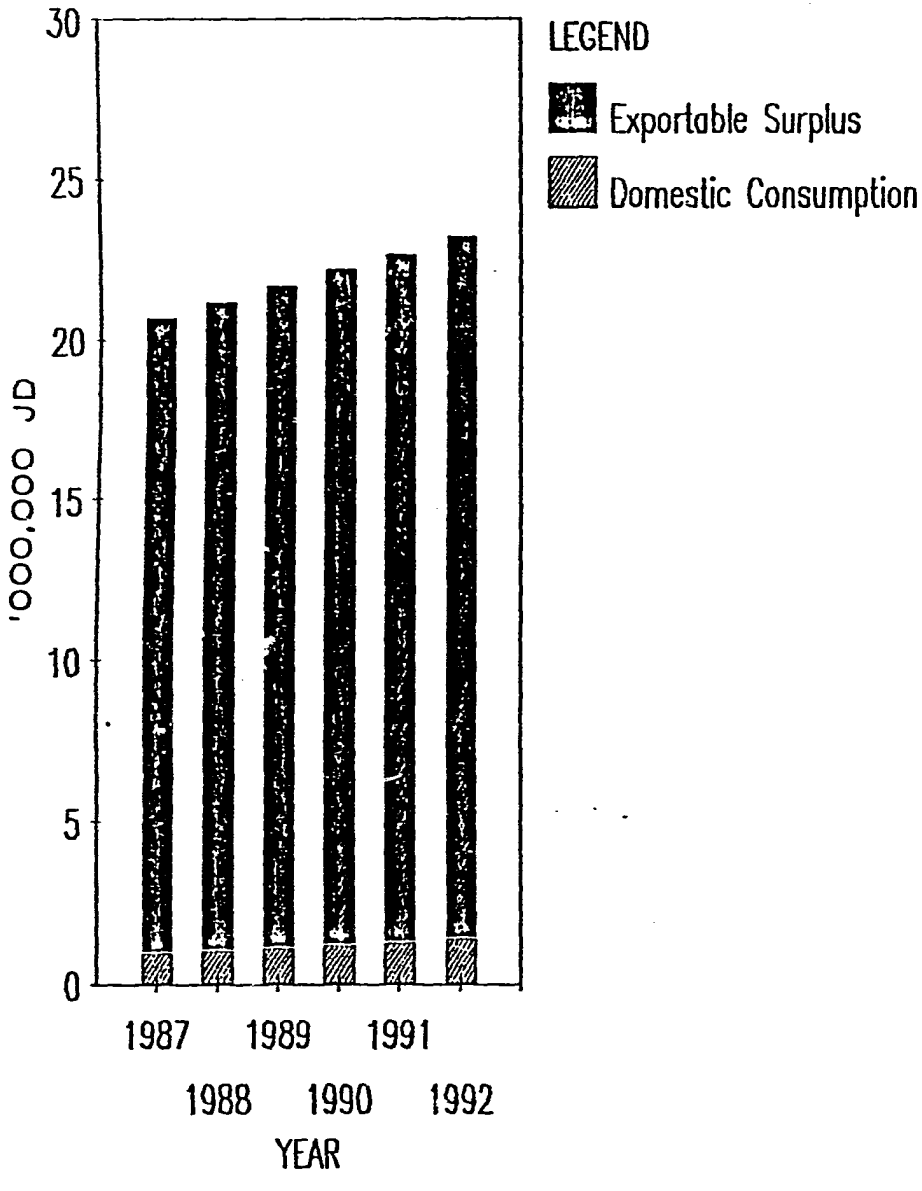
OTHER VEGETABLES

Projections of Domestic Consumption and Exportable Surplus
High Value



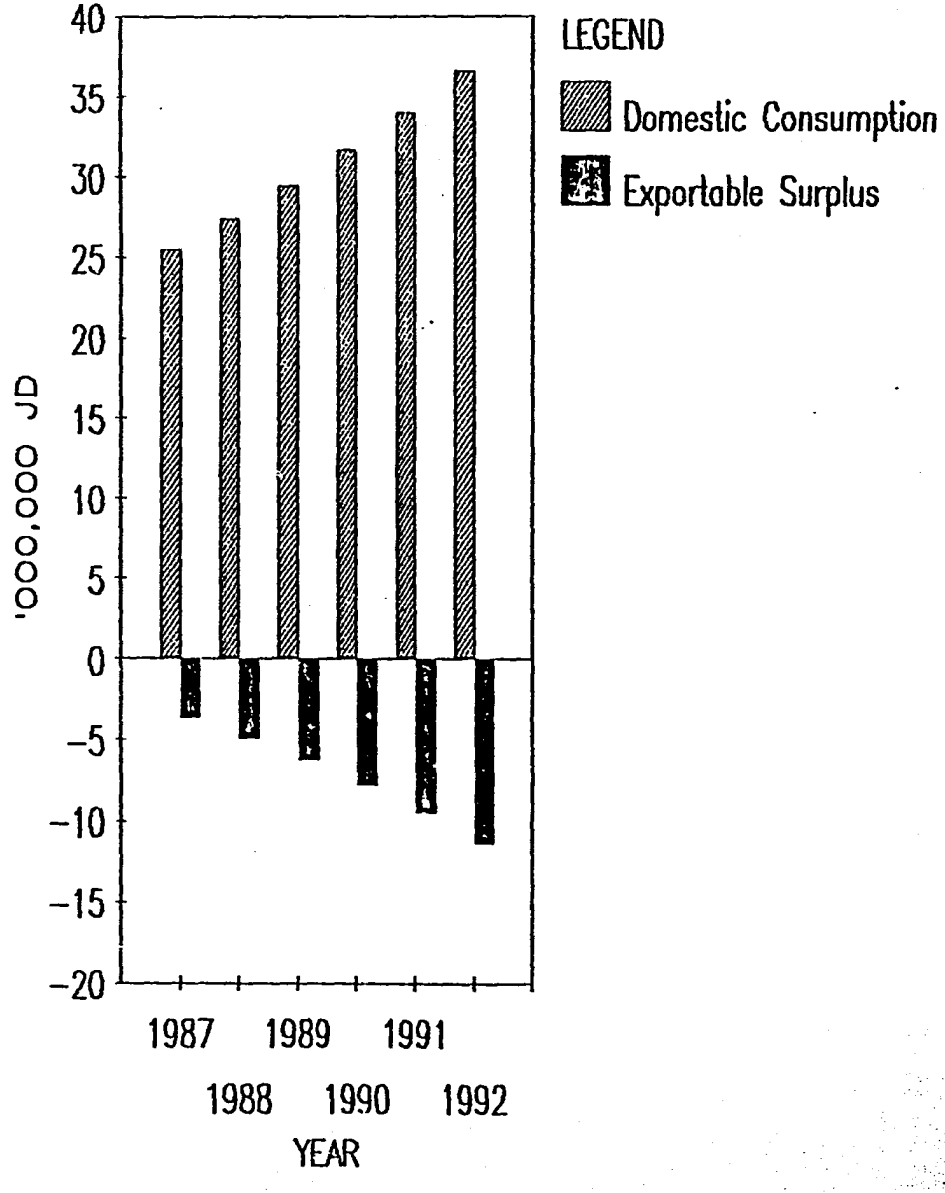
CITRUS

Projections of Domestic Consumption and Exportable Surplus
High Value



OTHER FRUITS

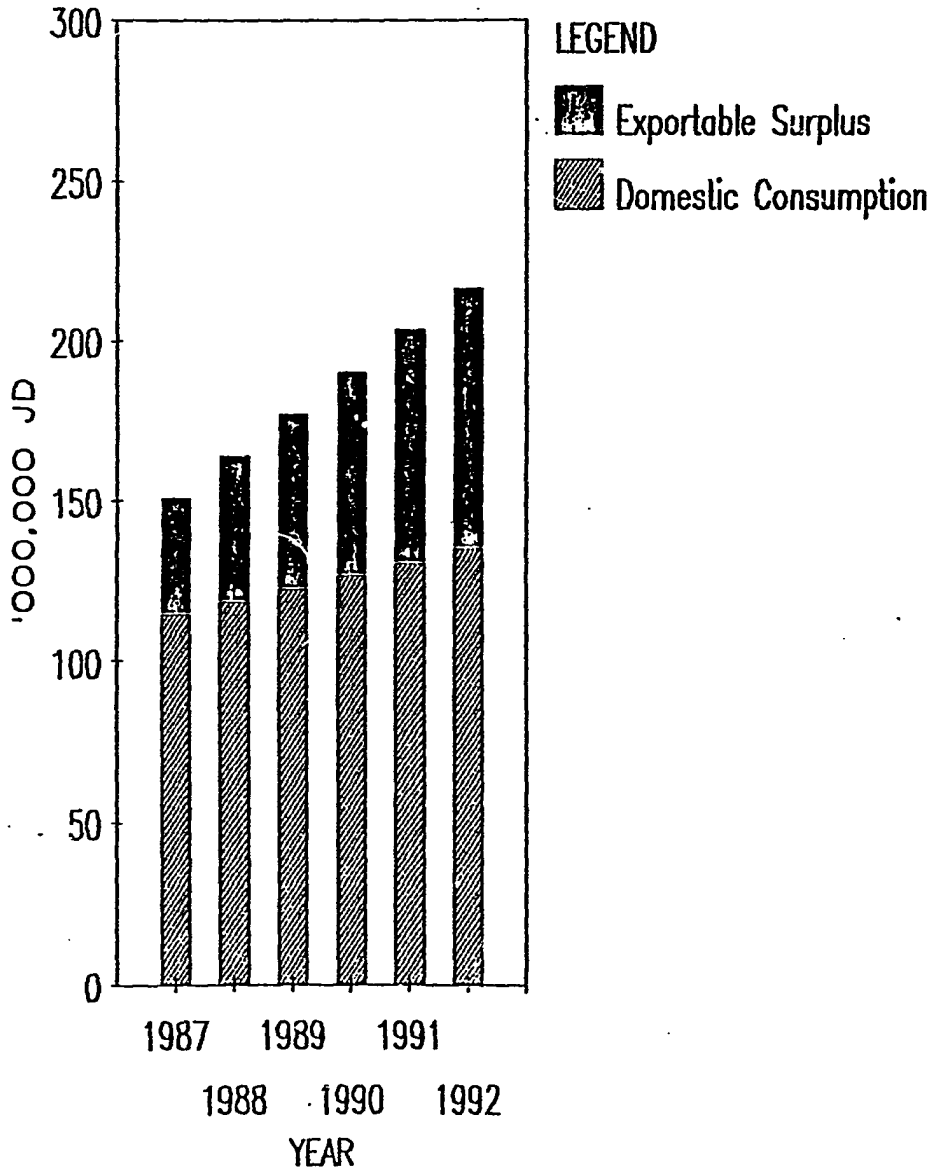
Projections of Domestic Consumption and Exportable Surplus
High Value



ALL VEGETABLES AND FRUITS COMBINED

Projections of Domestic Consumption and Exportable Surplus

Low Value



Impact of Market Interventions on Producers, Consumers and the Nation

As indicated earlier, on the whole the Jordanian economy has not had large distortions causing inefficiencies in recent years. However, it is well to examine the impact on producers, consumers, and the economy as a whole from some initial and potential distortions. AMPCO is the sole importer of potatoes, onions, garlic and apples. In the case of potatoes, in 1986, the estimated price in the Amman wholesale market averaged JD 138.70 per ton compared with an import cost (including transport and other expenses) for potatoes in Amman of JD 117.90. These and other basic statistics for potatoes are shown in Table 2, (more complete analysis and concepts are shown in Annex I). The higher domestic price resulting from charging more than the actual import price in the domestic market encouraged producers to supply more potatoes as indicated by the elasticity of supply in Table 2. The higher price caused consumers to purchase less as indicated by the elasticity of demand in Table 2.

The gain to AMPCO from the implicit tax on potato imports was JD 318,702 (Table 3). Producers gained an estimated JD 775,422 from higher prices and additional output. Gains to AMPCO and to producers were less than the loss of JD 1,325,711 to consumers, hence national income in Jordan was estimated to be reduced by JD 234,587. National income fell JD .3 for each Jordanian Dinum gained by producers. Results are shown in Annex I for onion imports also. Distortions were relatively minor in the case of onions, garlic, and apples, hence are not discussed here.

Many countries pursue policies of import substitution and self-sufficiency to save foreign exchange and promote food security. Jordan has not and has no plan to follow such a policy, but the implications of raising domestic prices for producers and consumers to bring self-sufficiency in potatoes are shown in Table 4. The cost in national income would be considerable, an estimated JD 966,424. An increase in the open market domestic price of JD 117.90 per ton to JD 158.19 per ton raises net income to producers but lowers income to consumers. An estimated .61 JD of national income is sacrificed per JD gained by producers.

TABLE 2

BASIC STATISTICS -- POTATOES, 1986

Domestic production (t)	39,000
Net imports (t)	15,178
Consumption (t)	54,178
Elasticity of supply (%)	.5
Elasticity of demand (%)	-2.0
Wholesale price, Amman (JD/t)	138.70
Import (border) price, Amman (JD/t)	117.90
Proportional price gain (%)	17.60

TABLE 3

IMPACT OF TAX ON IMPORTS OF POTATOES (JDs)

Loss to consumers	1,325,711
Gain to AMPCO	318,702
Gain to producers	775,422
Net social cost in national income	234,587
Loss in national income/gain to producers	.30

TABLE 4

IMPACT OF SELF-SUFFICIENCY IN POTATOES

(Price increase 40.29 JD/t over 117.90 JD/t border price)

	(tons)	(JDs)
Loss to consumers	42,784	2,539,980
Gain to producers	5,189	1,573,556
Net social cost in national income (JDs)	47,973	966,424
Loss in national income (gain to producers)		.61

Trade Policies Summary

As noted above there is insufficient justification for the GOJ to intervene in markets to help agriculture by reducing the exchange value of the JD. We now turn to options regarding specific trade policies. Recommendations are to:

- Rely mainly on the private trade to develop and manage export markets. The private trade has been responsive and innovative.

- Rely on the Agricultural Marketing and Processing Corporation (AMPCO) to pursue innovative methods in merchandizing fruits and vegetables in penetrating selected new foreign markets that may entail loses in early years.

- Allow private firms to import garlic, onions, potatoes, and apples. This not only will lower prices for these commodities, it also will permit private traders to expand agricultural exports by engaging in barter counter-trade. Losses incurred by AMPCO in developing foreign markets can be reimbursed directly by the government rather than from cross-subsidies obtained from "taxes" on imports.

- Terminate the fee on imports of production inputs for agriculture and the basic industries for more efficient resource allocation. Alternative revenue sources such as a fee for Jordan Valley irrigation water can be found [1].

---

1. A source of inefficiency is the charge of only three fills per cubic meter when operating and maintenance costs are estimated to be 13.5 fils per cubic meter of irrigation water in the Jordan Valley. Addition of capital recovery would make costs approximately 30 fils per cubic meter. Plans to cover operating costs initially would entail adjustment burden to producers but would encourage more efficient water use -- less water logging at the irrigation head and more water available at the tail -- both of which would increase yields.

- Explore innovative marketing techniques. Some countries have had success with marketing organizations established to ensure high quality of branded and advertised fruits and vegetables for export markets. Jordan's export markets may be too small and diffuse to engage in such activity at favorable benefits relative to costs, but conclusions cannot drawn without further study.

- Re-examine benefits relative to costs of AMPCO's processing of tomato paste for domestic or export use from excess tomato supplies. The total cost per ton including administration for the 2431 tons of tomato paste processed in 1986 averaged 553 JD, a loss of 331 JD per ton. One option would be to terminate paste processing. Another, option would be to reduce the price paid Farmers for tomatoes used in processing. Paying farmers all variable production costs encourages excess tomato production. Benefits can be increased for AMPCO tomato paste activities relative to costs by paying farmers harvest and delivery costs high enough to encourage delivery but low enough to reduce future production.

- A final reconsideration is to avoid widespread use of export subsidies. Jordan is not now subsidizing exports across the board. Specific, targeted measures noted above to penetrate and develop selected foreign markets are warranted by AMPCO, but general export subsidies are unwarranted and would reduce nation income of Jordan.

Jordan's farmers rightly are disturbed by loss of export markets from unfair competition caused by subsidies to fruit and vegetable production in other countries. At issue is the appropriate response. The best solution in this case is for all countries to open markets and terminate subsidies but that solution is not feasible. The second test solution is confrontation through export subsidies or other means used by Jordan to successfully remove

16

market distortions in other countries. Such an outcome also is unrealistic. The third best but only reasonable solution is for Jordan to avoid subsidies even if other countries are using them. The biggest losers from export subsidies and market distortions are the countries using them. The worst solution is to practice confrontational market interventions that are unsuccessful in reducing barriers in other countries.

Given that the best policy is to avoid subsidies, it is important nonetheless to practice compassion. Consumers and taxpayers in Jordan who gain from more open trade and avoiding subsidies can compensate farmers for some of the burden of adjusting a world of growing barriers to trade. Such compensation should assist rather than halt the adjustment process.

In the following pages, reasons advanced for low farm prices such as collusion in wholesale markets, lack of market information, poor product quality, and reference pricing are addressed. Changes suggested will improve Jordan's fruit and vegetable markets but will not ensure producers of high prices and favorable net returns. The latter are problems in supply and demand balance that the market will address if allowed time to work. Given time for adjustment well-managed Jordanian farms will adjust to the new supply-demand balance and cover their costs production.

The Wholesale Market

Fruit and vegetable wholesale markets are found in five locations but the three major markets are in Amman, Zarka, and Irbid. The Amman market is the largest, with up to 90 percent of some fruits and vegetables produced in the Jordan Valley passing through it. This section focuses on this market because it is the largest market and because most of the policy reform interest centers on it.

Some alleged problems of the market include:

1. Excessive fees are charged for providing market services believed to be of little or no value.

2. It is controlled and manipulated by a few wholesalers.
3. Producers have low bargaining power relative to commission agents and other wholesalers, hence receive and unfairly low price for their produce.

Before listing options for reform of the market to provide greater competition and balance bargaining power between market participants, it is useful to list beneficial activities or functions performed by the wholesale market.

1. Price discovery for market clearing. The market pools knowledge of buyers and sellers regarding supply-demand conditions to reach a price that clears the market. A higher price causes waste from surpluses. A lower price causes shortages.
2. Controlling market flow. Fruits and vegetables are perishable and can be stored for only limited periods of time at considerable cost in refrigeration or deterioration in quality. Producers have some limited flexibility in timing delivery of their produce, however. Information provided by the market and sometimes by wholesalers themselves helps producers adjust time of delivery to receive a somewhat better price and reduced instability in market flows.

3. Convenience. Much time and knowledge would be required by producers for efficient direct marketing to consumers. The wholesale market saves producers' time and other resources that would be required to sell directly to consumers or retailers. Producers receive information regarding proper packing and other delivery methods from the wholesale market. Those bringing in supplies can be assured of a market although not necessarily at their preferred price. Retailers and exporters can be assured of finding supplies (although, like producers, not necessarily at the preferred price or grade) and in volume producing potential to sort for obtaining needed volumes by quality. Exporters with current knowledge of

prices and supply-demand conditions from telephone or telex in export markets can quickly assemble supplies to respond.

4. Risk Avoidance. A producer who sells directly to retailers or consumers risks having no market and risks loss of his produce by spoilage. A producers avoiding the market risks the chance of losing receipts by selling his commodity at a lower price than justified by supply-demand conditions. A retailer avoiding the market risks paying more than his competitors pay for produce.

A related convenience is advance payment for merchandise or credit provided by wholesalers to producers. Interest rates are high and some producers become overly dependent on and excessively obligated to wholesalers for credit. On the other hand, the commission agent may be the only source of credit available to some producers who are high credit risks and for whom taking receipts directly from market sales is the only source of repayment. the wholesaler risks default if the producer is unable or unwilling to deliver a crop. Unlike most of the credit sources, the wholesaler is not subsidized. Experience with cooperative or parastatal markets the world over is the advance payments are rare while payment delays for delivered merchandise are frequent.

These wholesale market functions create time, form, and place utility of benefit to producers and consumers. Considerable time, skill, and some capital are contributed to the market by the wholesaler. For their market services, commission agents are to receive a commission of 5 percent of produce value from purchasers, but observers report that competition has driven the rate down to an average commission of 4 percent. In addition, the producers pays 2 percent tax to the municipality for using facilities, bringing the total official charge to 7 percent of sales value. The wholesaler also contributes 2 percent municipal tax, most of which (because of reference pricing at retail discussed elsewhere) is passed back to the producer as a lower price. Hence, the producer effectively pays about 9 percent for selling through the wholesale market.

Several observations suggest that benefits of selling through the wholesale market are judged to be worth it expense to producers, retailers, and consumers:

1. Relatively little produce is purchased by consumers or retailers directly from farmers. producers are restricted in selling direct in Amman but produce can be sold at the farm itself or outside Amman. Restrictions on directly selling in Amman are not enforced, yet few producers sell direct.
2. The Jordan Farmers Organization (JCO) in the early 1980s experimented with a few retail stores that avoided wholesale markets. The experiment was not a success. Producer or consumer cooperatives could but have not chosen to sell direct to avoid or reduce marketing costs.
3. Currently 55 commission agents and other wholesalers are licensed to operate in the stalls of the Amman market. Proportions of sales accounted for by the top commission agents in volume are as follows: The top 4 commission agents accounts for 13 percent of sales and the top 8 agents account for 23 percent of all sales. A relatively few wholesalers do not account for a significant share of sales, and collusion is more feasible in a relatively closed market than among scattered firms. But concentration is not near the eight firms controlling 65 - 80 percent of the market recognized by market analysts as necessary to control prices and profits.[1]
4. Whether the commission of 5 percent allowed to agents is excessive relative to services performed cannot be accurately judged. However, a rate arbitrarily set too high or too low is fairly easily circumvented in market arrangements between buyer and seller. Competition ultimately determines the commission rate which is reported by market experts to average less than 5 percent. Competition is essential for a well-functioning market.

---

[1]Stephen Miller. "The Structural Stability of the Concentration-Performance Relationship in Food Manufacturing." Southern Journal of Agricultural Economics 14 (December 1981): 43-49.

The Amman wholesale market is efficient in pooling information, bringing together the produce of several thousand sellers for sale to about 500 retailers. Given the large numbers of buyers, sellers, and wholesalers as well as easy access to alternative markets, systematic collusion is neither likely nor in evidence. The wholesale market performs a useful service and need to be continued. The market does not function as well as it could, however, and a number of changes are needed. The best policy is to take measures to ensure competition and avoid market abuse. The following measures will ensure competition and better serve the interests of producers and consumers.

1. The first priority is for the municipality to finance the construction of a larger wholesale market in Amman that would provide adequate space, including space for the export trade. The Amman market was constructed just over 20 years ago to handle 50,000 tons of produce per year. Now with only modest expansion of space it handles 1,000,000 tons per year. The facility should be large enough to accommodate more stalls for commission agents and allow for expected sizable future growth in the Amman produce market. The facility can be paid for from the current fee on market sales. The facility should be large enough to hold sales in shorter periods of time.
2. The number of wholesale licenses and stalls should be expanded to at least 100. A license costs 500 JD per year, but the ability of a commission agent to operate in the market and earn income depends on access to one of the 55 available stalls. Whether more than 100 wholesalers are needed can be judged from the value received from sale of stalls. Such stalls now sell for up to 50,000 JD and rent for 2,000 JD per year. Each license and stall would be permanent property of the municipality but would be reauctioned periodically to commission agents and wholesalers. Leases auctioned each pay five years to wholesalers bringing a high value would support a case

for added stalls and bringing a low value would signal adequate numbers of stalls.

3. Award one stall each to the Jordan Valley Farmers Association and to the Jordan Cooperative Organization (JCO currently has a stall) at no charge. The cooperatives would be required to pay the regular market fee, however, to help pay for the new facility. The cooperatives are a guideline against which to measure the performance of private commission agents. The cooperatives would be responsible for choosing a competent agent for the market.
4. Hold fruit and vegetable auctions at regularly scheduled but shorter periods to bring more buyers and sellers together at each sale. Expanded auction space with more room for parking and display would facilitate such a change.

22

Retail Prices and the Reference Price
System for Fruits and Vegetables in Jordan

Retail price controls for fruits and vegetables were instituted in Jordan in 1967. Searching for solutions to the acute marketing problems that have confronted the horticultural sector in recent years, the government decided on December 5, 1985 to free retail prices. The liberalization experiment was, however, short-lived. An evaluation of the first two months of this experiment was performed by the Ministry of Supply in February 1986. Comparison of December 1985 - January 1986 with December 1984 - January 1985 showed that wholesale prices declined for most commodities, and both retail prices and margins increased for many others between the two periods. The evaluation concluded that freeing retail prices had a negative impact on producers and consumers, and on March 3, 1986, less than three months after price controls were abolished, the price control system was reimposed.

The objective of this paper is to examine the effects of the retail reference price system for fruits and vegetables on market performance. A description of how retail prices are determined will be first presented. The price liberalization experiment will then be assessed and options for retail price policy reform suggested.

I. The Retail Reference Price System

Retail outlets in Jordan are scattered throughout the country. In villages, fruits and vegetables are sold in general stores, but there exists a large number of specialized shops for these commodities in larger urban areas. Retailers buy from central markets and sell in general or specialized stores. Itinerant retailers sell their produce from pick-up trucks in the more populated areas and along main roads and highways near urban centers.

Although there exists a number of local assembly and secondary wholesale markets for fruits and vegetables, most transactions take place at the central markets. Commission agents facilitate transactions in these markets by selling on behalf of the farmer, but do not own the produce. However, most commission agents are also wholesalers who buy and sell for their own account. Many wholesalers are also exporters. Exporters deal directly with farmers, or buy from assembly and central wholesale markets.

24

There are three major wholesale markets located in Irbid, Zarka and Amman. The Amman wholesale market was built in 1966 and is administered by the Municipality of Amman. Volumes of fruits and vegetables sold in this market represent a large share of total domestic production and most imports and exports.

When produce enters the Amman Wholesale Market, type and volume are recorded by market personnel. The produce must be consigned to one of the 55 commission agents who represent the farmer. The commission agent holds an auction and sells to the highest bidder among wholesalers, exporters and retailers.

Commission agents receive 4 to 5 percent of the product's wholesale price for their services. The Municipality of Amman charges an additional 4 percent fee for the use of the market. Two percent of this fee is collected from the farmer and 2 percent from the buyer.

All prices and volumes are recorded each day by personnel from the market administration. These prices are used as a basis for determining wholesale prices for that day and retail prices for the following day.

After 11:00 a.m., a pricing committee meets in one of the wholesale market offices. The Committee consists of four members representing the Ministry of Agriculture, the Ministry of Supply, the Agricultural Marketing Organization, and the Municipality of Amman.

Wholesale prices are recorded from information collected by Market Inspectors as "highest", "lowest", and "most representative". No rigorous method is used to determine these levels. The most recurrent price recorded in each range is chosen, irrespective of quantities, as representative of that range. Since the "most representative" price is reported as the "Amman wholesale market price", it is important to note that it is the mode (in the statistical sense) and does not necessarily reflect the price at which most quantities are sold.

Using the "highest" and lowest" wholesale price as benchmarks, the four-member committee determines corresponding "upper" and "lower" retail prices for the following day. These prices are reported in all newspapers and enforced by the 120 inspectors employed by the Ministry of Supply. For reasons explained below the upper or ceiling price is reported as the retail price in most statistical documents.

25

In determining retail margins, the Committee relies mainly on its members' "market experience" and "personal judgment". Consequently, retail margins do not represent fixed proportions of wholesale prices. Even the range of the mark-ups is difficult to define since these may vary substantially from one commodity to the other, and from one day to the next. Furthermore, if on a particular day the wholesale price of a particular commodity is judged "too high", the retail price ceiling of that commodity will be determined at a substantially lower level (sometimes less than 50 percent of the wholesale price). A similar procedure is used when the wholesale price is judged "too low".

II. The Price Liberalization Experiment: Assessment, and Implications for Retail Price Policy Reform

This section provides a thorough examination of the liberalization period. Relationships between volumes, wholesale and retail prices, and retail margins during that period will be explored, and options for retail price policy reform will be investigated.

Table 1 shows that, with the exception of the less widely produced commodities, wholesale prices for all vegetables and citrus declined between December 1985 - January 1986 and the previous December - January period. The decline is also apparent when wholesale prices during the liberalization period are compared with average wholesale prices in December 1980 - January 1985. These results seem, at first glance, alarming. However, an examination of the volumes of produce entering the Amman Wholesale Market (Table 2) indicates that with the exception of eggplant, the decline in wholesale prices was merely a reflection of the increase in these volumes. The increase in the quantity of fruits and vegetables sold at the Amman Wholesale Market was probably a consequence of an increase in the volumes of produce from the West Bank and Gaza that would have otherwise been exported directly to neighboring countries in the absence of price decontrols and farmers' expectations of higher prices.

Table 2 also shows that wholesale prices of the minor vegetables increased as a result of their lower volumes. This inverse relationship is illustrated in Figure 1.

To assess the impact of price liberalization on consumers, it is important to note that retail prices for most commodities declined during the liberalization period (Table 3 and Figure 2). More important, even though retail prices of citrus, eggplant and minor vegetables rose, a basket of main vegetables and citrus became 6 percent less expensive, and a basket of tomatoes, eggplant, squash and cucumber (Jordan's main vegetables) became 29 percent cheaper.

Elimination of price controls made the situation even more favorable to low-income consumers. With an insufficient retail margin for higher quality produce under price controls, merchants attempted, in the absence of well-defined grades and standards, to sell as much of their produce as possible at the ceiling price irrespective of product quality (1). With a wider price range, due to the elimination of price controls, lower-income consumers most likely had access to lower-quality produce at a lower price.

Elimination of the reference price was also most likely beneficial to high-income consumers. Prior to liberalization, the highest-quality fruits and vegetables were exported. To be sure, a local market for high-quality produce existed and retailers catered to this market by selling from under the counter or from back rooms at a price believed to be 20 to 40 percent higher than the ceiling price. However, for fear of being fined, many retailers were reluctant to engage in this parallel-market activity. Consequently, the market did not send price signals back to producers that some consumers were willing to pay for quality produce. Hence, farmers were given inadequate incentives to produce for that market.

Retail margins for most fruits and vegetables were higher in December 1985 - January 1986 than in December 1984 - January 1985 as well as in December/January 1980-1986 (Table 4 and Figure 3). However, the retail margin during the liberalization period did not exceed that of December/January 1980-1985 by more than 8 percent for the main vegetables and

(1) Reflecting this reality, most statistical documents report ceiling prices as retail prices.

27

16 percent for the main vegetables and citrus combined (Figure 4). Moreover, it is likely that these margins would have decreased in the longer run for two reasons:

1. More retailers would have entered the market as the initial expansion in the fruits and vegetable stores (1) would have continued.

2. An examination of Figures 5 and 6 indicates that wholesale and retail prices moved, as can be expected, in the same direction. However, due to the stickiness of retail prices in the short run, the decrease in wholesale prices was larger than the fall in retail prices (2). Retail prices' greater flexibility over time would have reduced the retail margin by ensuring greater syncronization between the two prices.

The above analysis provides insights into the changes in prices and margins that resulted from retail price decontrols in Jordan in December 1985 and January 1986. While these results must be accepted with caution because they represent only short-term responses, they are indicative of the overall magnitude and direction of change that occured during the liberalization period.

The major findings of the analysis may be summarized as follows:

1. Wholesale prices decreased during the liberalization period in comparison with similar previous periods. However, this decrease reflected an increase in the quantities of fruits of vegetables sold at the Amman Wholesale Market during that period.

2. Retail prices increased for some commodities but decreased for most fruits and vegetables. More important, a basket representing the main fruits and vegetables consumed in Jordan was less expensive during the liberalization period.

---

(1) 300 new stores were reportedly in business between December 1985 and February 1986.

(2) The transition to a freer market environment as well as the shortness of the period under consideration may explain the unusual behavior of citrus and minor vegetable prices.

3. Although price liberalization resulted in a higher retail margin, the new margin was not unreasonably higher than the controlled margin. Moreover, this margin would have adjusted downwards, had the experiment been allowed to continue.

4. Price controls had adverse effects on both high- and low-income consumers. Merchants were, for fear of being fined, reluctant to sell high quality produce to consumers who were willing to pay for it, and attempted to sell lower quality produce at the ceiling price. Consequently, Jordanian consumers were faced with a situation where high-quality produce was in short supply and lower - quality produce sold at prices higher than they would have been under a free price system.

5. Pricing according to quality would have helped the export market by sending signals to farmers on the need to learn superior harvesting, grading and packing techniques.

These conclusions suggest that price liberalization would benefit high- and low-income consumers alike, and send price signals on quality to producers with resulting beneficial effects on the export market. The findings also suggest that the fear of higher retail prices and margins associated with price liberalization does not appear to be founded.

To avoid the undersirable effects that may accompany sudden changes, prices ceilings should, nonetheless, be raised only gradually until complete liberalization is achieved.

Another alternative would be to liberalize retail prices for selected minor fruits and vegetables and monitor their price behavior over a longer period of time. This alternative would provide ample opportunity for assessing what might be expected when price controls are removed for all fruits and vegetables.

Implementation of either alternative will necessitate the institution of a strong market information system. As price ceilings are relaxed, wholesale and retail prices by grade of produce need to be reported. Proportion of produce sold at various wholesale and retail price

levels should also be recorded so that a more meaningful overall wholesale-retail margin can be calculated for individual as well as aggregate commodities. Such detailed information will be necessary to investigate a) how margins perform before and after relaxation of reference prices; b) whether and why margins differ by commodity and quality of produce; c) to what extent farmers are rewarded for producing quality merchandise; d) to what extent price liberalization improves grades and standards; and e) the impact of this improvement on the export market.

This information system will first be used to monitor the transition to a freer environment, and, on a more permanent basis, to disseminate information to farmers and traders.

TABLE 1. AMMAN WHOLESALE MARKET: WHOLESALE PRICES OF VEGETABLES & CITRUS (DEC.-JAN., 1985-1986)

	average Dec1980-Jan1985	Dec1984-Jan1985	Dec1985-Jan1986	December 1985 - January 1986 % change with respect to Dec1984-Jan1985
	(JD/Ton)			(Percent)
ALL VEGETABLES	154	184	128	-30
MAIN VEGETABLES	188	209	127	-39
TOMATO	188	213	135	-36
EGGPLANT	97	102	74	-27
SQUASH	145	188	74	-60
CUCUMBER	327	365	211	-42
OTHER VEGETABLES	100	99	131	40
CITRUS	158	161	145	-10
MAIN VEG. & CITRUS	169	178	137	-23

Sources: computations using data from
1. Ministry of Agriculture
2. Ministry of Supply: and
3. Amman Wholesale Market Report, 1986

TABLE 2. AMMAN WHOLESALE MARKET: VOLUME OF VEGETABLES & CITRUS (DEC.-JAN., 1985-1986)

	average Dec1980-Jan1985	Dec1984-Jan1985	Dec1985-Jan1986	December 1985 - January 1986 % change with respect to Dec1984-Jan1985
	(000tons)			(Percent)
ALL VEGETABLES	36.2	38.6	44.2	15
MAIN VEGETABLES	20.4	24.3	33.1	36
TOMATO	6.6	9.2	12.6	38
EGGPLANT	4.4	6.1	5.4	-11
SQUASH	3.9	3.9	7.6	91
CUCUMBER	5.4	5.1	7.4	48
OTHER VEGETABLES	15.8	14.2	11.1	-22
CITRUS	28.1	35.2	37.9	8
MAIN VEG. & CITRUS	48.5	59.5	71.1	19

Sources: computations using data from
1. Ministry of Agriculture
2. Ministry of Supply: and
3. Amman Wholesale Market Report, 1986

TABLE 3. RETAIL PRICE OF VEGETABLES & CITRUS (DEC.-JAN.,1985-1986)

	average Dec1980-Jan1985	Dec1984-Jan1985	Dec1985-Jan1986	December 1985 - January 1986 % change with respect to Dec1984-Jan1985
	(JD/Ton)			(Percent)
ALL VEGETABLES	202	221	192	-13
MAIN VEGETABLES	241	247	176	-29
TOMATO	244	256	210	-18
EGGPLANT	131	128	149	-18
SQUASH	191	226	140	-38
CUCUMBER	399	409	256	-38
OTHER VEGETABLES	140	126	204	61
CITRUS	210	197	224	14
MAIN VEG. & CITRUS	221	215	202	-6

Sources: computations using data from
1. Ministry of Agriculture; and
2. Ministry of Supply

33

TABLE 4. RETAIL MARGIN FOR VEGETABLES & CITRUS (DEC.-JAN.,1985-1986)

	yearly average 1980-85(*)	average Dec1980-Jan1985	Dec1984-Jan1985	Dec1985-Jan1986	difference Dec85-Jan86/Dec80-Jan85
	(Percent)				
ALL VEGETABLES	30	33	21	50	17
MAIN VEGETABLES	32	30	18	38	8
TOMATO	36	32	20	54	22
EGGPLANT	32	39	25	100	61
SQUASH	32	35	20	89	54
CUCUMBER	26	24	12	21	-3
OTHER VEGETABLES	27	39	56	58	19
CITRUS	30	33	22	55	22
MAIN VEG. & CITRUS	30	32	21	48	16

(*) excluding Dec., 84 & Jan., 85

Sources: computations using data from
1. Ministry of Agriculture;
2. Ministry of Supply; and
3. Tables 2-3

34

FIGURE 1. VOLUME AND WHOLESALE PRICE: VEGETABLES AND CITRUS
Change Dec/Jan 84/85 & Dec/Jan 85/86

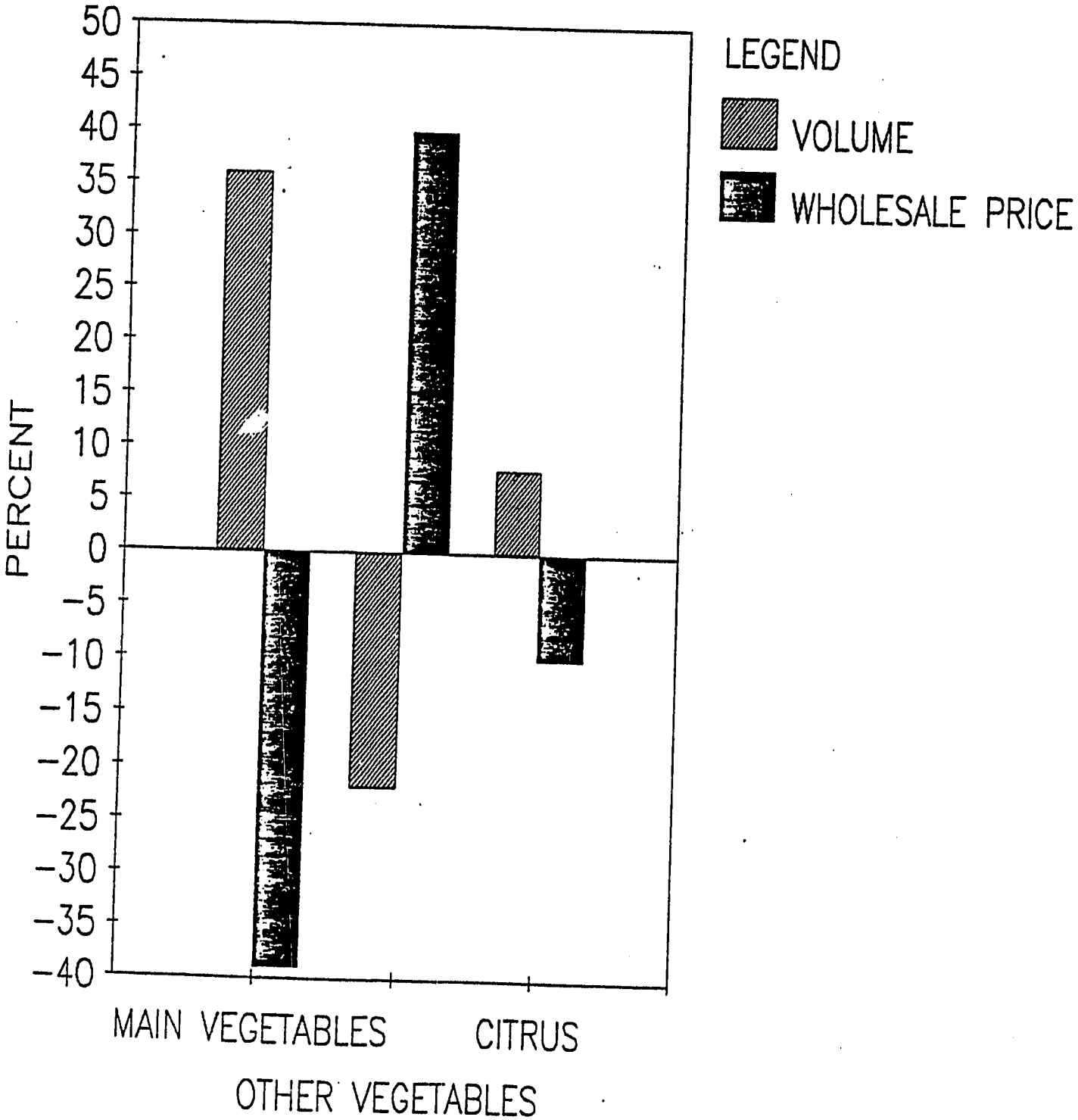


FIGURE 2. RETAIL PRICES VEGETABLES AND CITRUS

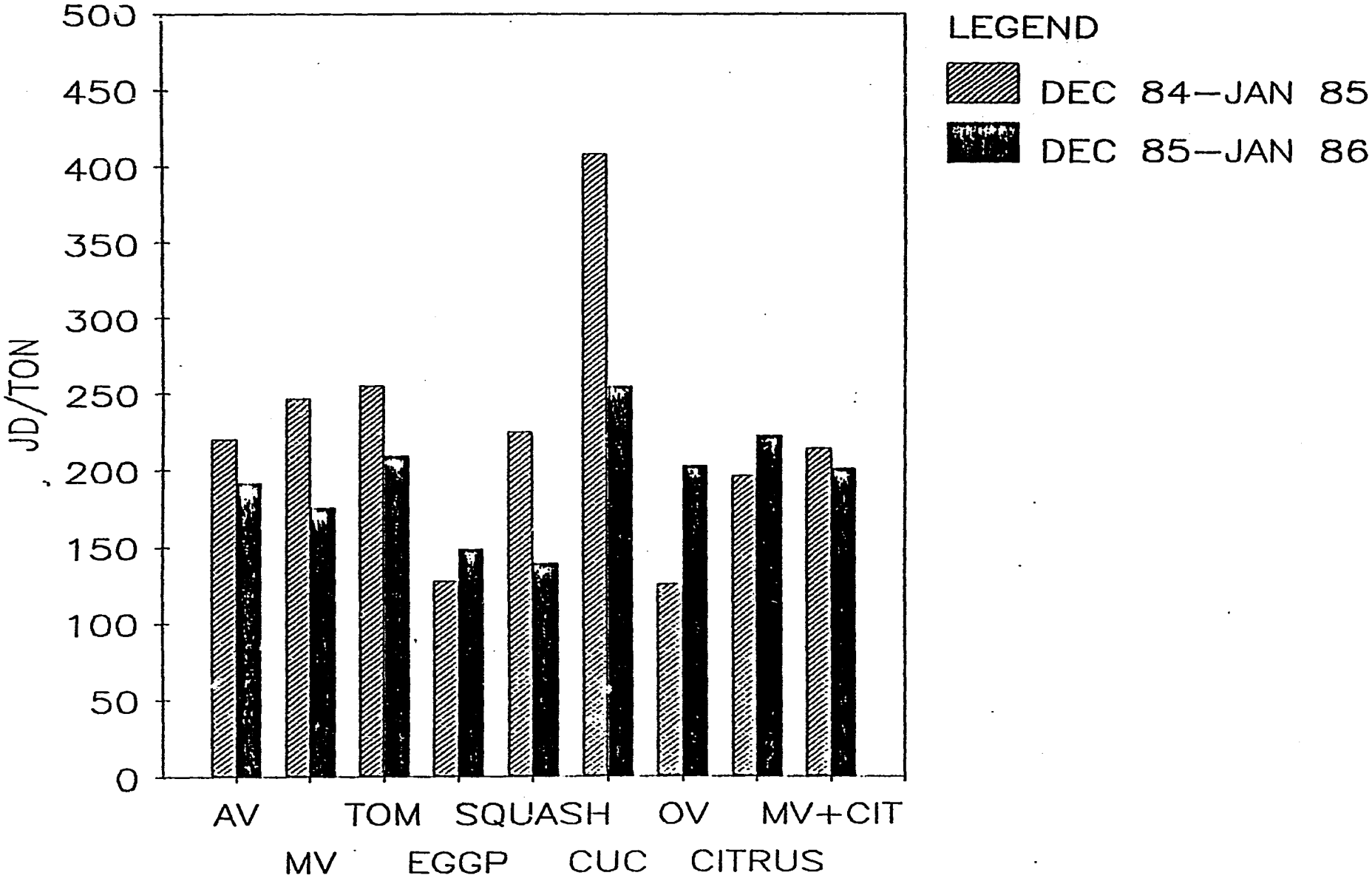


FIGURE 3. RETAIL MARGIN VEGETABLES & CITRUS

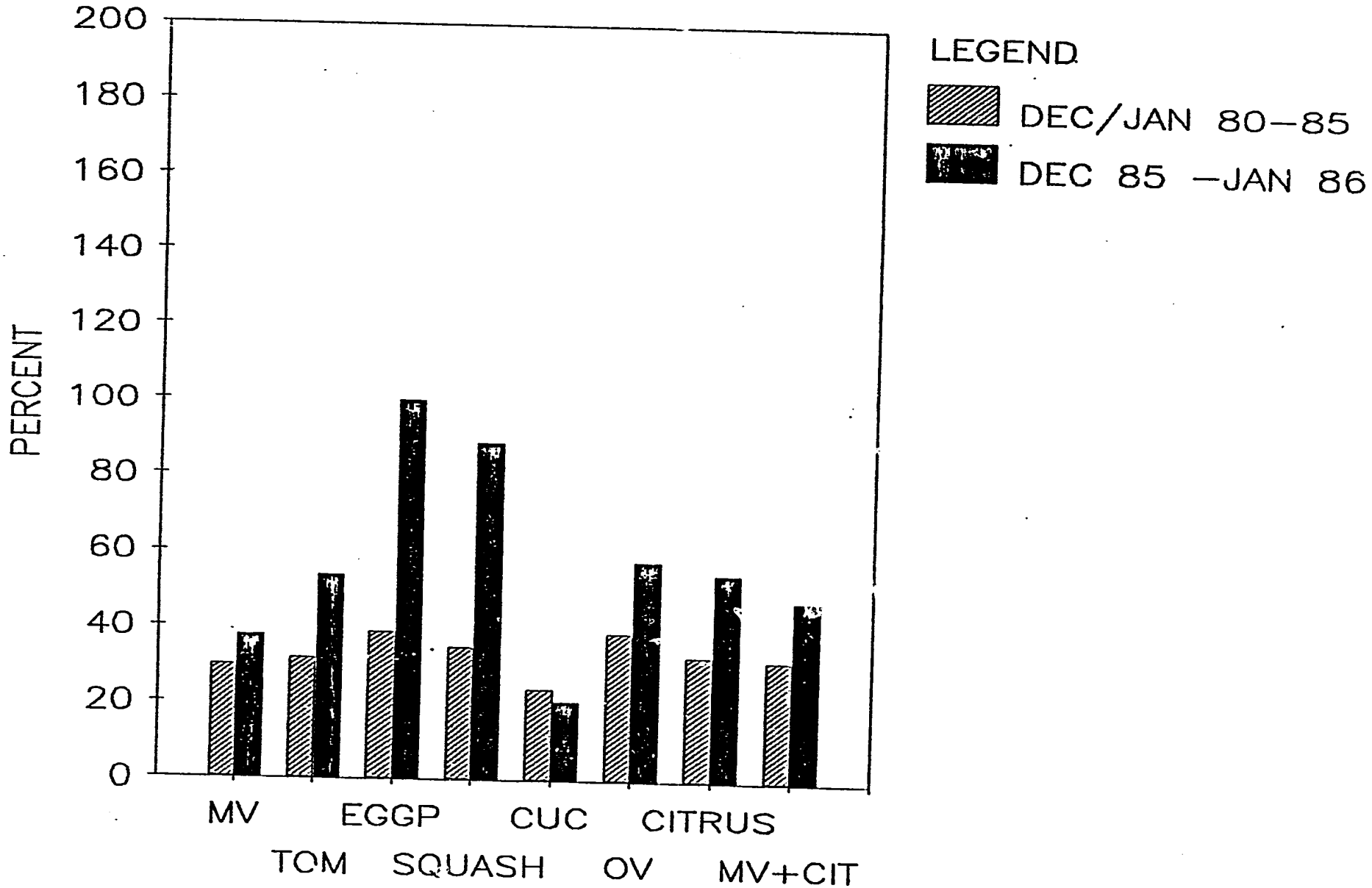
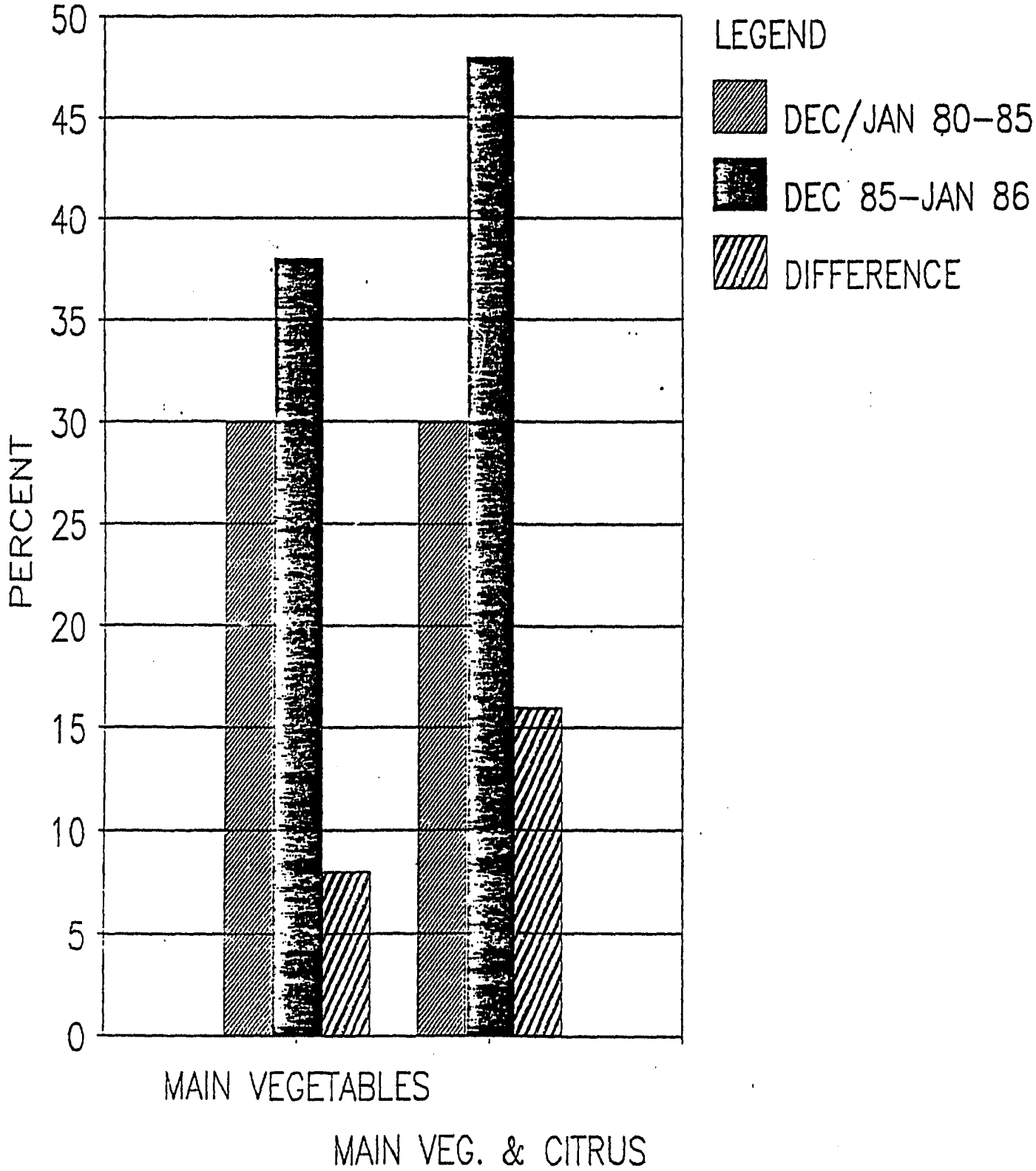


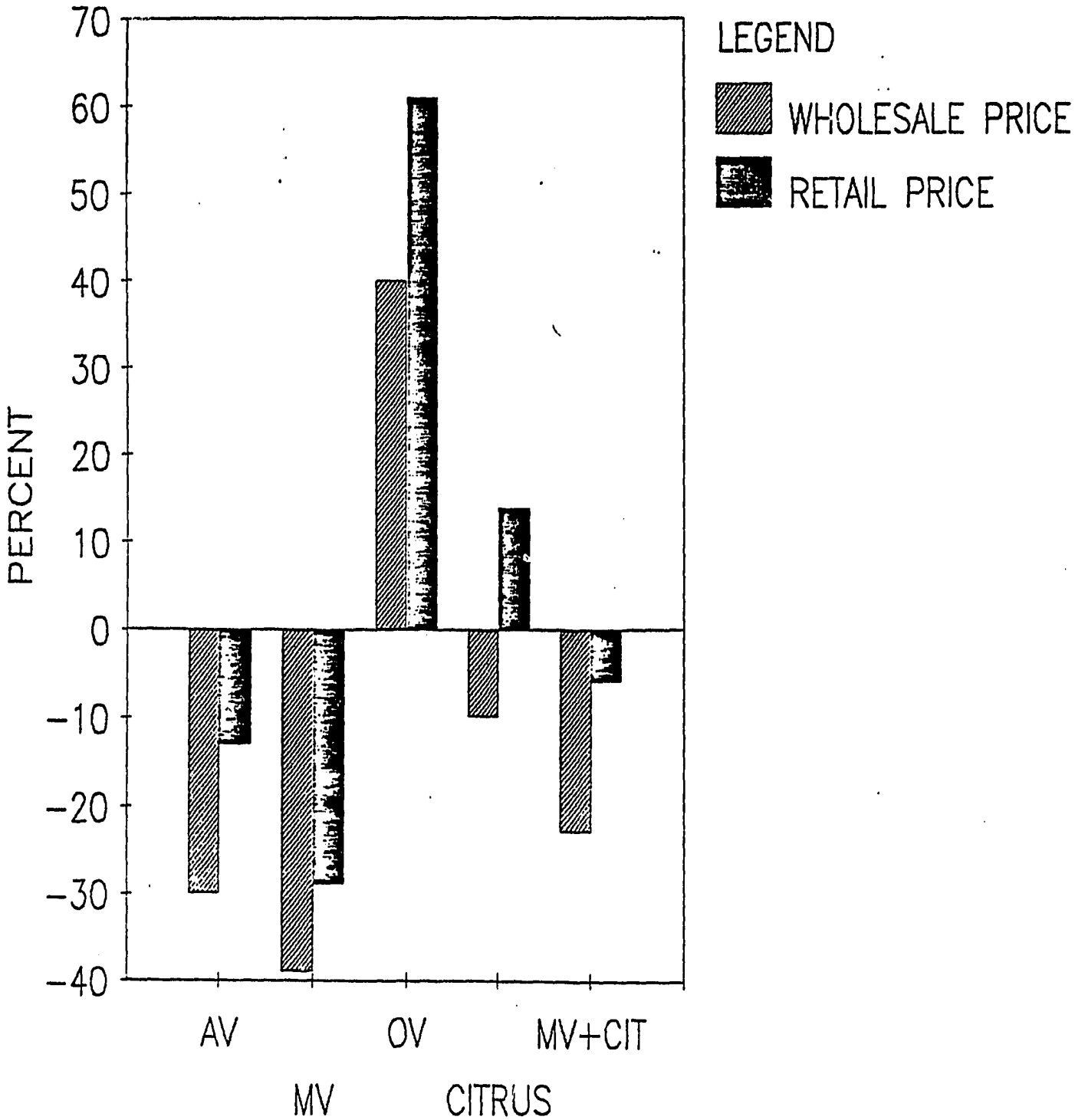
FIGURE 4. RETAIL MARGIN

MAIN VEGTABLES AND MAIN VEGETABLES & CITRUS



38

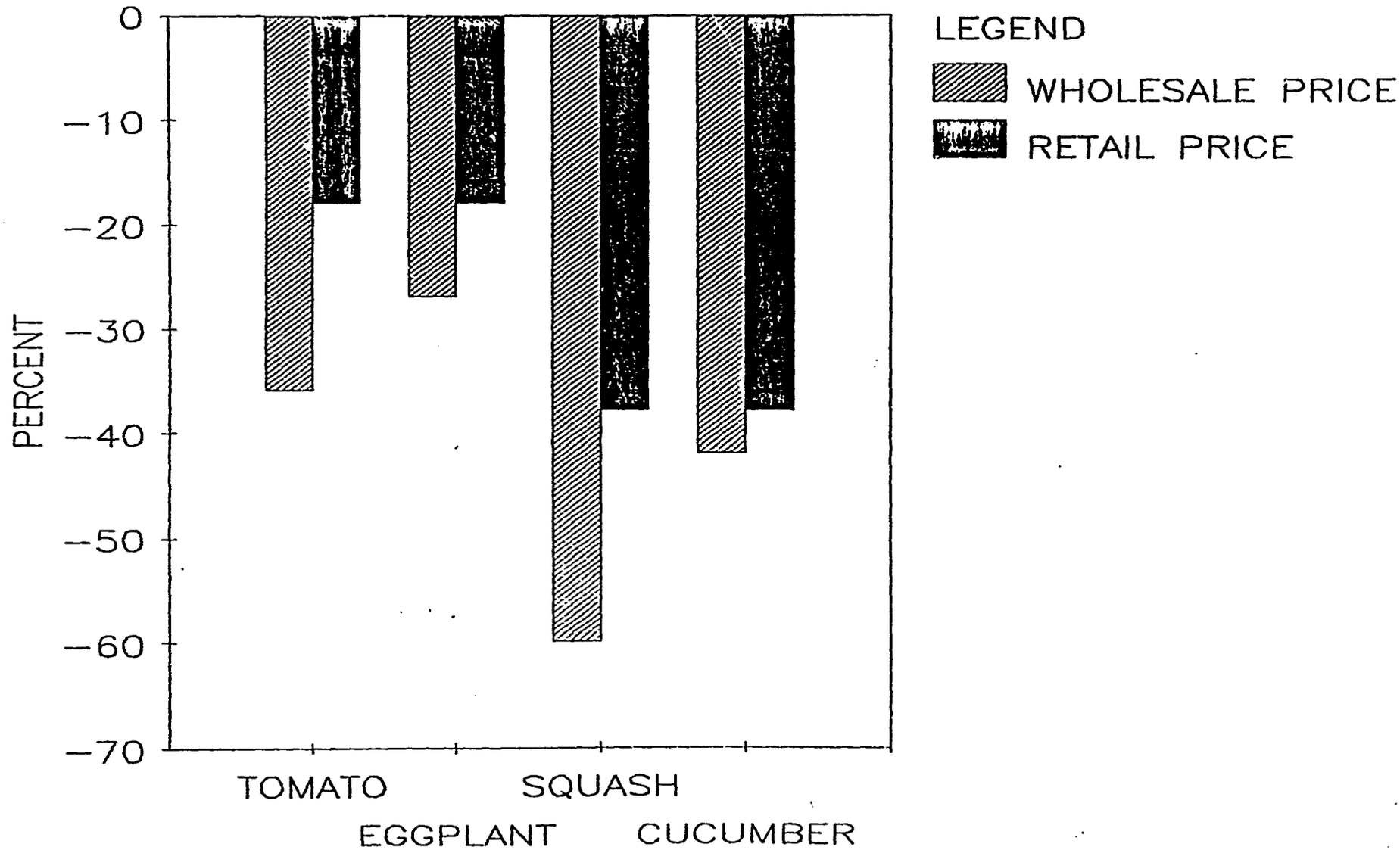
FIGURE 5. WHOLESALE & RETAIL PRICES: VEGETABLES AND CITRUS
Change Dec/Jan 84–85 & Dec/Jan 85–86



79

FIGURE 6. WHOLESALE AND RETAIL PRICES: MAIN VEGETABLES

Change Dec/Jan 84–85 & Dec/Jan 85–86



DRAFT-3: JANUARY 6, 1988

THE CROPPING PATTERN POLICY IN JORDAN

A study of its Approach and Achievements, and some Proposals for Reform

C

41

Introduction

Starting in 1985, the Government of Jordan put into effect a policy that has come to be known as the "cropping pattern." The policy consists of limiting the irrigated area that farmers can plant in tomatoes, squash, cucumber, and eggplant. It has its origin in the inability of the domestic and export markets to absorb the available production of these four crops. Each year, farmers in the Jordan Valley and in the Highlands are issued a license which specifies how much land they can devote to these crops.

This paper examines this policy and suggests some reforms in its content and mode of implementation. It first describes and evaluates the methodology and data used in setting the area limits which are enforced each year. It continues with an evaluation of the achievements of the policy in terms of limiting area planted, production, and, more importantly, the influence it has had on resource allocation decisions at the farm level. In its closing section, the paper presents some suggested reforms on the objectives and content of the policy.

The reform proposals result from the evaluation of achievements. The basic theme in the reform proposals is that the cropping pattern policy, in its present form, has outlived its usefulness. The changes needed are required to make the policy appropriate to present conditions and to take advantage of the beneficial changes that the policy itself has brought about.

Background

Because of the tremendous scarcity of good arable land in Jordan, it is government policy to maximize its productive potential. To the extent possible, all arable land in the country on any one year should be put to agricultural use.

42

Jordan has five climatic zones. From east to west one finds first the semi-desertic area (less than 100 mm of rain per year) which represents 85% of the national territory. There is no settled agriculture in these zones. In some parts of this area one finds livestock grazing. Second is the marginal zone (7-8% of the national territory) with annual rainfall of between 100-250 mm. Grazing of livestock is the main activity in this zone. The third zone is referred to as the semi-arid zone (6% of total land area of Jordan) with precipitation at 250-350 mm annually. In this zone, cereals and summer vegetables are grown. Most of the cereal produced in the country comes from this zone. The fourth zone is called the semi-humid area (0.5% of Jordan). It rains more than 500 mm in this area. Together with the semi-arid zone, this area is commonly referred to as Highlands. Forestry, fruit trees and some cereals are the main crops grown in the semi-humid area. The fifth zone is the Jordan Valley area. It is completely irrigated but shares the rainfall pattern of the semi-arid zone (250-350 mm). This is the main vegetable producing area of Jordan. Approximately 80% of the Jordan Valley area is devoted to vegetables; 10% is occupied by fruit trees; the rest is devoted to a variety of other crops.

The first and second zones are mainly state lands. Recently, ground water was discovered in these two areas. Land in these areas has been allocated in large units to agri-businesses, with the restriction that they grow cereals and fodder. Vegetables cannot be grown in these areas. Zones three and four are privately owned, and here land can be freely sold and fragmented. The Jordan Valley represents a very special case with respect to land ownership. Because of the huge investments in irrigation that have taken place in this area, land cannot be sold or fragmented without the approval of the Jordan Valley Authority.

Because we are examining policies affecting irrigated land planted in tomatoes, cucumbers, squash and eggplant, we are looking at climatic zones three, four, and five which is to say the Jordan Valley and the Highlands. Not to be confused with climatic zones are the areas known as ghors, or watersheds, which are three in number. There is a North, a Central (or

Middle), and a South Ghor which taken all together make the Jordan Valley. When referring to regions, we mean one of these ghors or the Highlands.

To conclude our background remarks, let us look at some very significant changes which have occurred in recent decades. Agricultural production in Jordan has undergone drastic transformations. With the development of the Jordan Valley, there has been a rapid expansion in area under irrigation and a measurable increase in the utilization of underground water resources. At the same time, the widespread use of greenhouses, drip irrigation, and high yielding varieties pushed production to unprecendented levels. Unfortunately, as production increased, Jordan experienced a rapid decline in foreign demand for its agricultural products. Up to the end of the decade, export demand was an important variable in the total demand equation for Jordanian fruits and vegetables.

Emergence of the Cropping Pattern Policy.

As a result of these developments, in the early 1980's the domestic production of tomatoes, cucumbers, squash and eggplants began to show signs of surpassing the absorptive capacity of both local and foreign demand. It is important to mention that these crops are consumed both locally and for export in equally large amounts. The problem became more acute during the 1984-85 agricultural season when prices reached very low levels. The government response to this problem was the application in 1985 of compulsory ceilings on what farmers could grow of these four crops. This policy, which came to be known as the "cropping pattern", was applied to irrigated lands only. The objective of the cropping pattern was thus to modify the normally ocurring land allocation at the farm level in favor of less abundant, more marketable produce. A subsidiary objective of this policy was to promote import substitution of cereals, potatoes, onions, garlic, carrots, fodder, etc.

The cropping policy has been implemented for three seasons along these lines. Well before the start of the agricultural season, the Department of Agricultural Economics and Planning of the Ministry of Agriculture

estimates the production requirements to meet domestic and export demand for the four crops subject to the compulsory cropping pattern policy. Using appropriate yield estimates, the total area needed to satisfy domestic and foreign demand for these crops is calculated.

For the Jordan Valley, questionnaires are sent each year between May and June to the Regional Directorates of Agriculture to gather information on what each farmer plans to grow on his farm. The sum total of the intended cultivation of the four crops subject to the cropping pattern policy have generally exceeded the total area requirements as estimated by the Department of Agricultural Economics and Planning. Based on this information and on the estimated areas which will meet prospective demand, farmers are given licenses that authorize them to cultivate a specified area. For the Highlands, similar questionnaires are sent in October-November.

The extension agents of the Ministry of Agriculture are responsible for ensuring farmers' compliance with the mandatory cropping pattern. Farmers found in violation of the allocated land limits are notified to uproot the excess planted area within 10 days. If they persist a fine is issued. The fine ranges from JD 25 to JD 50 for each dunum planted over the maximum authorized. In addition to the fine, violators are made to pay a higher charge for the water they use.

Methodology and Data used to set Area Limits

In the Jordan Valley the summer and winter seasons are well defined. The mandatory cropping pattern thus establishes explicit limits for areas that can be devoted to tomatoes, squash, cucumbers and eggplant during each season. In the Highlands, since the seasons are not well defined, the maximum land area that can be devoted to these crops is set for the entire growing season.

To determine the maximum area needed to meet prospective local and foreign demand the following variables are considered: (a) estimated local consumption; (b) expected export demand; (c) estimated inflow from the West

Bank; and (d) expected amounts required by the processing industry. The figures arrived at by considering all these variables constitute the estimated production needs for a particular year.

The total acreage required of a particular crop is calculated by dividing the expected production requirement by the estimated average yield of the crop in question. The average yield used is a weighted average which uses as weights the type of irrigation, and the total area planted in each agricultural region in which the country is divided: North, Central, South Ghors and the Highlands. A detailed explanation of how this concepts are applied is provided in Appendix A.

Compliance indicators

Number of Fines

The effectiveness of the cropping pattern policy can be judged by the number of farmers who have been served fines for non-compliance. It should be noted that there is a difference between non-compliers and the number of farmers who actually pay fines. Political influence explains this difference in most cases.

Despite the fact that records are quite limited on this aspect, it has been documented that during the 1986/87 cropping season a total of 1,127 licenses were issued for the Highland region. Of these license holders, 124 were found in violation of the allowed area. It is not known how many of these were given fines and paid them. In the Jordan Valley 5,165 licenses were issued during the same cropping season. Only 86 license holders were given fines for non-compliance. From these figures one can easily infer that the punitive aspect of the policy cannot be totally counted upon to ensure that farmers behave in accordance with area requirements as estimated by the government.

Licensed Area Versus Planted Area

A comparison between licensed area versus actually planted area is provided by the exhibit on the next page. During the first year (1985/86) of the cropping pattern, the Jordan Valley winter season results indicate that tomato producers in the Central Ghor planted more area than licensed while those in the Southern Ghor planted less. The overall result was that for the valley as a whole, the area planted exceeded the area licensed. In the summer season, tomatoes are grown only in the North and Central Ghors. For the winter season, the North Ghor planted less than the licensed area while the Central Ghor exceeded the limit. The overall result was less area planted than allowed.

For the second season of implementation of the cropping pattern policy (1986/87), the area planted in tomatoes in all ghors was less than the licensed area during winter. The magnitude of the undershoot was different among ghors, in the Central Ghor producers planted 60 percent of the licensed area in tomatoes; the South Ghor producers planted 88 percent of the licensed area. During the summer, Central Ghor farmers planted only 72 percent of the licensed area for tomatoes.

The area cultivated in eggplant in the winter season of 1985/86 reached only 83 percent of the licensed areas (all ghors taken together). In the summer, these same ghors planted 9,000 dunums which represented 82 percent of the licensed area. In the Highlands, only 63 percent of the licensed area was actually planted.

Difference between Area Licensed and
Area Actually Planted over 1985/86 and
1986/87 Cropping Seasons

	Area Licensed (Dunum)	Area Actually Planted (Dunum)	Difference
1985/86 Cropping Season			
Jordan Valley Winter			
Tomatoes	29,500	37,300	7,800
Eggplant	15,000	12,500	-2,500
Squash	18,600	18,000	-600
Jordan Valley Summer			
Tomatoes	29,000	27,700	-1,300
Eggplant	11,000	9,000	-2,000
Squash	6,400	5,500	-900
Highlands			
Tomatoes	22,000	16,000	-6,000
Eggplant	3,200	2,000	-1,200
Squash	10,000	5,000	-5,000
1986/87 Cropping Season			
Jordan Valley Summer			
Tomatoes	28,500	20,500	-8,000
Eggplant	6,500	2,800	-3,700
Squash	4,500	1,900	-2,600
Cucumber	72		- 90
Jordan Valley Winter			
Tomatoes	34,500	24,200	-10,300
Eggplant	25,200	9,600	-15,600
Squash	24,500	13,600	-10,900
Cucumber	6,200	5,300	- 900
Highlands Winter			
Tomatoes	13,600	12,000	-1,600
Eggplant	1,000	665	- 335
Squash	3,200	2,300	- 900
Cucumber	3,100	2,850	- 250
Highlands Summer			
Tomatoes	6,900	4,300	-2,600
Eggplants	1,000	665	- 335
Cucumber	3,100	2,850	- 250

The area planted in squash in the Jordan Valley reached 97 percent of licensed area in the winter of 1985/86. During summer, the area actually planted represented 86 percent of the licensed area. Highlands squash producers planted only 49 percent of the licensed area.

For the 1986/87 cropping season the comparison of the area licensed and actually planted can be summarized as follows:

Eggplant area planted in the winter was only 38 percent of licensed area in the Jordan Valley. In the summer, the area planted was 43 percent of the licensed area. Highlands growers planted 36 percent and 66 percent of the licensed areas during the first and second growing seasons.

Squash actually planted reached 55 percent of the licensed area in the Jordan Valley during winter. In summer, this crop was planted up to 41 percent of the licensed area. In the highlands, squash reached 56 percent of licensed area in the first growing season and 73 percent in the second season.

Cucumbers are grown mainly in greenhouses. No information is available for the 1985/86 season. For the 1986/87 season in the Jordan Valley, a total of 6,178 greenhouses were allowed for the winter season; of these, 5,300 were actually planted (86 percent). In the summer, 162 green houses were licensed; of these, 72 were actually planted. It should be mentioned that cucumbers are grown principally in the winter. In the summer, the Jordan Valley is generally too hot for cultivation under greenhouses. The number of greenhouses in the summer is thus normally quite low. In the highlands, cucumbers grown in the 1986/87 season reached 95 percent of licensed area during the first growing season. During the second season, the percentage was 91 percent.

What these figures indicate is that producers have generally chosen to plant less than the area which they are permitted to grow under the

cropping pattern policy. Where the cropping pattern policy has aimed at reducing overproduction by reducing the area growers are allowed to plant, farmers have responded by devoting to these crops even lower area than the government deemed necessary to meet local and export demand.

Land Use Behavior Before and After Implementation of the Cropping Pattern Policy

The statistical information on land use behavior for the country as a whole is presented on the following page and can be summarized as follows:

Tomatoes. The area planted before implementation of the cropping pattern policy (average of the last three years) was 137 thousand dunums. During the 1985/86 cropping season it reached 81 thousand dunums, or a total decrease of 41 percent. During the 1986/87 season, 61 thousand dunums were grown (25 percent less than in the previous season).

Eggplant. Before enforcement of the cropping pattern policy the average area planted was 50 thousand dunums. After the first year of implementation, it dropped to 24 thousand dunums (52 percent less). The following season it fell even further to 15 thousand dunums.

Squash. The 1984/85 average area planted (before cropping pattern) was 48 thousand dunums. After implementation of the cropping pattern policy 28 thousand dunums were planted. During the 1986/87 season, the area planted was 28 percent lower than the previous year (20,500 dunums).

Cucumbers. Before the cropping pattern 94 percent of all greenhouses in the country was planted in cucumbers. After the first year of implementation of the cropping pattern policy only 70 percent of the greenhouses was grown in cucumbers.

Land Use Behavior Before and After the
Implementation of the Cropping Pattern Policy

Average Before (1983-85)	Highlands	Ghors	Grand Total
Tomatoes	34,000	103,000	137,000
Eggplants	6,000	43,000	49,000
Squash	8,000	40,000	48,000
1985/86 Cropping Season			
Tomatoes	16,000	65,000	81,000
Eggplants	2,000	22,000	24,000
Squash	5,000	23,000	28,000
1986/87 Cropping Season			
Tomatoes	16,000	45,000	61,000
Eggplants	2,000	13,000	15,000
Squash	4,500	16,000	20,500

Production and Price Behavior Before and After Implementation of the Cropping Pattern Policy

A look at the data on next page confirms our expectations. Namely, production of the key crops has not decreased as rapidly as area planted. While land under production has decreased (the main policy instrument), there has not been a proportional decrease in total production. In the face of area restrictions, producers tended to intensify crop husbandry thus achieving substantial increases in yield.

In this context, prices have remained at pretty much the same nominal level as before the policy was started. This is a desirable effect when considering what would have happened had area in crops been allowed to continue at the past rate of increase (table on page C-12).

51

Comparative Behavior of Area, Production and Yield Before and After Cropping Pattern

	Average Production (81-84)	Average Area (1983-85)	Yield (tons/diem)
Tomatoes	378,500	137,000	2.76
Eggplants	108,000	49,000	2.20
Squash	80,500	48,000	1.68

	Average Yield (81-85)	Average Yield (85-86)	Average Yield (86-87)
Tomatoes	2.76	3.65	3.63
Eggplants	2.20	3.33	3.00
Squash	1.68	2.35	2.34

32

Jordan: Nominal Yearly Wholesale and Retail
Prices in JDs per Ton for Selected Commodities

Tomatoes	Wholesale JD/Ton	Retail JD/Ton
1982	115	165
1983	133	177
1984	102	159
1985	103	138
1986	102	142

Eggplant	Wholesale JD/Ton	Retail JD/Ton
1982	159	216
1983	178	230
1984	190	233
1985	169	211
1986	146	199

Cucumber	Wholesale JD/Ton	Retail JD/Ton
1982	237	308
1983	282	356
1984	261	309
1985	190	234
1986	193	246

Eggplant	Wholesale JD/Ton	Retail JD/Ton
1982	118	157
1983	133	175
1984	106	135
1985	89	118
1986	98	142

Evaluation of the System Currently in Effect

In a situation such as Jordan's, where production exceeds potential demand, two strategies can be used to bring supply and demand closer together. First, prices could be allowed to drop so that decreased returns on tomato, squash, cucumber, and eggplant production would make their production unattractive compared to other production alternatives. Alternatively, policy could aim to cut production by means other than price decreases, such as compulsory area restrictions or voluntary production decreases brought about by a system of market orders. The compulsory area restrictions route was elected by the Jordanian Government and took the form of the cropping pattern policy we have been dealing with in this paper.

The cropping pattern policy as implemented in Jordan has outlived its usefulness. There was a case for guiding the transition of Jordanian agriculture from dealing with insufficiency to dealing with overabundance. The sudden disappearance and increased instability of traditional export markets (due to the Gulf War) made a case for government input to guide agricultural production. This is even more apparent in view of the fact that existing farmers' organizations in Jordan are not and have not been sufficiently vigorous to fill this role. The crux of the matter now is how to manage this policy instrument so that it does not impede the transformation which Jordanian agriculture must undergo if it is to prosper in the long run.

It is well known that numerous countries in the region are producing fruits and vegetables for export quite successfully. Competition is presently keen and will get stronger in the future. To date, Jordan has relied mainly on tomatoes, cucumbers, squash, and eggplant for exports. An expanding export market depends on market and crop diversification. Instead, the cropping pattern policy, if maintained in its present form too long, will lessen the stimulus to seek flexibility and change which under the market conditions faced by Jordan are considered key means to competitiveness.

54

On the positive side, there is no question that the cropping pattern policy was timely and has fulfilled most of the objectives it set out to achieve. As our analysis indicates, the area planted in tomatoes, squash, and eggplant, and the number of greenhouses used for cucumbers has in fact decreased since the policy took effect. Although difficult to verify, it is reasonable to expect that prices would have fallen more in the absence of the policy. Production of these crops has decreased more slowly than the reduction in planted area would lead one to expect. The yield increases that were recorded since the policy started is a clear sign the farmers knew how to produce with better yields, but previously lacked an incentive to do so.

On the subject of the methodology used to set the regulatory parameters of the policy, one must say that an extensive body of knowledge and accumulated experience about the crops subject to the policy is used in arriving at area limits and its allocation among growing regions. Very little could be improved here. There is still some question about the quality and reliability of data on production, area and related topics used by the policy analysts. This topic should be reviewed as more time and resources become available.

As the production and area planted in overabundant crops continues to decrease, the initial purpose of the cropping pattern policy will have been completed. At the current pace of change this will occur in the near future. When that time comes the government may have to shift its guiding role over to crops which face normal market conditions (i.e., not an oversupply condition) if it is to continue applying this policy at all. Undoubtedly reducing overproduction is more clear-cut than forecasting production levels that could meet expected market demand. The government would be directly responsible for any error as the producer would be responding to government directives. To avoid these potential pitfalls changes are needed. The proposed reforms that we present below consider the need for the Jordanian Government to guide the development of agriculture while simultaneously taking full advantage of the usefulness of market signals to achieve this objective.

Reform Proposals

Reform A

This proposal consists of continuing the present system of compulsory cropping patterns but with suitable modifications in its operation and administration. As indicated above, little can be added in terms of the type of information which is used to establish the cropping ceilings for the various crops. Increased sophistication in the way data are analyzed and may only marginally improve the accuracy of the estimates presently used to determine the ceilings of area that should be planted to overabundant crops.

When the policy was commenced, the Department of Agricultural Economics and Planning of the Ministry of Agriculture was responsible for the entire regulatory process: from the estimation of the area ceilings to the issuing of licenses to farmers. This has changed recently. The Regional Directorates of Agriculture now issue the licenses to farmers using the guidelines which emanate from the Ministry of Agriculture. This approach has lessened the burden on the Department of Agricultural Economics and Planning so that it may perform more appropriate functions in the area of policy formulation and analysis.

We did not have a chance to review the efficacy of the policy enforcement machinery. This responsibility rests with the agricultural extension service. To be effective as change agents extension personnel need the trust and appreciation of their clients. Using them as enforcers of measures which carry a penalty for noncompliance works against the extension function. Moreover, it overburdens the system. Extension agents collect the planting intentions of farmers prior to the cropping season, deliver the licenses, inspect farmers fields, issue warnings to those farmers exceeding their licensed limits, issue the fines, and serve as witness in court proceedings. The financial and goodwill costs of enforcing the cropping pattern policy through the extension system are quite large indeed.

The government will have to find alternative ways of policing the cropping pattern policy if it is interested in maintaining a viable extension system. The setting up of an alternative system is part of the cost of keeping this policy in its form.

There is substantial evidence that the compulsory cropping pattern regulation affects allocative decisions at the farm level (more of this when Option B is discussed). Under these circumstances, the lag between the time farmers indicate what they would like to plant and when they are informed about what they are allowed to plant may be too short to implement the necessary adjustments. The licensing system will have to be quickened to avoid farmers' responding to the belated signals in the cropping pattern policy.

No amount of reforms will result in a system that gives completely accurate area planting ceilings. Under the present system the responsibility for errors falls on the government, for it is the government that determines what crops and how much area should be planted with the implicit message that such production can be safely sold. The probability for error, however, is too high. If, for instance, too many farmers exceed their limits those who strictly followed it will still be unable to dispose of their production. In essence, the problem is not with how the ceilings are established and how accurate they are. The real weakness lies with trying to hold production of these overabundant crops within absorbable limits while at the same time maintaining the attractiveness of returns farmers can obtain by producing them.

The pressure will keep mounting for the government to back its area limitation with some assured minimum prices. If this step is taken, things will get much more complicated. In its present form this policy has been effective to guide farmers through a transitional period. It has accomplished its objective because it has provided farmers with useful information. If price guarantees become part of the policy, it will immediately turn into a price support scheme. The fiscal cost of these programs is substantial and many countries are nowadays looking for ways of terminating them.

There are several reasons to change the focus and content of the present cropping pattern policy.

1. Continued use of the extension system to enforce the cropping pattern policy will render it ineffective to promote the productivity improvements that Jordanian agriculture needs to stay competitive.

2. Area planted in the overabundant crops has decreased significantly.

3. Producers have been responsive to the government guidelines and their actions indicate that they have understood the nature of the problem.

4. The objective conditions that called for the policy have ceased to exist and new measures are called for in the new environment.

Reform B

This proposal consists of converting the present cropping pattern policy into an effective production and marketing system. It is based on the fact that in actuality the information that flows from the implementation of the cropping pattern policy is already being used by farmers as a basis for making their planting decisions.

To verify this hypothesis, a sample of the planting intentions in the Jordan Valley for the 1986/87 and the 1987/88 cropping seasons was examined. By measuring the change in the area requested for planting of tomatoes, squash, cucumber, and eggplant between these two cropping seasons, it is possible to determine the influence of the policy on farmers' production decisions. It should be remarked that at this phase of the implementation of the policy, farmers are free to request approval for whatever amount of these four crops they wish to plant.

The evidence of the analysis is unequivocal. In the Middle and North Ghors, farmers' requests for permission to plant the problem crops

decreased substantially between the two periods reviewed. The South Ghor is relatively new and in the process of development. Consequently the area planted to these crops is relatively small and the area requested for planting has increased between the two periods.

Change in Farmers' Declared Planting Intentions Between the 1986/87 and the 1987/88 Cropping Seasons.

	Middle Ghor 86/87 (A)	Middle Ghor 87/88 (B)	Change B/A	North Ghor 86/87 (A)	North Ghor 87/88 (B)	Change B/A
Tomatoes						
Winter	1182	1202	1.7%	0	11	
Summer	459	384	-16.3%	1535	1350	-12.1%
Eggplant						
Winter	516	499	-3.3%	196	154	-21.4%
Summer	13	11	-15.4%	625	477	-23.7%
Squash						
Winter	653	601	-8.0%	861	856	-0.6%
Summer	88	67	-23.9%	432	342	-20.8%

Note: These figures are sample totals. The sample sizes were as follows: Middle Ghor, 70 farmers; North Ghor, 70 farmers.

The evidence is that the cropping pattern policy has worked well. It is not, however, owing to enforcement nor accuracy in setting land use ceilings for planting of the four problem crops. The truth is that farmers' planting decisions have been influenced by the information that the government makes available to them in the process of implementing the cropping pattern policy. At its inception, the farmers' requests were high compared to what the government licensed to plant. Actual planted area was even below that of the licensed amount.

As the cropping pattern policy has become a source of information to farmers, what we propose to do is to make better use of it in this sense. For this to happen, gradual and well-planned changes in the system are necessary. These changes are:

1. The cropping pattern policy has to be stripped of its compulsory nature. Farmers will not be given licenses allowing them to plant certain crops but timely and reliable information so that they can make those choices on their own.

2. A target date needs to be established for completing the shift suggested under numeral one. One to two years may provide sufficient time to prepare farmers and the institutional changes for the shift. This time frame itself may have to be studied carefully to avoid giving the system unnecessarily strong shocks.

3. The information and the channels of communication to be used under the new system need to be developed and tested for effectiveness. Collection of the cropping intentions is presently a census as all farmers have to be interviewed. A well-designed sample is all that is needed to come up with the same kind of data. This could be done in a week's time (as farmers in the Jordan Valley are spatially concentrated) and the data fed back to farmers within another week. With a small sample, the data collection can be done at intervals to cover not only cropping intention but actual plantings, production, and market conditions as well.

Presently, the emphasis has been on the four crops experiencing overabundance. The scope of the policy needs to be widened to include other important crops. Information on production and market conditions on these other crops will become much more important as the system improves in efficiency and reach.

Reform C

This reform option is a variation of Option B. Under this option, planting control will be voluntary and concentrated on large holdings. To encourage farmers to participate in this program farmers could be paid a proportion of the normal returns they would obtain if they had planted the four overabundant crops.

It is known that area under these four vegetables has been expanding rapidly because they are remarkably easy to grow and their cultivation is well known by farmers. Tomato plants can be harvested during a period of two months, thus affording farmers an extended flow of income, and thus making it easy to withstand price fluctuations. The agro-economics of eggplant production is similar to these just mentioned for tomatoes. Squash and cucumbers also make a pair in terms of their agronomic requirements. We have, then, a group of crops whose similarities have made them popular with all farmers. This brings us, nonetheless, to a perspective on the issue of diversification worth exploring.

Because of their ease of cultivation and well-understood agronomics, these crops are grown by large and small farm operators alike. It would be much easier for an operator of a large holding to get away from these crops because they have more resources with which to experiment and also to endure failure. They are also less risk averse than operators of smaller holdings. Why not promote diversification by leaving the four problem crops to be cultivated, exclusively if possible, by the operators of smaller holdings? This is the idea behind this last option.

How to best achieve this objective is still open to question. To get closer to understanding how feasible this option is we have used the sample of cropping intentions we employed in discussing our reform Option "B". This time, however, we have broken down our sample by holding size.

As the table below indicates, there is a very small number of farm units larger than 100 dunums (based on this sample). These farms, however, account for close to fifty percent of the acreage that could potentially be planted to the four overabundant crops. A great deal of brevity and accuracy in the management of supply can be accomplished by concentrating the cropping pattern policy on larger holdings.

Change in Farmer's Planting Intentions during the Last Two Cropping Seasons by Farm Holding Size.

	Number of Holding	Tomatoes		Eggplant		Squash	
		86/87	87/88	86/87	87/88	86/87	87/88
Middle Ghor							
over 100 dun	10	317	689	230	227	298	283
LT 100 dun	60	292	513	299	283	443	385
	70						
South Ghor							
over 100 dun	6	310	392	79	87	20	40
LT 100 dun	54	338	429	100	102	25	29
	60						
North Ghor							
over 100 dun	8	555	565	225	300	365	457
LT 100 dun	62	795	970	406	521	833	836
	70						

The cropping pattern policy could be implemented selectively for Ghors, for farm sizes, and only during particular periods when government estimates indicate that production may outstrip demand for too large a

62

margin. Under this mode, the government will have to strengthen its capacity to closely monitor production and marketing of the target crops so that it can decide when to intervene to restrict production. This approach is feasible if only a small subset of farm holdings (large holdings, for instance) are included in the program in order to get maximum impact with minimum administrative requirements.

Appendix A

Methodology Used to Define Area Ceilings

Jordan Valley: Estimation Parameters for Winter Tomatoes

For purposes of illustrating the methodology, tomato is taken as an example. The following paragraphs provide a detailed explanation of the parameters used to specify the area needed for tomato production for the Jordan Valley for the winter 1987/88 growing season.

Estimated Local Consumption. Planting in the Jordan Valley for the winter season starts in mid-August. This production comes to the market in mid-December and is totally consumed by the end of April. Consumption of tomato is greater in the summer than in the winter season. These consumption figures are based on a study made by the Department of Statistics several years ago. They have been updated on the basis of population growth and some well known consumption parameters. During winter the monthly average consumption of tomatoes is put at 10 thousand tons per month. In the summer the average monthly consumption goes up to 12 thousand tons.

Exports. Exports are considered more variable. The expected export monthly demand is a five-year moving average. The shrinkage of exports witnessed in recent years was given close consideration during the period being described.

Processing. Processing of tomato is done only by the Agricultural Marketing and Processing Corporation (AMPCO). AMPCO's processing intentions constitute the most important variable. As a rule, most processing takes place during the summer season because tomato yields are larger during summer due to warmer weather and because importing countries also produce tomatoes during this season. Moreover, during June and July, production from the Jordan Valley overlaps with the beginning of Highland production.

Inflow from the West Bank. The West Bank is an important producer of vegetables. Agricultural imports into Jordan are controlled according to Jordan's needs. Product inflow from the West Bank is subtracted from the sum

total of the various components just described. For tomatoes, inflow from the West Bank is kept at around 16 thousand tons during the winter season. In summer, no tomatoes come from the West Bank. The amount of inflow allowed from the West Bank varies by product but in general it is not allowed to exceed fifty percent of the estimated production of the West Bank.

The estimated total production requirements minus inflow from the West Bank constitutes the maximum that must be produced domestically. This figure when divided by the average yield gives the total area of tomatoes needed during the winter season. For the 1987/88 growing season, the average yield for tomatoes was 3.5 Mt per dunum. Tomato for processing was estimated to yield 5 Mt per dunum.

Once total production requirements are estimated, the remaining step is to divide the total area among the producing regions. Certain regions are given special consideration. For example, while winter tomatoes are grown in the Southern Ghor and in parts of the Middle Ghor, the latter region has a smaller range of production options owing to its soil and climate. On account of this factor and because of the size of the Southern Ghor, this Ghor is allocated a larger area for tomato production than the Middle Ghor.

Jordan Valley: Summary of Parameters Used to Estimate Area Requirements for Tomatoes for the Winter Season

Month	Observed Consumption (tons)	Exports Observed Moving Average (tons)	Processing (tons)
Mid-December	4,000	449	00
January	8,000	3,720	00
February	8,000	6,990	485
March	10,000	13,170	1,150
April	12,000	16,690	3,100
Total	42,000	40,470	4,740

Jordan Valley: Estimation parameters for Winter Eggplant, Squash and Cucumber

The parameters used to determine the area required for the three other crops are as follows:

	Average Monthly Consumptions (tons)	Average Monthly Exports (tons)	Inflows Allowed From West Bank (tons)	Average Yields
Eggplant	3,000	3,800-4,500	3,600 (Total)	3.5 tons/dunum
Squash	2,400	230-4,500	00	2.0 tons/dunum
Cucumbers	3,000-3,500	4,000-6,000	00	6-7 tons/Green house

Jordan Valley: Estimation Parameters for all crops for the Summer Season

Cropping pattern regulations for the summer season are specified at the same time that the winter season controls are established. The summer season for eggplant is an exception because its growing period in the Jordan Valley overlaps well into the production and planting of the Highlands. Thus, eggplant area allocation between the Jordan Valley and the Highlands assumes that 80 percent of the production should come from the Highlands and the rest from the Valley. This is especially true during the August-November period.

For estimating the area requirements for the cropping pattern in the Valley in the summertime, the following parameters are used:

67

Jordan Valley: Summary of Parameters Used to Estimate Area Requirements for all Crops for the Summer Season

	Observed Local Consumption (Tons)	Exports (Tons)	Processing (Tons)	West Bank Inflow (Tons)
Tomato				
May	12,000	25,000	7,700	None
June	12,000	18,000	10,000	None
Half-July	8,000	3,500	3,700	None
Eggplant				
May	3,000	4,500	None	None
June	3,000	2,800	None	None
July	3,000	1,900	None	None
Aug.-Nov.	2,400 (all)	2,000 (all)	None	None
Squash				
Oct.	2,400	300	None	None
Nov.	2,400	500	None	None
Dec.	2,400	2,500	None	None
Jan.	2,400	4,500	None	None
Feb.	2,400	3,500	None	None
March	2,400	2,600	None	None
April	2,400	2,300	None	None

Average yields used to calculate area requirements in the summertime are as follows:

Tomatoes	
Table	4 tons/dunum
Industrial	5 tons/dunum
Eggplant	3.5 tons/dunum
Squash	2.0 tons/dunum

Highlands: Estimation Parameters for all Crops

The Highland cropping pattern is planned from mid-July up to mid-December. For tomatoes an average monthly consumption of 12,000 tons is considered. Total exports for the entire period is put at 25,000 tons (the average exports between 1980-85 was 25,000). The processing requirement amounted to 5,000 tons for the whole period. Inflows from the West Bank are banned during this period. Non-irrigated areas that produce tomatoes (about 20,000 dunums producing 10,000 tons) are subtracted from the total production requirements from irrigated areas. The yield level used to estimate area requirements is 4 tons/dunum.

The total production requirements for eggplant from the Highland areas is 14,000 tons. This figure includes domestic consumption and exports (inflows from the West Bank are banned). The average yield used to estimate the area requirements for eggplant is 3.5 tons/dunum

Total needs for squash from the Highlands is about 12,000 tons for the entire period. No processing and no inflow from the West Bank are included. The average yield used to estimate area requirement is 2 tons/dunum.

Cucumbers are mainly produced in greenhouses. The cropping pattern regulation is based on the number of greenhouses that could be used for cucumbers. At present, only 60 percent of the country's greenhouses can be used for cucumber cultivation.

STATISTICAL APPENDIX

70

OVERALL CHANGE (IN DUNUMS) IN CROPPING INTENTIONS BETWEEN THE 1986/87 AND THE 1987/88 CROPPING SEASONS

		Middle Ghor 86/87 (A)	Middle Ghor 87/88 (B)	CHANGE B/A	North Ghor 86/87 (A)	North Ghor 87/88 (B)	CHANGE B/A	South Ghor 86/87 (A)	South Ghor 87/88 (B)	CHANGE B/A
Total Area		4609	4609	0.0%	5047	5047	0.0%	2173	2173	0.0%
Cultivated Area		4229	4229	0.0%	4500	4500	0.0%	2039	2039	0.0%
Cereals		162	391	141.4%	1075	1029	-4.3%	300	158	-47.3%
Greenhouses										
	Cucumber	15	171	1040.0%	37	34	-8.1%	39	48	23.1%
	Pepper	13	31	138.5%	3	6	100.0%	8	10	25.0%
	Greenbeans	1	2	100.0%	0	0		0	0	
	Other	0	1		5	5	0.0%	29	37	27.6%
	Total	29	205	506.9%	45	45	0.0%	76	95	25.0%
Tomato	Wint	1182	1202	1.7%	0	11		648	821	26.7%
	Sum	459	384	-16.3%	1535	1350	-12.1%	0	0	
Eggpla	Wint	516	499	-3.3%	196	154	-21.4%	179	189	5.6%
	Sum.	13	11	-15.4%	625	477	-23.7%	0	0	
Squash	Wint	653	601	-8.0%	861	856	-0.6%	45	69	53.3%
	Sum	88	67	-23.9%	432	342	-20.8%	0	0	
Cucumb	Wint				28	37	32.1%	10	10	0.0%
	Sum				0	5		0	0	
Potato	Wint	163	268	64.4%	384	765	99.2%	20	36	80.0%
	Sum	153	186	21.6%	148	407	175.0%	0	0	
Onions	Wint	6	0	-100.0%	79	139	75.9%	7	20	185.7%
	Sum	440	549	24.8%	99	143	44.4%	0	0	
Garlic	Wint	0	20			0				
	Sum	0	0			5				
Pepper	Wint	118	90		301	364	20.9%	164	110	-32.9%
	Sum	20	25	25.0%	108	69	-36.1%	0	0	
Caulif	Wint	30	36	20.0%	121	64	-47.1%	0	0	
	Sum	0	0		0	33		0	0	
Cabbag	Wint	27	30	11.1%	102	47	-53.9%	0	2	
	Sum	0	0		0	12		0	0	
Grbean	Wint	19	29	52.6%	252	220	-12.7%	80	135	68.8%
	Sum	71	81	14.1%	133	174	30.8%	0	0	
Brbean	Wint	62	28	-54.8%	167	133	-20.4%	26	59	126.9%
	Sum	0	0		0	0		0	0	
Lettuc	Wint	6	10	66.7%	73	100	37.0%	0	0	
	Sum	0	0		0	0		0	0	
Melons	Wint				10	0	-100.0%	0	0	
	Sum				114	76	-33.3%	905	1000	10.5%
Spinac	Wint				32	5	-84.4%			
	Sum				0	0				
Jew.Ma	Wint					0		8	3	-62.5%
	Sum					76		860	820	-4.7%
Maize	Wint					0				
	Sum					150				
Other	Wint				38	21	-44.7%	235	80	-66.0%
	Sum				208	40	-80.8%	2	8	300.0%
Vegetables Total										
	Winter	2782	2813	1.1%	2644	2916	10.3%	1414	1534	8.5%
	Summer	1244	1303	4.7%	3402	3359	-1.3%	907	1828	101.5%
Cereal		162	391	141.4%	1075	1029	-4.3%	300	158	-47.3%
Greenhouses		29	205	606.9%	45	45	0.0%	76	95	25.0%

NOTE: These are sample figures. They do not refer to the ghors in their entirety.

NORTH GHOR

CHANGE IN THE CROPPING INTENTION OF FARMERS BETWEEN THE 1986/87 AND THE 1987/88 CROPPING SEASONS

(PERCENT)

	CEREALS	GREENHOUSE CUCUMBER	TOMATOES		EGGPLANT		SQUASH	
			WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
Over 300 Dun.	-25.0%			25.0%		-70.0%	-33.3%	0.0%
100-LT300	-7.7%			-16.4%	-23.1%	-8.3%	-22.2%	-14.6%
70-LT100	8.0%	-16.7%		-16.7%	-25.0%	-10.3%	-2.6%	-19.7%
40-LT70	33.6%	0.0%		-17.0%	-53.8%	-10.4%	14.4%	-17.8%
20-LT40	26.6%	0.0%		-19.4%	3.4%	-31.7%	23.0%	-30.7%
TOTAL	-4.3%	-8.1%		-12.1%	-21.4%	-23.7%	-0.6%	-20.8%

	CUCUMBERS	CAULIFLOWER	POTATOES		ONIONS		PEPPER	
	WINTER	WINTER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
Over 300 Dun.							50.0%	
100-LT300		-100.0%	96.5%	250.0%	33.3%	50.0%	33.3%	-45.5%
70-LT100		-100.0%	72.9%	181.3%		66.7%	-14.0%	-64.7%
40-LT70		-14.3%	46.7%	162.5%	250.0%	-66.7%	22.2%	-30.8%
20-LT40	32.1%	-52.8%	183.6%	119.2%	50.0%	30.8%	0.0%	4.3%
TOTAL	32.1%	-47.1%	99.2%	175.0%	75.9%	44.4%	20.9%	-36.1%

	CABBAGES	BROADBEAN	GREENBEAN		MELON		LETTUCE	SPINACH
	WINTER	WINTER	WINTER	SUMMER	WINTER	SUMMER	WINTER	WINTER
Over 300 Dun.			-50.0%					
100-LT300	-100.0%	-60.0%	11.7%	26.3%		-100.0%		
70-LT100	-100.0%	7.1%	-21.1%	-100.0%	-100.0%	-32.3%	66.7%	
40-LT70	-19.2%	-5.6%	-21.6%			-11.1%	5.1%	-50.0%
20-LT40	-58.1%	-25.3%	-9.8%	45.5%		11.4%	75.0%	-100.0%
TOTAL	-53.9%	-20.4%	-12.7%	30.8%	-100.0%	-33.3%	37.0%	-84.4%

MIDDLE GHOR

CHANGE IN THE CROPPING INTENTION OF FARMERS BETWEEN THE 1986/87 AND THE 1987/88 CROPPING SEASONS

		GREENHOUSES			BROADBEAN
	CEREALS	CUCUMBER	PEPPER	GREENBEAN	WINTER
Over 300 Dun.	196.0%				
100-LT300	53.2%	1420.0%	250.0%		-60.3%
70-LT100		25.0%	25.0%	100.0%	
40-LT70		1066.7%	366.7%		-100.0%
20-LT40					150.0%
TOTALS	141.4%	1040.0%	138.5%	100.0%	-54.8%

	TOMATOES		EGGPLANTS		SQUASH		POTATOES	
	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
Over 300 Dun.	-9.1%	-15.7%	20.0%		20.0%			-100.0%
100-LT300	3.6%	-25.0%	-7.2%		-10.1%		200.0%	-100.0%
70-LT100	6.5%	-20.0%	-1.1%		-4.9%		38.2%	50.0%
40-LT70	11.6%	-15.1%	-1.0%	-27.3%	-18.2%	-19.6%	61.8%	42.5%
20-LT40	-1.5%	-13.4%	-13.3%	200.0%	-9.2%	-29.7%	58.8%	42.6%
TOTALS	1.7%	-16.3%	-3.3%	-15.4%	-8.0%	-23.9%	64.4%	21.6%

	ONIONS		PEPPER		GREENBEAN		CAULIFLOWER	CABBAGES
	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER	WINTER	WINTER
Over 300 Dun.		18.2%		25.0%		8.3%		
100-LT300			-31.8%				25.0%	
70-LT100	-100.0%	66.7%	-28.6%					
40-LT70		43.1%	-16.7%		100.0%	60.0%	10.0%	11.1%
20-LT40		64.0%	-26.8%		25.0%	33.3%	25.0%	11.1%
TOTALS	-100.0%	24.8%	-23.7%	25.0%	52.6%	14.1%	20.0%	11.1%

SOUTH GHOR

CHANGE IN THE CROPPING INTENTION OF FARMERS BETWEEN THE 1986/87 AND THE 1987/88 CROPPING SEASONS

(PERCENT)

		GREENHOUSES		
	CEREALS	CUCUMBER	PEPPER	OTHER
Over 300 Dun.	-28.6%	20.0%	25.0%	13.3%
100-LT300	-20.0%	25.0%	25.0%	42.9%
70-LT100				
40-LT70	-100.0%			
20-LT40	-100.0%			
5-LT20				
TOTAL	-47.3%	23.1%	25.0%	27.6%

	TOMATO	EGGPLANT	SQUASH	POTATOES	ONIONS	PEPPER
	WINTER	WINTER	WINTER	WINTER	WINTER	WINTER
Over 300 Dun.	33.3%	14.3%	25.0%			-14.3%
100-LT300	23.6%	6.8%		80.0%		-41.1%
70-LT100						
40-LT70	21.6%	12.5%	11.1%		114.3%	-33.3%
20-LT40	18.9%	1.5%	22.2%			-28.0%
5-LT20	37.0%	-2.1%	14.3%			-44.4%
TOTAL	26.7%	5.6%	53.3%	80.0%	192.9%	-32.9%

	GREENBEAN	BROADBEAN	MELONS	WATERMELON		OTHER	
	WINTER	WINTER	SUMMER	WINTER	SUMMER	WINTER	SUMMER
Over 300 Dun.			-3.7%		-14.3%	-100.0%	
100-LT300	54.0%	108.3%	6.5%		3.5%	-36.7%	150.0%
70-LT100							
40-LT70	58.8%	75.0%	82.9%		-35.7%	-74.1%	
20-LT40	466.7%	400.0%	7.1%	-100.0%	29.1%	-53.4%	
5-LT20	45.0%	164.3%	6.9%		-12.4%	-73.4%	
TOTAL	69.4%	126.9%	10.6%	-62.5%	-4.7%	-66.2%	300.0%

74

NORTH GHOR

CHANGE IN THE CROPPING INTENTION OF FARMERS BETWEEN THE 1986/87 AND 1987/88 CROPPING SEASONS

1986/87	Cereals	Green Houses (Number) Cucumber	Pepper	Greenbean	Other	Total	Tomato Alone Wint	Sum	Tomato Mix Wint	Sum	Tomato Total Wint	Sum
Over 300 Dun.	300	0	0	0	0	0	0	250	0	0	0	250
100-LT300	323	0	0	0	0	0	0	305	0	0	0	305
70-LT100	81	15	3	0	0	0	0	155	0	0	0	155
40-LT70	163	7	3	0	0	0	0	292	0	0	0	292
20-LT40	162	12	0	0	5	0	0	337	11	11	11	348
TOTAL	1029	34	6	0	5	0	0	1339	11	11	11	1350

1987/88	Cereals	Green Houses (Number) Cucumber	Pepper	Greenbean	Other	Total	Tomato Alone Wint	Sum	Tomato Mix Wint	Sum	Tomato Total Wint	Sum
Over 300 Dun.	400	0	0	0	0	0	0	200	0	0	0	200
100-LT300	350	0	0	0	0	0	0	365	0	0	0	365
70-LT100	75	18	0	0	0	18	0	186	0	0	0	186
40-LT70	122	7	3	0	0	10	0	352	0	0	0	352
20-LT40	128	12	0	0	5	17	0	432	0	0	0	432
TOTAL	1075	37	3	0	5	45	0	1535	0	0	0	1535

1986/87	Eggplant Wint	Sum	Pepper Wint	Sum	Squash Wint	Sum	Cucumbers Wint	Sum	Cauliflower Wint	Sum	Cabbages Wint	Sum
Over 300 Dun.	0	15	75	0	20	30	0	0	0	0	0	0
100-LT300	100	110	120	30	245	70	0	0	0	0	0	0
70-LT100	18	70	37	6	111	53	0	0	0	0	0	0
40-LT70	6	103	77	9	191	83	0	0	30	0	21	0
20-LT40	30	179	55	24	289	106	37	5	34	33	26	12
TOTAL	154	477	364	69	856	342	37	5	64	33	47	12

1987/88	Eggplant Wint	Sum	Pepper Wint	Sum	Squash Wint	Sum	Cucumbers Wint	Sum	Cauliflower Wint	Sum	Cabbages Wint	Sum
Over 300 Dun.	0	50	50	0	30	30	0	0	0	0	0	0
100-LT300	130	120	90	55	315	82	0	0	10	0	10	0
70-LT100	24	78	43	17	114	66	0	0	4	0	4	0
40-LT70	13	115	63	13	167	101	0	0	35	0	26	0
20-LT40	29	262	55	23	235	153	28	0	72	0	62	0
TOTAL	196	625	301	108	861	432	28	0	121	0	102	0

NORTH GHOR

CHANGE IN THE CROPPING INTENTION OF FARMERS BETWEEN THE 1986/87 AND 1987/88 CROPPING SEASONS

		Green Houses (Number)					Tomato Alone		Tomato Mix		Tomato Total	
1986/87	Cereals	Cucumber	Pepper	Greenbean	Other	Total	Wint	Sum	Wint	Sum	Wint	Sum
Over 300 Dun.	300	0	0	0	0	0	0	250	0	0	0	250
100-LT300	323	0	0	0	0	0	0	305	0	0	0	305
70-LT100	81	15	3	0	0	0	0	155	0	0	0	155
40-LT70	163	7	3	0	0	0	0	292	0	0	0	292
20-LT40	162	12	0	0	5	0	0	337	11	11	11	348
TOTAL	1029	34	6	0	5	0	0	1339	11	11	11	1350

		Green Houses (Number)					Tomato Alone		Tomato Mix		Tomato Total	
1987/88	Cereals	Cucumber	Pepper	Greenbean	Other	Total	Wint	Sum	Wint	Sum	Wint	Sum
Over 300 Dun.	400	0	0	0	0	0	0	200	0	0	0	200
100-LT300	350	0	0	0	0	0	0	365	0	0	0	365
70-LT100	75	18	0	0	0	18	0	186	0	0	0	186
40-LT70	122	7	3	0	0	10	0	352	0	0	0	352
20-LT40	128	12	0	0	5	17	0	432	0	0	0	432
TOTAL	1075	37	3	0	5	45	0	1535	0	0	0	1535

	Eggplant		Pepper		Squash		Cucumbers		Cauliflower		Cabbages	
1986/87	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum
Over 300 Dun.	0	15	75	0	20	30	0	0	0	0	0	0
100-LT300	100	110	120	30	245	70	0	0	0	0	0	0
70-LT100	18	70	37	6	111	53	0	0	0	0	0	0
40-LT70	6	103	77	9	191	83	0	0	30	0	21	0
20-LT40	30	179	55	24	289	106	37	5	34	33	26	12
TOTAL	154	477	364	69	856	342	37	5	64	33	47	12

	Eggplant		Pepper		Squash		Cucumbers		Cauliflower		Cabbages	
1987/88	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum
Over 300 Dun.	0	50	50	0	30	30	0	0	0	0	0	0
100-LT300	130	120	90	55	315	82	0	0	10	0	10	0
70-LT100	24	78	43	17	114	66	0	0	4	0	4	0
40-LT70	13	115	63	13	167	101	0	0	35	0	26	0
20-LT40	29	262	55	23	235	153	28	0	72	0	62	0
TOTAL	196	625	301	108	861	432	28	0	121	0	102	0

SOUTH GHOR

CHANGE (IN DUNUMS) IN THE CROPPING INTENTION OF FARMERS BETWEEN THE 1986/87 AND THE 1987/88 CROPPING SEASONS

1986/87	Cereals	Green Houses (Number) Cucumber	Pepper	Greenbean	Other	Total	Tomato Alone Wint	Sum	Tomato Mix Wint	Sum	Tomato Total Wint	Sum
Over 300	70	15	4	0	15	34	90	0	0	0	90	0
100-LT300	135	24	4	0	14	42	220	0	0	0	220	0
70-LT100												
40-LT70	50	0	0	0	0	0	81	0	0	0	81	0
20-LT40	45	0	0	0	0	0	119	0	0	0	119	0
5-LT20	0	0	0	0	0	0	138	0	0	0	138	0
TOTAL	300	39	8	0	29	76	648	0	0	0	648	0

1987/88	Cereals	Green Houses (Number) Cucumber	Pepper	Greenbean	Other	Total	Tomato Alone Wint	Sum	Tomato Mix Wint	Sum	Tomato Total Wint	Sum
Over 300	50	18	5	0	17	0		0	0	0	120	0
100-LT300	108	30	5	0	20	0		0	0	0	272	0
70-LT100												
40-LT70	0	0	0	0	0	0		0	0	0	98.5	0
20-LT40	0	0	0	0	0	0		0	0	0	141.5	0
5-LT20	0	0	0	0	0	0		0	0	0	189	0
TOTAL	158	48	10	0	37	0		0	0	0	821	0

1986/87	Eggplant Wint	Sum	Pepper Wint	Sum	Squash Wint	Sum	Cucumbers Wint	Sum	Cauliflower Wint	Sum	Cabbages Wint	Sum	Watermelon Wint	Sum	Melon Wint	Sum
Over 300	35		35		20		0		0	0	0		0	70		270
100-LT300	44		56		0		0		0	0	0		0	375		275
70-LT100																
40-LT70	20		21		9		0		0	0	0		0	140		82
20-LT40	33		25		9		10		0	0	0		8	98		169
5-LT20	47		27		7		0		0	0	0		0	177		109
TOTAL	179		164		45		10		0	0	0		8	860		905

1987/88	Eggplant Wint	Sum	Pepper Wint	Sum	Squash Wint	Sum	Cucumbers Wint	Sum	Cauliflower Wint	Sum	Cabbages Wint	Sum	Watermelon Wint	Sum	Melon Wint	Sum
Over 300	40	0	30	0	25	0	0	0	0	0	0	0	0	60	0	260
100-LT300	47	0	33	0	15	0	0	0	0	0	0	0	0	388	0	293
70-LT100																
40-LT70	22.5	0	14	0	10	0	0	0	0	0	2	0	0	90	0	150
20-LT40	33.5	0	18	0	11	0	10	0	0	0	0	0	0	126.5	0	181
5-LT20	46	0	15	0	8	0	0	0	0	0	0	0	3	155	0	116.5
	189	0	110	0	69	0	10	0	0	0	2	0	3	819.5	0	1000.

SOUTH GHOR

CHANGE (IN DUNUMS) IN THE CROPPING INTENTION OF FARMERS BETWEEN THE 1986/87 AND THE 1987/88 CROPPING SEASONS

(Cont.)

1986/87	Greenbean		Broadbean		Lettuce		Spinach		Potatoes		Onions		Others	
	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum
Over 300	0		0		0	0	0	0	0		0		40	0
100-LT300	50		12		0	0	0	0	20		0		60	2
70-LT100														
40-LT70	17		6		0	0	0	0	0		7		27	0
20-LT40	3		1		0	0	0	0	0		0		29	0
5-LT20	10		7		0	0	0	0	0		0		79	0
TOTAL	80		26		0	0	0	0	20		7		235	2

1987/88	Greenbean		Broadbean		Lettuce		Spinach		Potatoes		Onions		Others	
	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum	Wint	Sum
Over 300	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100-LT300	77	0	25	0	0	0	0	0	36	0	0	0	38	5
70-LT100														
40-LT70	27	0	10.5	0	0	0	0	0	0	0	15	0	7	3
20-LT40	17	0	5	0	0	0	0	0	0	0	4.5	0	13.5	0
5-LT20	14.5	0	18.5	0	0	0	0	0	0	0	1	0	21	0
	135.5	0	59	0	0	0	0	0	36	0	20.5	0	79.5	8

DRAFT-3: JANUARY 8, 1988

Annex I

Welfare analysis of the Impact of Market Interventions on Producers, Consumers, and the Nation

Annex A

Welfare Analysis of the Impact of Market Interventions on Producers, Consumers, and the Nation

Impact on consumers, Producers and Society of Market Interventions Raising Domestic Rice to p' from Border Price p.

Figure 1 shows domestic demand D_d, domestic supply S_d and import supply pS (small country assumption) for a total supply curve S_d as giving market equilibrium price p. Importing at price p along import supply curve pS given domestic production q_p, consumption q_c, and imports $q_c - q_p$ without intervention. If parastatal intervenes to import quantity $q_c' - q_p'$ holding domestic price at p', then results are as depicted below and in attached table.

Area in Figure 1		Line in Table 1
Loss to consumers	(18)	1 + 2 + 3 + 4 + 5
Gain to producers	(12)	1
Gain to parastatal	(19)	3 + 4
Net Social cost	(21)	2 + 5

Impact on Consumers, Producers, and Society of market Intervention to Bring Self-Sufficiency at Price P_e and Quantity q_e.

Given supply and demand depicted in Figure 1, self sufficiency is obtained by raising price to p_e. The import gap of $q_c - q_p$ is closed by greater domestic supply quantity $q_e - q_p$ and reduced domestic demand $q_c - q_e$ or

$$q_c - q_p = (q_e - q_p) + (q_c - q_e)$$

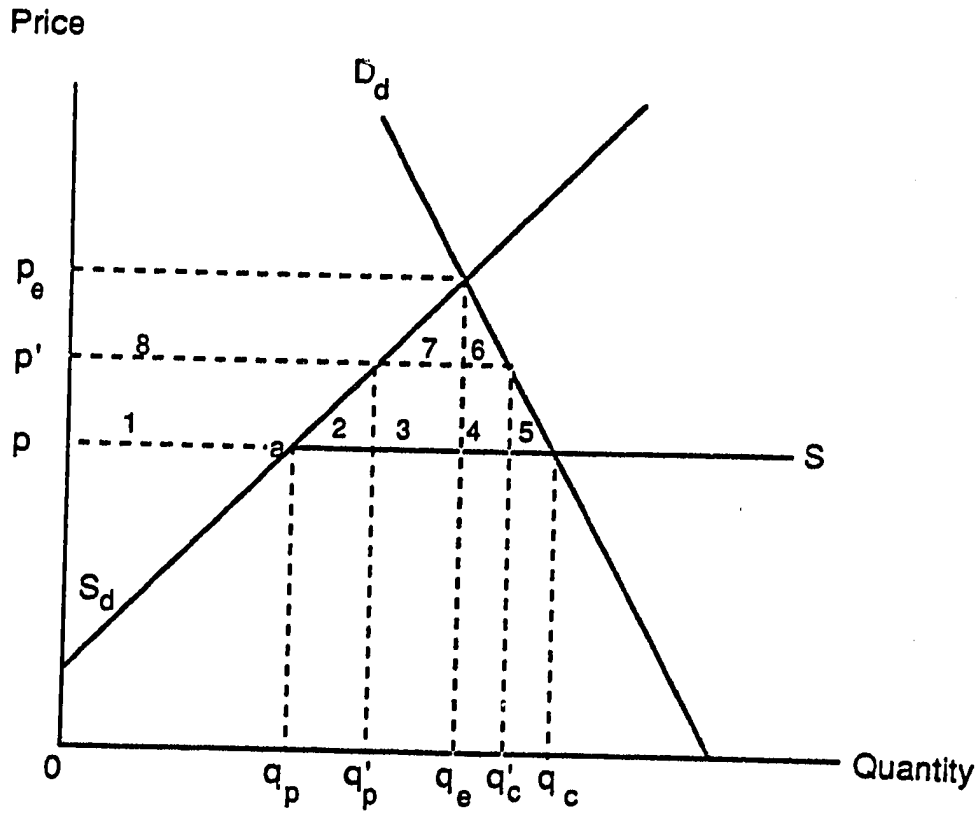


Figure 1. Supply and Demand Curves for a Fruit or Vegetable

21

The implications for producer, consumers, and the nation compared to market equilibrium at p are summarized as:

Area in Figure 1		Line in Table 1
Loss to consumers	(44)	1 thru 8
Gain to producers	(42)	1 + 8
Net social cost	(45)	2 thru 7

Potato and Onion Estimates

Key estimates are production and net imports, prices, and elasticities.

		Price		
Potatoes	Amman wholesale price*	138.70	JD/t	1986
Onions	Amman wholesale price*	95.30	JD/t	1986

*From worksheets on Amman Wholesale Market

Potatoes	Amman "border" price (Aqaba price plus transport and other charges to Amman)*		
Onions	Amman "border" price	88.27	JD/t

*Data from USAID and AMPCO

Potatoes	Jordan Production*	39,000 tons	1986/87
Onions	Jordan Production	9,800 tons	1986/87

*From Worksheets on winter season and summer season production supplied by Randall Cummings

Net Imports

Potatoes	Jordan net imports*	15,178 tons	1986
Onions	Jordan net imports*	12,255 tons	1986

*FAO worksheets. In the case of potatoes, the 1985 and 1986 net imports were similar but were about half 1983 and 1984 net imports. In the case of onions, net imports in 1985 were only 4,573 tons, but net imports were a little below 1983 and 1984 levels in 1986.

Elasticities: Supply

Potatoes	Askari and Cummings for Middle East countries	.23 short run .29 long run
	M.A. Salem recent estimate for Jordan (no length of run indicated)	.73
	Used in analysis	.50
Onions	M.A. Salem recent estimate for Jordan	.17

This is reasonable agreement with other short run elasticities and is used in analysis, rounded to .2. Askari and Cummings estimates ranged from .10 and .19 average for Middle East Countries.

84

Elasticities: Demand

Potatoes	M.A. Salem recent estimate for Jordan A comparable estimate for pototes is not available for Jordan from other sources but for other countries and commodities by other analysis, estimates tend to run lower. Hence, two estimates are used alternately in the analysis, -1.0 and -2.0.	-2.10
Onions	M.A. Salem recent estimate for Jodan Other estimates are unavailable for Jordan but comparable vegetables for other countries indicate a more likely value is -1.0. Hence estimates -1.0 is used in the analysis.	-3.77

• Hussein Askari and John Cummings. Agricultural Supply Response: A Survey. New York: Paeger, 1976

POTATO

Distribution of Benefits and Costs Among Producers, Consumers, AMPCO, and the Nation from Potato Import Policy, 1986, With Demand Elasticity - 2.0

Item	(See Figure 1)		
(1) Domestic Production (tons)	Qp'		39,000.000
(2) Net Imports (tons)	Qc'-Qp'		15,178.000
(3) Wholesale Price, AMMAN (JD/ton)	P'		138.700
(4) Border Price, CIF, AMMAN (JD/ton)	P		117.900
(5) Elasticity of Supply	Es		0.500
(6) Elasticity of Demand	|Ed|		2.000
(7) Price Gain From Intervention (JD/ton)	P'-P		20.800
(8) Proportional Price Gain	(P'-P)/p		0.176
(9) Addition of Price to Receipts (JD)	Qp (P'-P)	1+2	811,200.000
(10) Addition to Production (tons)	(Qp'-Qp)=Qp'Es(P'--)/P		3440.204
(11) Net Social Cost From Production (JD)	.5(P'-P)(Qp'-Qp)	2	35,778.117
(12) Producers Surplus Gain (JD)		1	775,421.883
(13) Producer Transfer (JD)			
(14) Consumption (tons)	Qc'=Qp'+(Qc'-Qp')		54,178.000
(15) Addition of Price to Consumer Cost (JD)	(P'-P)Qc'	1+2+3+4	1,126,902.400
(16) Loss of Consumption (tons)	Qc-Qc'=Qc'Ed(P'--)/P		19,116.241
(17) Net Social Cost From Consumption (JD)	.5(P'-P)(QC-Qc')	5	198,808.905
(18) Consumers Surplus Loss (JD)		1 thru 5	1,325,711.305
(19) Transfer to Parastatal (JD)	(P'-P)(Qc'-Qp')	3+4	315,702.400
(20) Other Social Cost (JD)			
(21) Total Net Social Cost		2+5	234,587.022
(22) Transfer Inefficiency To Producers		(2+5)/1	0.303
(23) Social Cost as Percent of Producers Receipts		(6+5)/Qp'P'	4.337
(24) Ln of Supply Intercept	ln a = ln Qp'- Es ln P'		8.105
(25) Ln of Demand Intercept	ln b = ln Qc' + Ed ln P'		20.765
(26) Ln of Pe	(ln b - ln a)/(Es + Ed)		5.064
(27) Pe (JD)	exp(ln Pe)		158.190
(28) Ln Qe	ln a + Es ln Pe		10.637
(29) Ln Qe	ln b - Ed ln Pe		10.637
(30) Qe (tons)	exp(ln Qe)		41,650.122
(31) Revenue (JD)	Pe Qe		6588,644.652
(32) Market Equil. Production (tons	Qp=Qp'-(Qp'-Qp)		35,559.796
(33) Market Equil. Consumption (tons)	Qc=Qc'+(Qc-Qc')		73,294.241
(34) Market Equil. Imports (tons)	Qc-Qp		37,734.444
(35) Isolation Price Gain (JD)	dP=Pe-P		40.290
(36) Proportional Price Gain	(Pe-P)/.5(Pe+P)		0.292
(37) Production Gain in Isolation (tons)	dQs=QpEs(Pe-P)/P		5,189.296
(38) Consumption Loss in Isolation (tons)	dQd=QcEd(Pe-P)/P		42,783.770
(39) Change in Net Imports (tons)	Qc-Qp+dQs+dQd		47,973.066
(40) Policy transfer to Producers (JD)	Qe(Pe-P	1+2+3+7+8	1,678,095.251
(41) Net Social Cost - Supply (JD)	.5(dP)(DQs)	2+3+7	104,539.112
(42) Net Gain in Producers Surplus (JD)		1+8	1,573,556.139
(43) Net Social Costs - Consumers (JD	.5(dP)(dQd)	4+5+6	861,885.116
(44) Net Loss in Consumers Surplus (JD)		1 thru 8	2,539,980.367
(45) Total Net Social Cost - Isolation (JD)		2 thru 7	966,424.228
(46) Transfer Inefficiency to Producers		(2 thru 7)/1+8	0.614
(47) Social Cost as Percent of Producers Receipts		(2 thru 7))/PeQe	14.668

86

POTATO

Distribution of Benefits and Costs Among Producers, Consumers, AMPCO, and the Nation from Potato Import Policy, 1986, With Demand Elasticity - 1.0

Item		(See Figure 1)		
(1)	Domestic Production (tons)	Qp'		39,000.000
(2)	Net Imports (tons)	Qc'-Qp'		15,178.000
(3)	Wholesale Price, AMMAN (JD/ton)	P'		138.700
(4)	Border Price, CIF, AMMAN (JD/ton)	P		117.900
(5)	Elasticity of Supply	Es		0.500
(6)	Elasticity of Demand	|Ed|		1.000
(7)	Price Gain From Intervention (JD/ton	P'-P		20.800
(8)	Proportional Price Gain	(P'-P)/p		0.176
(9)	Addition of Price to Receipts (JD)	Qp (P'-P)	1+2	811,200.000
(10)	Addition to Production (tons)	(Qp'-Qp)=Qp'Es(P'--)/P		3,440.204
(11)	Net Social Cost From Production (JD)	.5(P'-P)(Qp'-Qp)	2	35,778.117
(12)	Producers Surplus Gain (JD)		1	775,421.883
(13)	Producer Transfer (JD)			
(14)	Consumption (tons)	Qc'=Qp'+(Qc'-Qp')		54,178.000
(15)	Addition of Price to Consumer Cost (JD)	(P'-P)Qc'	1+2+3+4	1,126,902.400
(16)	Loss of Consumption (tons)	Qc-Qc'=Qc'Ed(P'--)/P		9,558.120
(17)	Net Social Cost From Consumption (JD)	.5(P'-P)(QC-Qc')	5	99,404.453
(18)	Consumers Surplus Loss (JD)		1 thru 5	1,226,306.833
(19)	Transfer to Parastatal (JD)	(P'-P)(Qc'-Qp')	3+4	315,702.400
(20)	Other Social Cost (JD)			
(21)	Total Net Social Cost		2+5	135,182.570
(22)	Transfer Inefficiency To Producers		(2+5)/1	0.174
(23)	Social Cost as Percent of Producers Receipts		(6+5)/Qp'P'	2.499
(24)	Ln of Supply Intercept	ln a = ln Qp'- Es ln P'		8.105
(25)	Ln of Demand Intercept	ln b = ln Qc' + Ed ln P'		15.832
(26)	Ln of Pe	(ln b - ln a)/(Es + Ed)		5.151
(27)	Pe (JD)	exp(ln Pe)		172.683
(28)	Ln Qe	ln a + Es ln Pe		10.681
(29)	Ln Qe	ln b - Ed ln Pe		10.681
(30)	Qe (tons)	exp(ln Qe)		43,516.176
(31)	Revenue (JD)	Pe Qe		7,514,488.600
(32)	Market Equil. Production (tons	Qp=Qp'-(Qp'-Qp)		35,559.796
(33)	Market Equil. Consumption (tons)	Qc=Qc'+(Qc-Qc')		63,736.120
(34)	Market Equil. Imports (tons)	Qc-Qp		28,176.324
(35)	Isolation Price Gain (JD)	dP=Pe-P		54.783
(36)	Proportional Price Gain	(Pe-P)/.5(Pe+P)		0.377
(37)	Production Gain in Isolation (tons)	dQs=QpEs(Pe-P)/P		6,703.979
(38)	Consumption Loss in Isolation (tons)	dQd=QcEd(Pe-P)/P		24,031.948
(39)	Change in Net Imports (tons)	Qc-Qp+dQs+dQd		30,735.926
(40)	Policy transfer to Producers (JD)	Qe(Pe-P	1+2+3+7+8	2,383,931.413
(41)	Net Social Cost - Supply (JD)	.5(dP)(DQs)	2+3+7	183,630.852
(42)	Net Gain in Producers Surplus (JD)		1+8	2,200,300.561
(43)	Net Social Costs - Consumers (JD	.5(dP)(dQd)	4+5+6	658,266.879
(44)	Net Loss in Consumers Surplus (JD)		1 thru 8	3,042,198.29[illegible]
(45)	Total Net Social Cost - Isolation (JD)		2 thru 7	841,[illegible]97.731
(46)	Transfer Inefficiency to Producers		(2 thru 7)/1+8	0.383
(47)	Social Cost as Percent of Producers Receipts		(2 thru 7))/PeQe	11.204

87

ONION

Distribution of Benefits and Costs Among Producers, Consumers, AMPCO, and the Nation from Onion Import Policy, 1986

Item		(See Figure 1)		
(1)	Domestic Production (tons)	Qp'		9,800.00
(2)	Net Imports (tons)	Qc'-Qp'		12,295.000
(3)	Wholesale Price, AMMAN (JD/ton)	P'		95.300
(4)	Border Price, CIF, AMMAN (JD/ton)	P		88.270
(5)	Elasticity of Supply	Es		0.200
(6)	Elasticity of Demand	|Ed|		1.000
(7)	Price Gain From Intervention (JD/ton)	P'-P		7.030
(8)	Proportional Price Gain	(P'-P)/p		0.080
(9)	Addition of Price to Receipts (JD)	Qp (P'-P)	1+2	68,894.000
(10)	Addition to Production (tons)	(Qp'-Qp)=Qp'Es(P'--)/P		156.098
(11)	Net Social Cost From Production (JD)	.5(P'-P)(Qp'-Qp)	2	548.686
(12)	Producers Surplus Gain (JD)		1	68,345.314
(13)	Producer Transfer (JD)			
(14)	Consumption (tons)	Qc'=Qp'+(Qc'-Qp')		22,095.000
(15)	Addition of Price to Consumer Cost (JD)	(P'-P)Qc'	1+2+3+4	155,327.850
(16)	Loss of Consumption (tons)	Qc-Qc'=Qc'Ed(P'--)/P		1,759.690
(17)	Net Social Cost From Consumption (JD)	.5(P'-P)(QC-Qc')	5	6,185.311
(18)	Consumers Surplus Loss (JD)		1 thru 5	161,513.161
(19)	Transfer to Parastatal (JD)	(P'-P)(Qc'-Qp')	3+4	86,433.850
(20)	Other Social Cost (JD)			
(21)	Total Net Social Cost		2+5	6,733.997
(22)	Transfer Inefficiency To Producers		(2+5)/1	0.099
(23)	Social Cost as Percent of Producers Receipts		(6+5)/Qp'P'	0.721
(24)	Ln of Supply Intercept	ln a = ln Qp'- Es ln P'		8.279
(25)	Ln of Demand Intercept	ln b = ln Qc' + Ed ln P'		14.560
(26)	Ln of Pe	(ln b - ln a)/(Es + Ed)		5.235
(27)	Pe (JD)	exp(ln Pe)		187.636
(28)	Ln Qe	ln a + Es ln Pe		9.326
(29)	Ln Qe	ln b - Ed ln Pe		9.326
(30)	Qe (tons)	exp(ln Qe)		11,222.012
(31)	Revenue (JD)	Pe Qe		2,105,653.500
(32)	Market Equil. Production (tons	Qp=Qp'-(Qp'-Qp)		9,643.902
(33)	Market Equil. Consumption (tons)	Qc=Qc'+(Qc-Qc')		23,854.690
(34)	Market Equil. Imports (tons)	Qc-Qp		14,210.788
(35)	Isolation Price Gain (JD)	dP=Pe-P		99.366
(36)	Proportional Price Gain	(Pe-P)/.5(Pe+P)		0.720
(37)	Production Gain in Isolation (tons)	dQs=QpEs(Pe-P)/P		1,389.279
(38)	Consumption Loss in Isolation (tons)	dQd=QcEd(Pe-P)/P		17,182.266
(39)	Change in Net Imports (tons)	Qc-Qp+dQs+dQd		18,571.545
(40)	Policy transfer to Producers (JD)	Qe(Pe-P	1+2+3+7+8	1,115,086.496
(41)	Net Social Cost - Supply (JD)	.5(dP)(DQs)	2+3+7	69,023.546
(42)	Net Gain in Producers Surplus (JD)		1+8	1,046,062.950
(43)	Net Social Costs - Consumers (JD	.5(dP)(dQd)	4+5+6	853,666.581
(44)	Net Loss in Consumers Surplus (JD)		1 thru 8	1,968,753.077
(45)	Total Net Social Cost - Isolation (JD)		2 thru 7	922,690.127
(46)	Transfer Inefficiency to Producers		(2 thru 7)/1+8	0.882
(47)	Social Cost as Percent of Producers Receipts		(2 thru 7))/PeQe	43.820

DRAFT-3: JANUARY 8, 1988

Annex II

Projections of Exportable Surplus of Fruits and Vegetables 1987-1992

TOMATOES

Supply and Demand Projections Under Different Income Elasticities and Real Income Growth Rate Scenarios

	DEMAND (TONS)			SUPPLY (TONS)	EXPORTABLE SURPLUS (TONS)		
	HIGH VALUE	LOW VALUE	AVERAGE		HIGH VALUE	LOW VALUE	AVERAGE
1987	223.2	215.6	219.4	321.4	98.2	105.8	102.0
1988	239.9	223.8	231.9	362.5	122.6	138.7	130.6
1989	257.8	232.3	245.1	403.5	145.7	171.2	158.4
1990	277.1	241.1	259.1	444.6	167.5	203.5	185.5
1991	297.8	250.3	274.0	485.6	187.8	235.3	211.6
1992	320.0	259.8	289.9	526.7	206.7	266.9	236.8

EGGPLANT

Supply and Demand Projections Under Different Income Elasticities and Real Income Growth Rate Scenarios

	DEMAND (TONS)			SUPPLY (TONS)	EXPORTABLE SURPLUS (TONS)		
	HIGH VALUE	LOW VALUE	AVERAGE		HIGH VALUE	LOW VALUE	AVERAGE
1987	51.6	49.9	50.8	74.8	23.2	24.9	24.0
1988	55.5	51.8	53.6	83.1	27.6	31.3	29.5
1989	59.6	53.7	56.7	91.3	31.7	37.6	34.6
1990	64.1	55.8	59.9	99.6	35.5	43.8	39.7
1991	68.9	57.9	63.4	107.8	38.9	49.9	44.4
1992	74.0	60.1	67.1	116.1	42.1	56.0	49.0

*High Value reflects a GNP growth rate of 5.8, elasticity of .65 and population growth rate of 3.7.
**Low value relfects a GDP growth rate of 4.1, elasticity of .25, and population growth rate of 3.1.

CUCUMBERS
Supply and Demand Projections Under Different Income Elasticities
and Real Income Growth Rate Scenarios

	DEMAND (TONS)			SUPPLY (TONS)	EXPORTABLE SURPLUS (TONS)		
	HIGH VALUE	LOW VALUE	AVERAGE		HIGH VALUE	LOW VALUE	AVERAGE
1987	52.5	50.7	51.6	82.6	30.1	31.9	31.0
1988	56.5	52.7	54.6	92.8	36.3	40.1	38.2
1989	60.7	54.7	57.7	103.0	42.3	48.3	45.3
1990	65.2	56.8	61.0	113.1	47.9	56.3	52.1
1991	70.1	58.9	64.5	123.3	53.2	64.4	58.8
1992	75.3	61.1	68.2	133.5	58.1	72.3	65.2

SQUASH
Supply and Demand Projections Under Different Income Elasticities
and Real Income Growth Rate Scenarios

	DEMAND (TONS)			SUPPLY (TONS)	EXPORTABLE SURPLUS (TONS)		
	HIGH VALUE	LOW VALUE	AVERAGE		HIGH VALUE	LOW VALUE	AVERAGE
1987	34.6	33.4	34.0	62.0	27.4	28.6	28.0
1988	37.2	34.7	35.9	66.1	28.9	31.4	30.2
1989	39.9	36.0	38.0	70.2	30.3	34.2	32.2
1990	42.9	37.3	40.1	74.3	31.4	37.0	34.2
1991	46.1	38.8	42.4	78.4	32.3	39.6	36.0
1992	49.6	40.2	44.9	82.5	33.0	42.3	37.6

*High Value reflects a GNP growth rate of 5.8, elasticity of .65 and population growth rate of 3.7.
**Low value relfects a GDP growth rate of 4.1, elasticity of .25, and population growth rate of 3.1.

MAIN VEGETABLES

Supply and Demand Projections Under Different Income Elasticities and Real Income Growth Rate Scenarios

	DEMAND ('000,000 JD)			SUPPLY ('000,000 JD)	EXPORTABLE SURPLUS ('000,000 JD)		
	HIGH VALUE	LOW VALUE	AVERAGE		HIGH VALUE	LOW VALUE	AVERAGE
1987	41.4	41.4	44.9	65.1	23.7	23.7	20.2
1988	44.5	42.7	47.3	72.7	28.2	30.0	25.4
1989	47.8	44.2	49.9	80.2	32.4	36.0	30.3
1990	51.3	45.7	51.2	87.8	36.5	42.1	36.6
1991	55.2	47.2	52.6	95.3	40.1	48.1	42.7
1992	59.3	48.8	54.0	102.9	43.6	54.1	48.9

OTHER VEGETABLES

Supply and Demand Projections Under Different Income Elasticities and Real Income Growth Rate Scenarios

	DEMAND ('000,000 JD)			SUPPLY ('000,000 JD)	EXPORTABLE SURPLUS ('000,000 JD)		
	HIGH VALUE	LOW VALUE	AVERAGE		HIGH VALUE	LOW VALUE	AVERAGE
1987	48.9	47.0	48.0	43.8	-5.1	-3.2	-4.2
1988	52.6	48.6	50.6	48.2	-4.4	-0.4	-2.4
1989	56.5	50.2	53.3	52.6	-3.9	2.4	-0.7
1990	60.7	51.9	56.3	56.9	-3.8	5.0	0.6
1991	65.2	53.6	59.4	61.3	-3.9	7.7	1.9
1992	70.1	55.4	62.8	65.7	-4.4	10.3	2.9

*High Value reflects a GNP growth rate of 5.8, elasticity of .65 and population growth rate of 3.7.
**Low value relfects a GDP growth rate of 4.1, elasticity of .25, and population growth rate of 3.1.

CITRUS

Supply and Demand Projections Under Different Income Elasticities and Real Income Growth Rate Scenarios

	DEMAND ('000,000 JD)			SUPPLY ('000,000 JD)	EXPORTABLE SURPLUS ('000,000 JD)		
	HIGH VALUE	LOW VALUE	AVERAGE		HIGH VALUE	LOW VALUE	AVERAGE
1987	0.98	0.95	0.96	20.71	19.73	19.76	19.75
1988	1.05	0.98	1.02	21.22	20.17	20.24	20.20
1989	1.13	1.01	1.07	21.73	20.60	20.72	20.66
1990	1.22	1.05	1.13	22.24	21.02	21.19	21.11
1991	1.31	1.09	1.20	22.74	21.43	21.65	21.54
1992	1.40	1.1[illegible]	1.26	23.25	21.85	22.13	21.99

OTHER FRUITS

Supply and Demand Projections Under Different Income Elasticities and Real Income Growth Rate Scenarios

	DEMAND ('000,000 JD)			SUPPLY ('000,000 JD)	EXPORTABLE SURPLUS ('000,000 JD)		
	HIGH VALUE	LOW VALUE	AVERAGE		HIGH VALUE	LOW VALUE	AVERAGE
1987	25.56	25.56	25.56	21.80	-3.76	-3.76	-3.76
1988	27.46	26.44	26.95	22.48	-4.98	-3.96	-4.47
1989	29.52	27.35	28.43	23.16	-6.36	-4.19	-5.27
1990	31.72	28.29	30.01	23.84	-7.88	-4.45	-6.17
1991	34.09	29.27	31.68	24.52	-9.57	-4.75	-7.16
1992	36.64	30.28	33.46	25.20	-11.44	-5.08	-8.26

*High value reflects a GNP growth rate of 5.8, elasticity of .65, and population growth rate of 3.7.
**Low value relfects a GDP growth rate of 4.1, elasticity of .35, and population growth rate of 3.1.

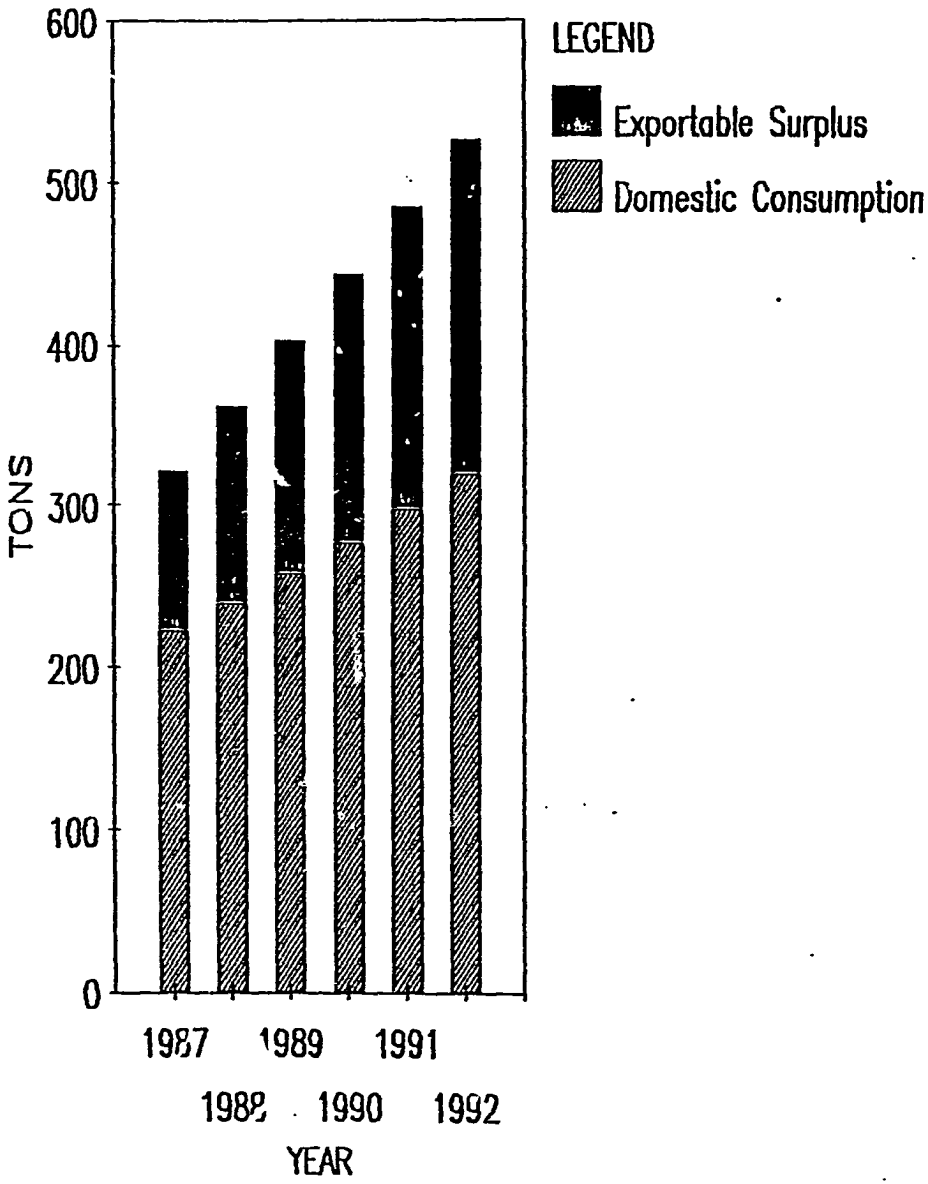
ALL VEGETABLES AND FRUITS COMBINED
Supply and Demand Projections Under Different Income Elasticities
and Real Income Growth Rate Scenarios

	DEMAND ('000,000 JD)			SUPPLY ('000,000 JD)	EXPORTABLE SURPLUS ('000,000 JD)		
	HIGH VALUE	LOW VALUE	AVERAGE		HIGH VALUE	LOW VALUE	AVERAGE
1987	114.9	114.9	121.2	151.4	36.5	36.5	30.2
1988	123.5	118.8	127.9	164.5	41.0	45.7	36.6
1989	132.7	122.8	134.9	177.7	45.0	54.9	42.8
1990	142.6	126.9	142.4	190.8	48.2	63.9	48.4
1991	153.2	131.2	146.2	203.9	50.7	72.7	57.7
1992	164.7	135.6	150.1	217.0	52.3	81.4	66.9

*High Value reflects a GNP growth rate of 5.8, elasticity of .65 and population growth rate of 3.7.
**Low value relfects a GDP growth rate of 4.1, elasticity of .25 for vegetables and .35 for fruits, and population growth rate of 3.1.

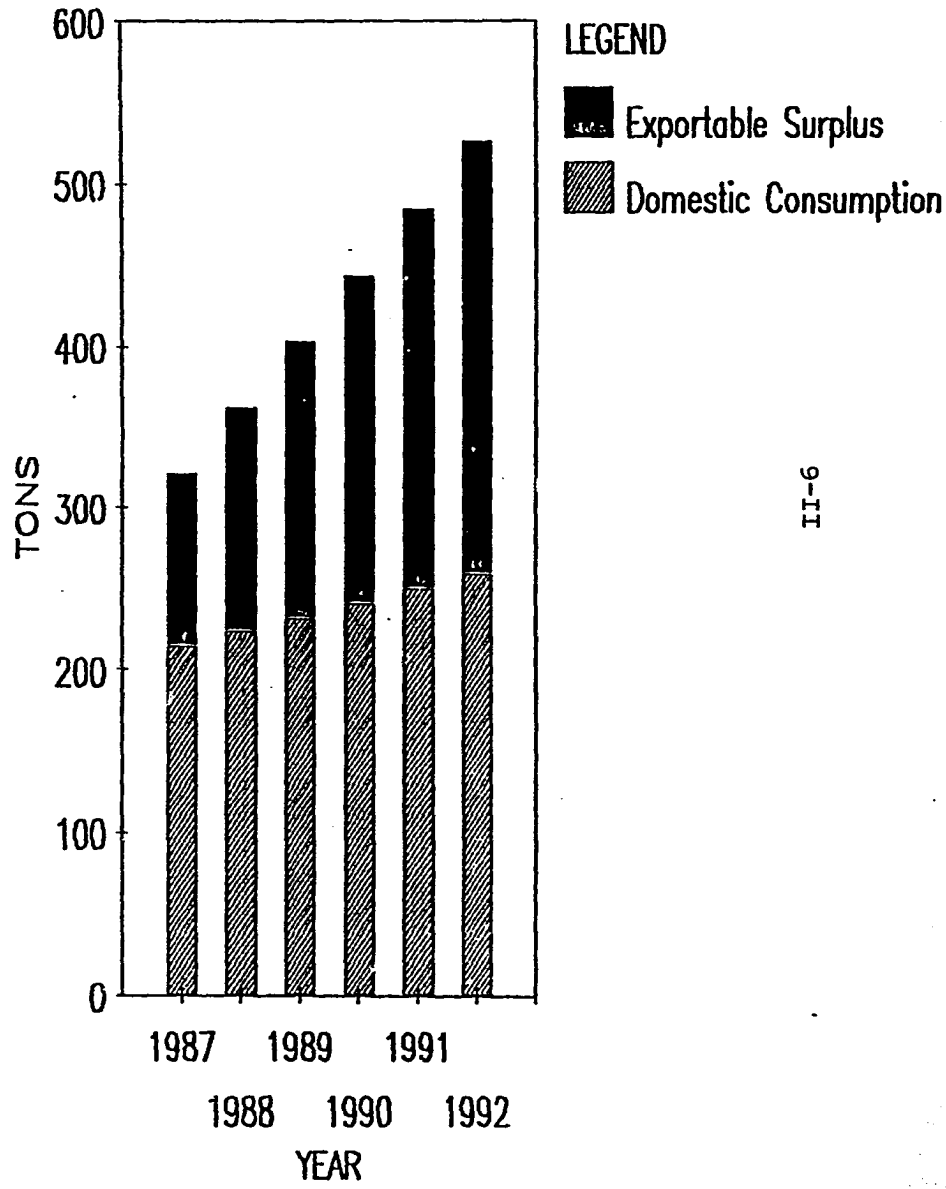
TOMATOES

Projections of Domestic Consumption and Exportable Surplus
High Value



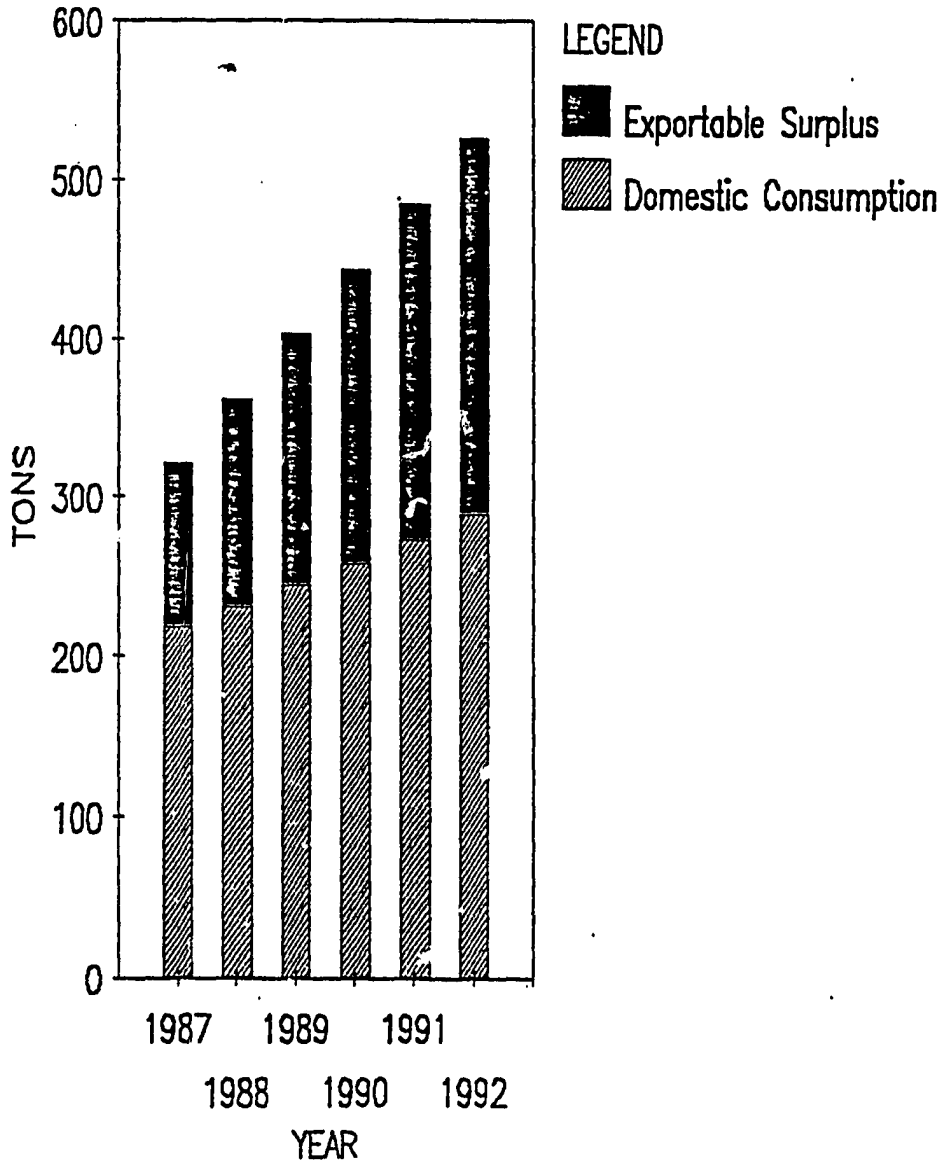
TOMATOES

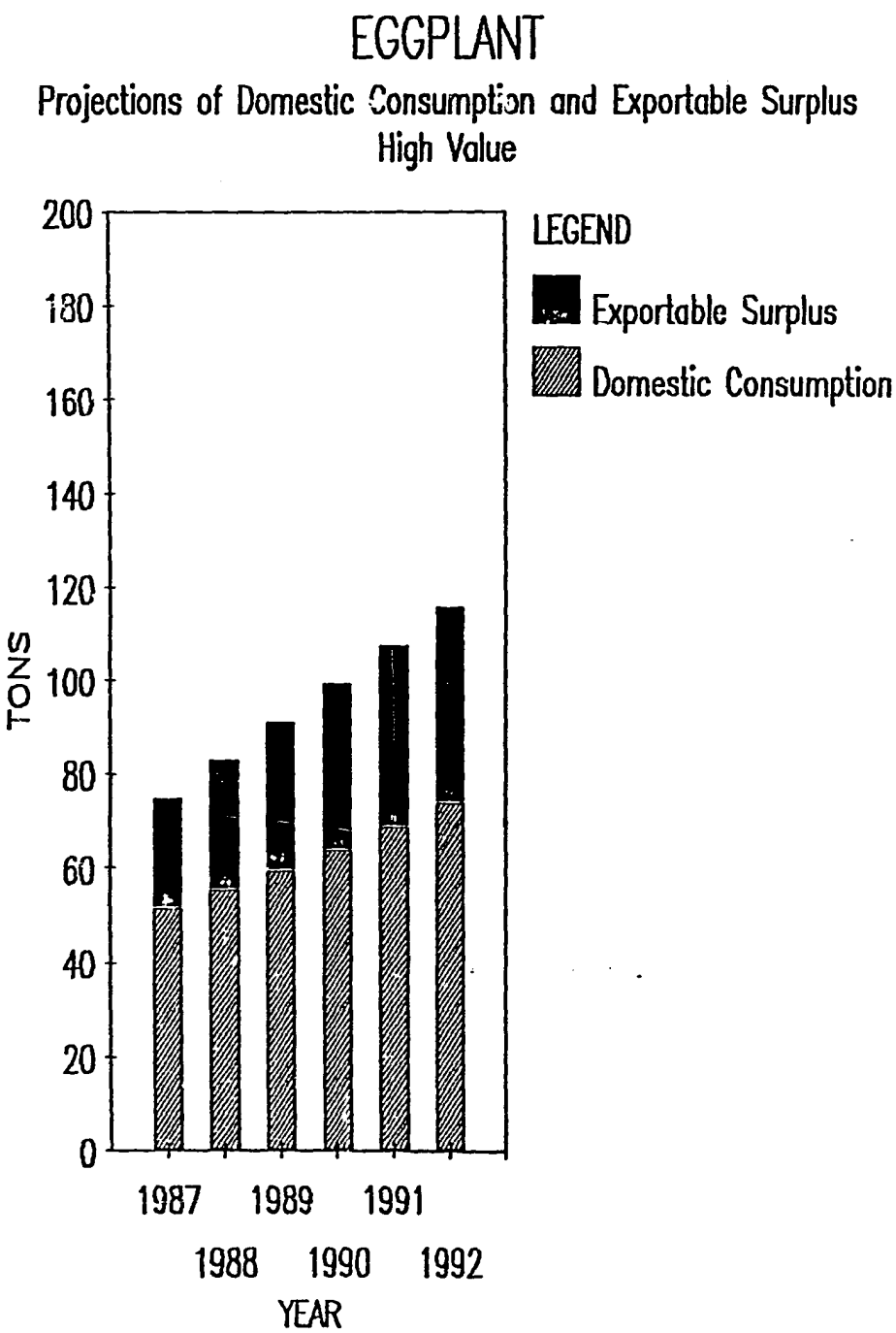
Projections of Domestic Consumption and Exportable Surplus
Low Value

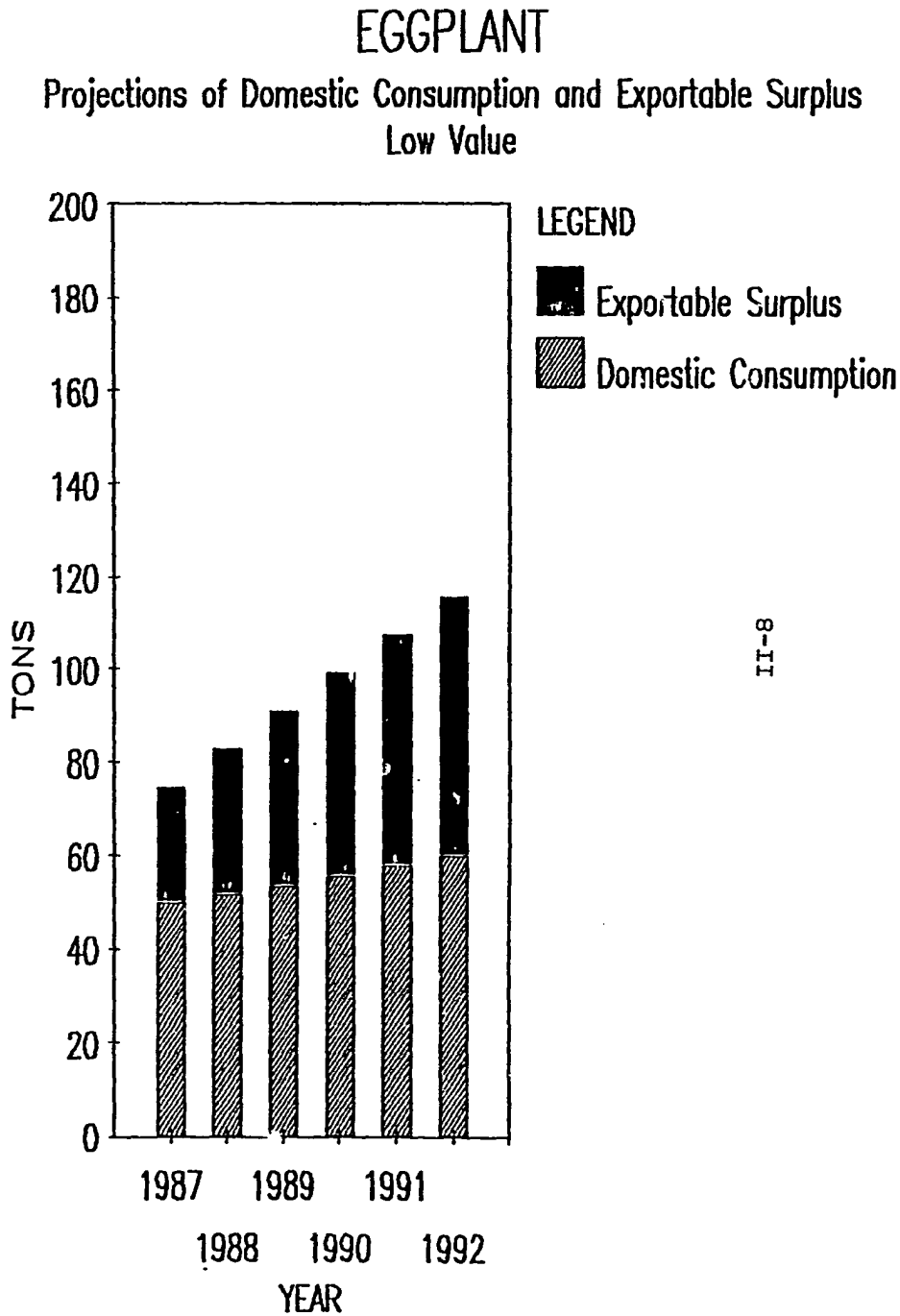


TOMATOES

Projections of Domestic Consumption and Exportable Surplus
Average

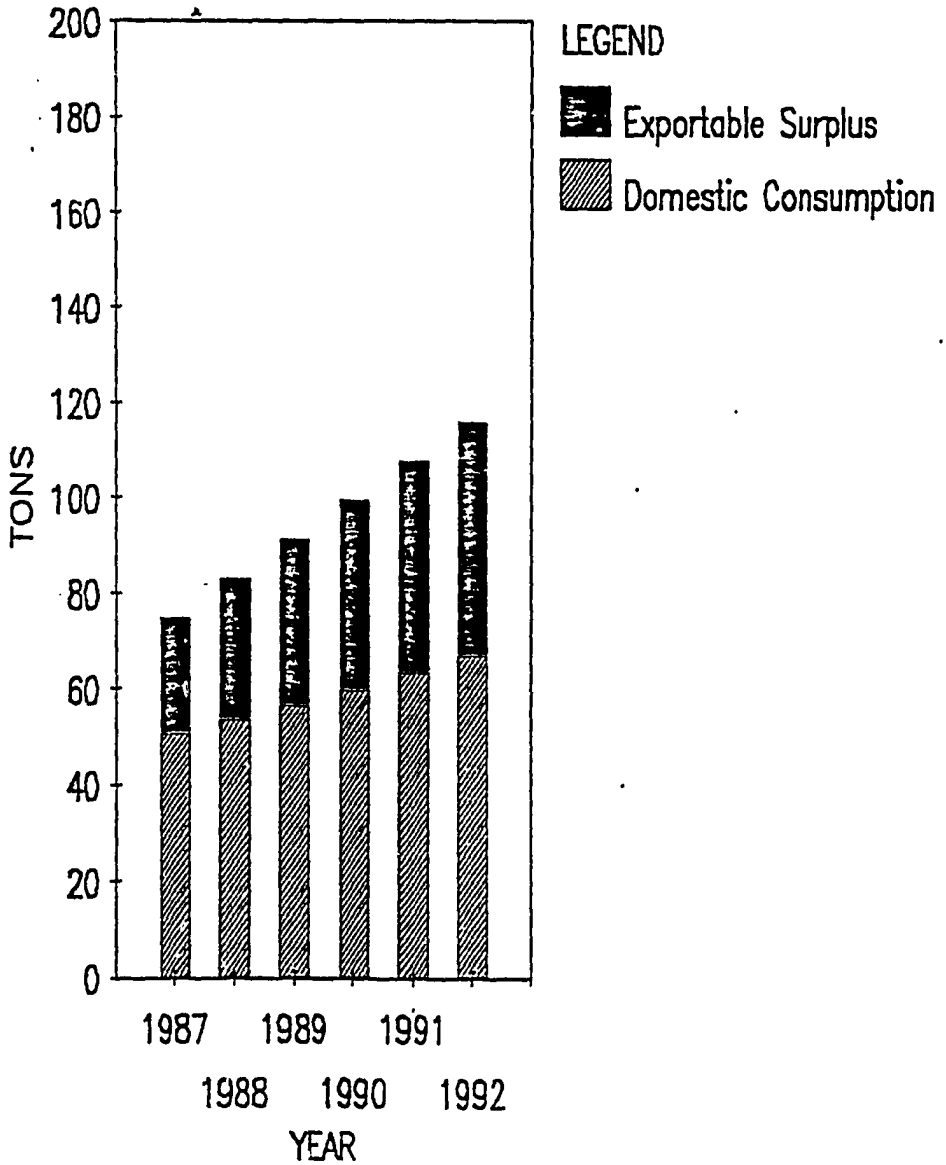



EGGPLANT
Projections of Domestic Consumption and Exportable Surplus
High Value
LEGEND
Exportable Surplus
Domestic Consumption
TONS
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
YEAR


EGGPLANT
Projections of Domestic Consumption and Exportable Surplus
Low Value
LEGEND
Exportable Surplus
Domestic Consumption
TONS
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
YEAR

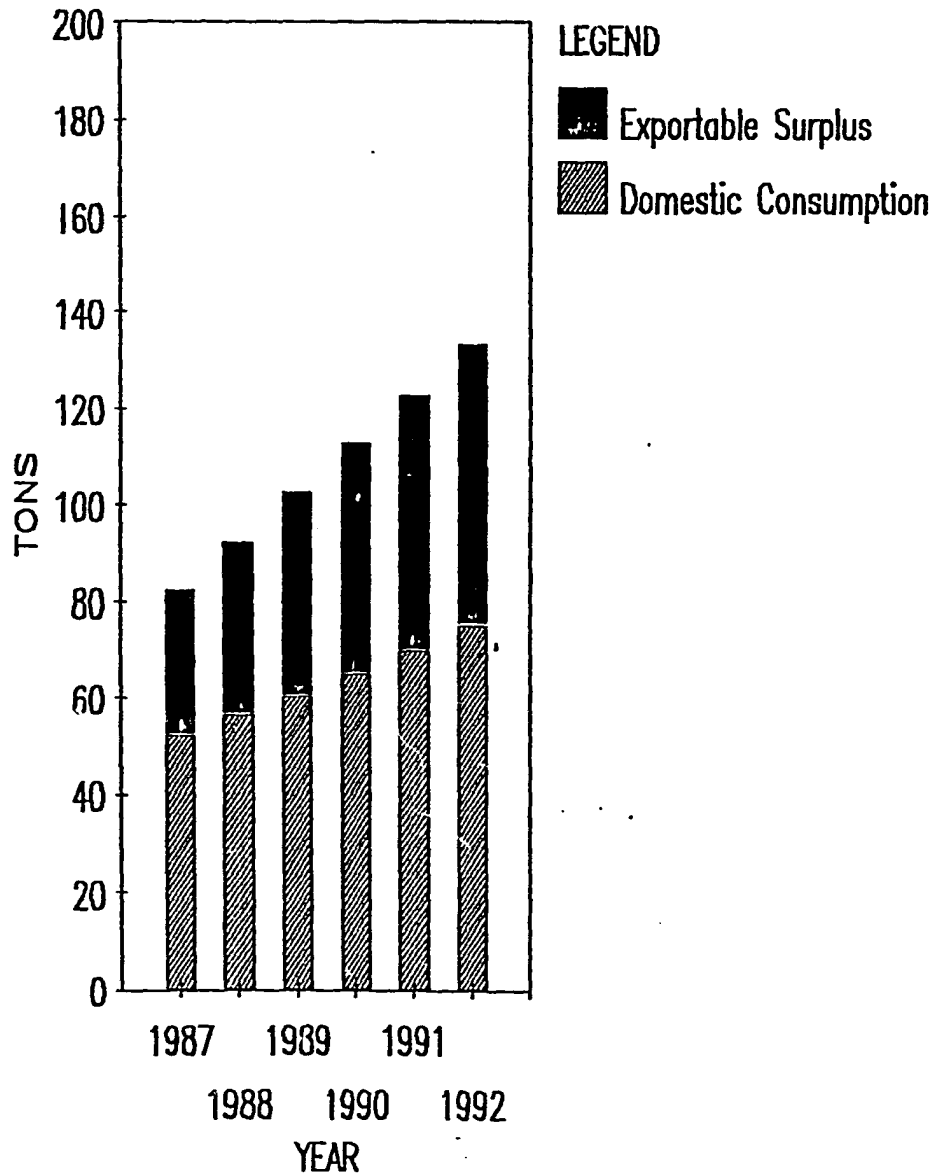
EGGPLANT

Projections of Domestic Consumption and Exportable Surplus
Average



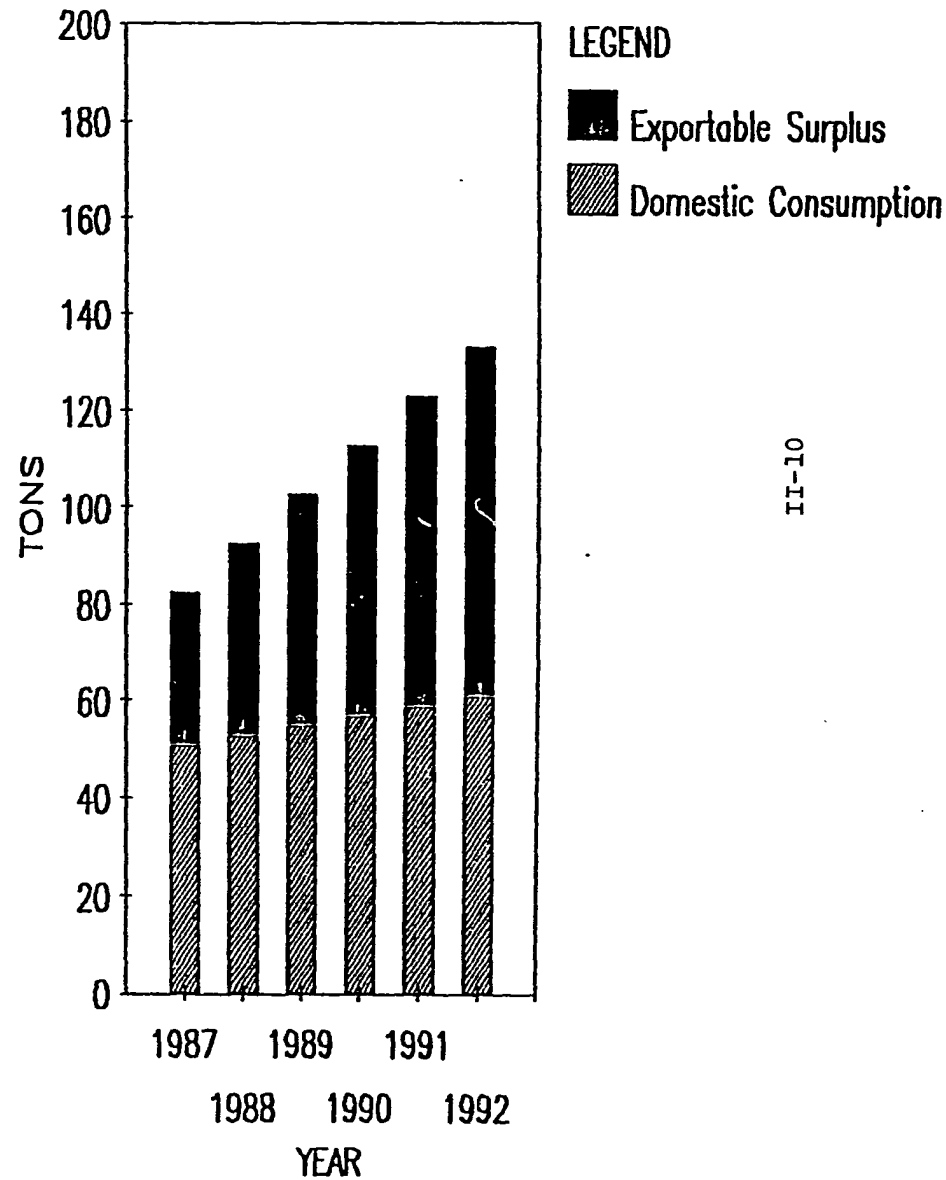
CUCUMBERS

Projections of Domestic Consumption and Exportable Surplus
High Value



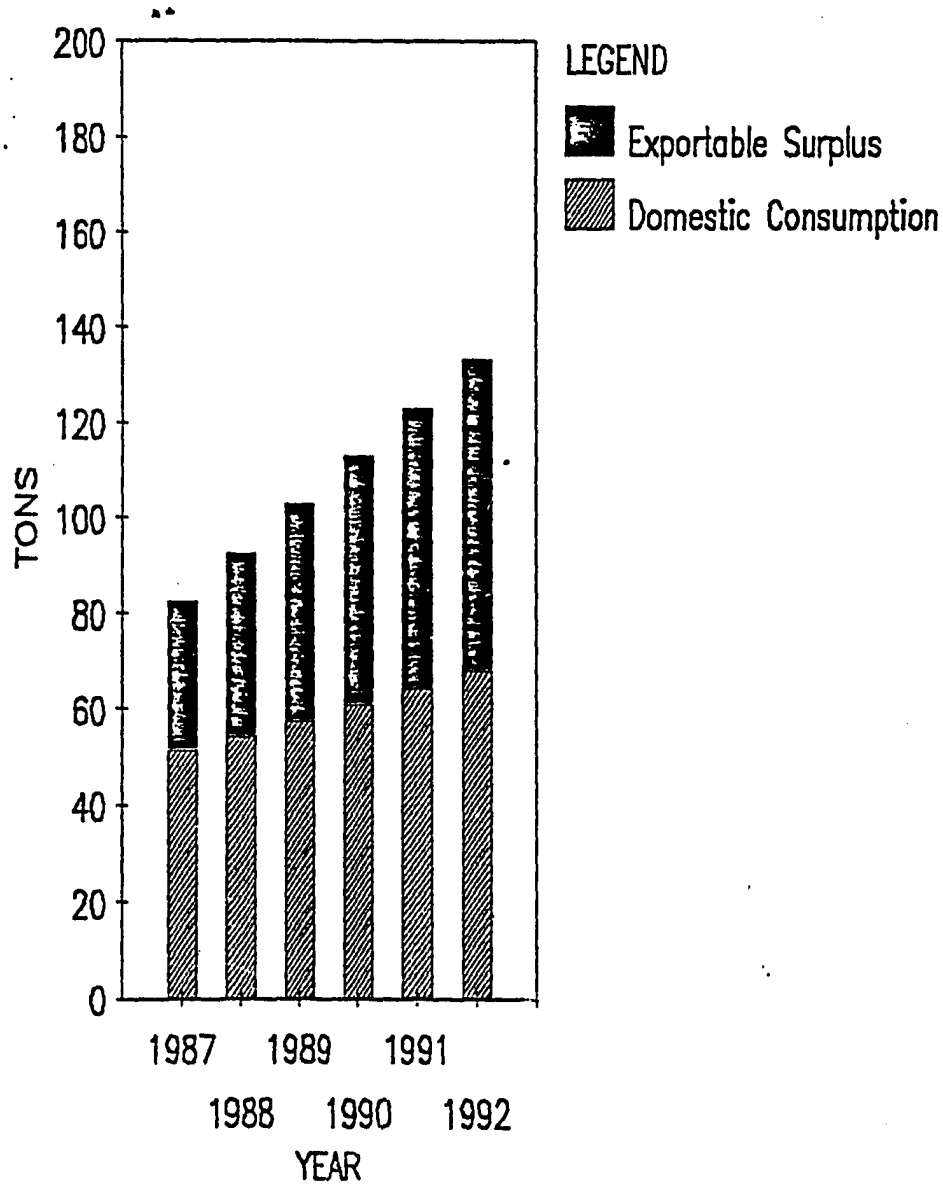
CUCUMBERS

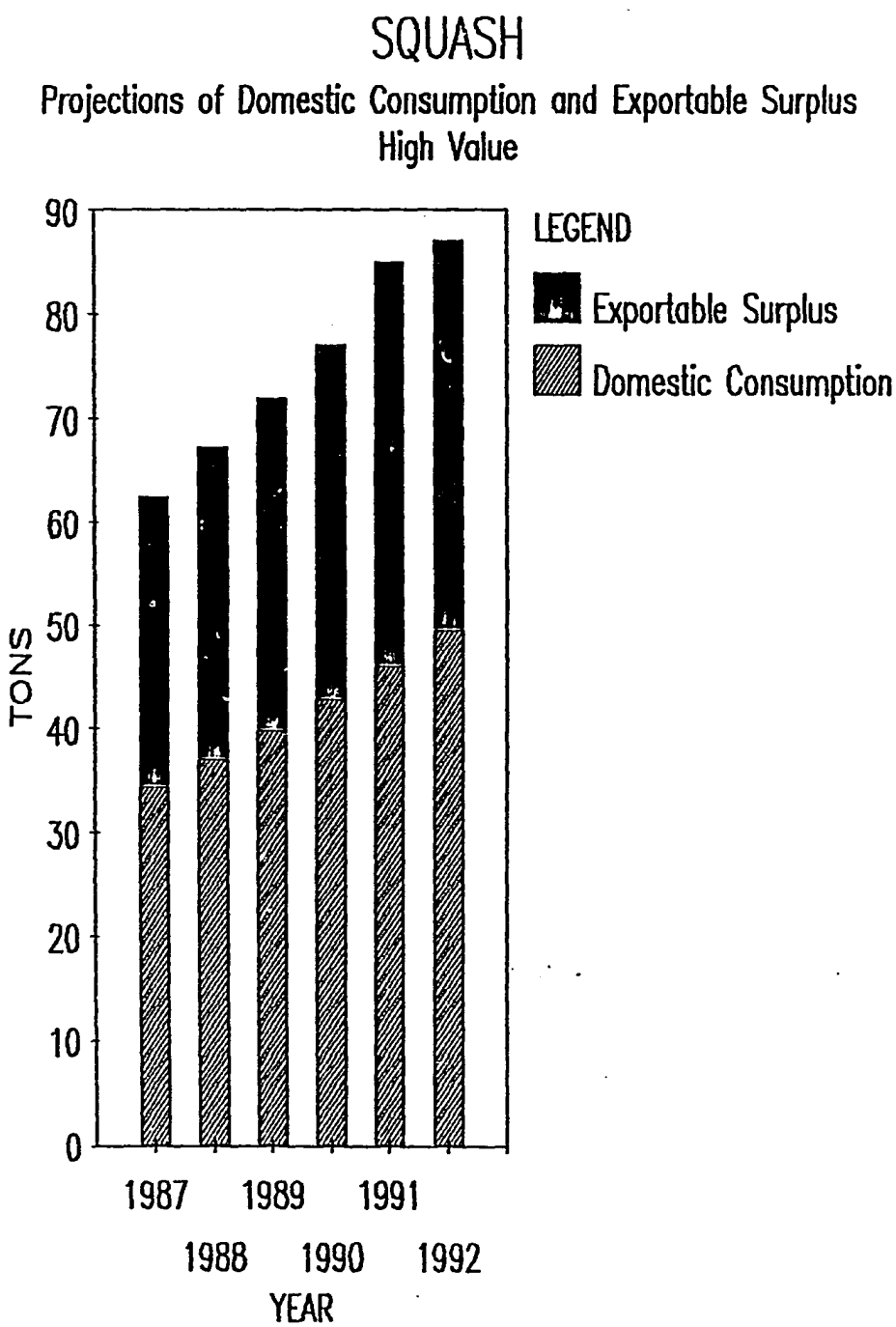
Projections of Domestic Consumption and Exportable Surplus
Low Value

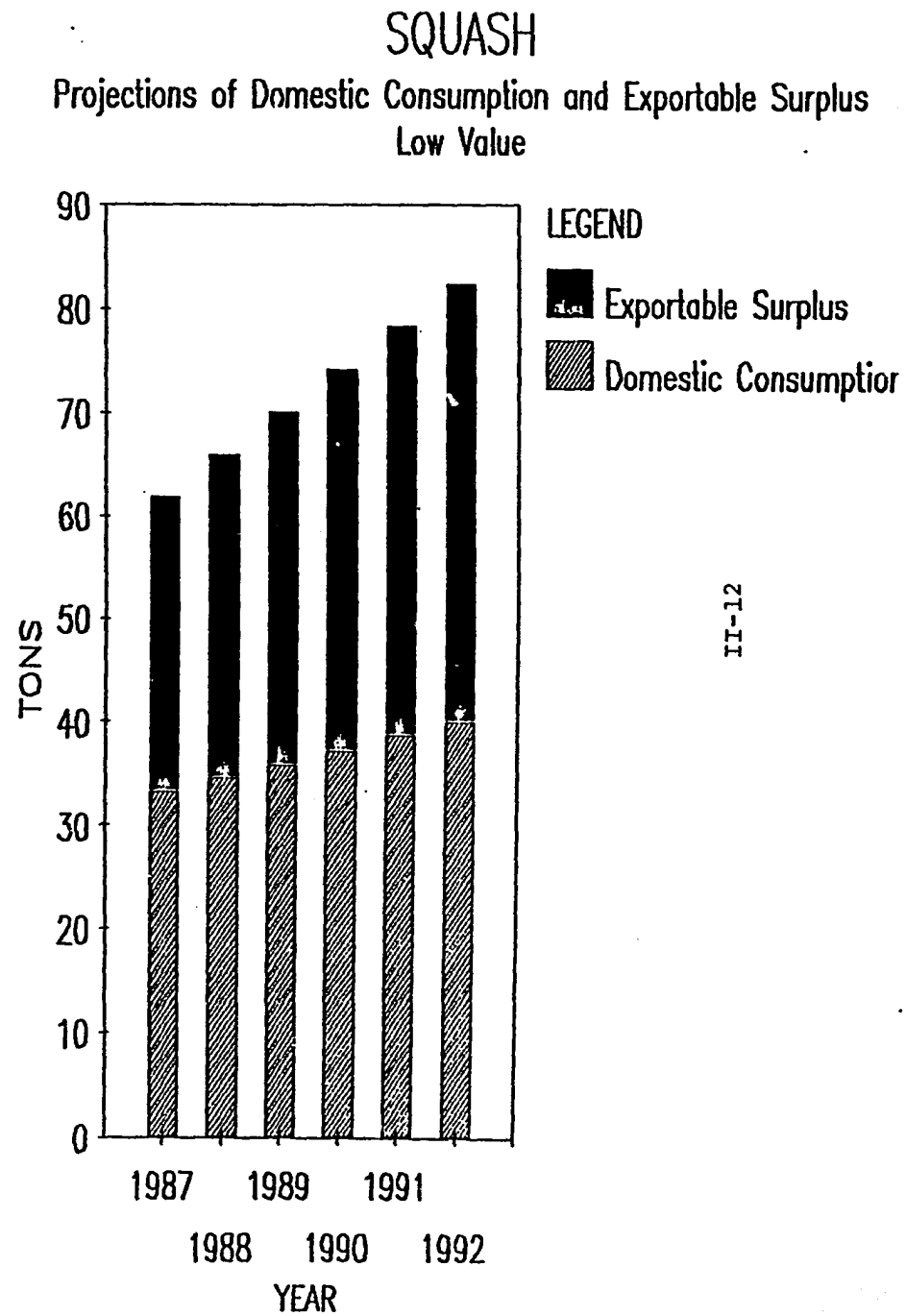


CUCUMBERS

Projections of Domestic Consumption and Exportable Surplus
Average

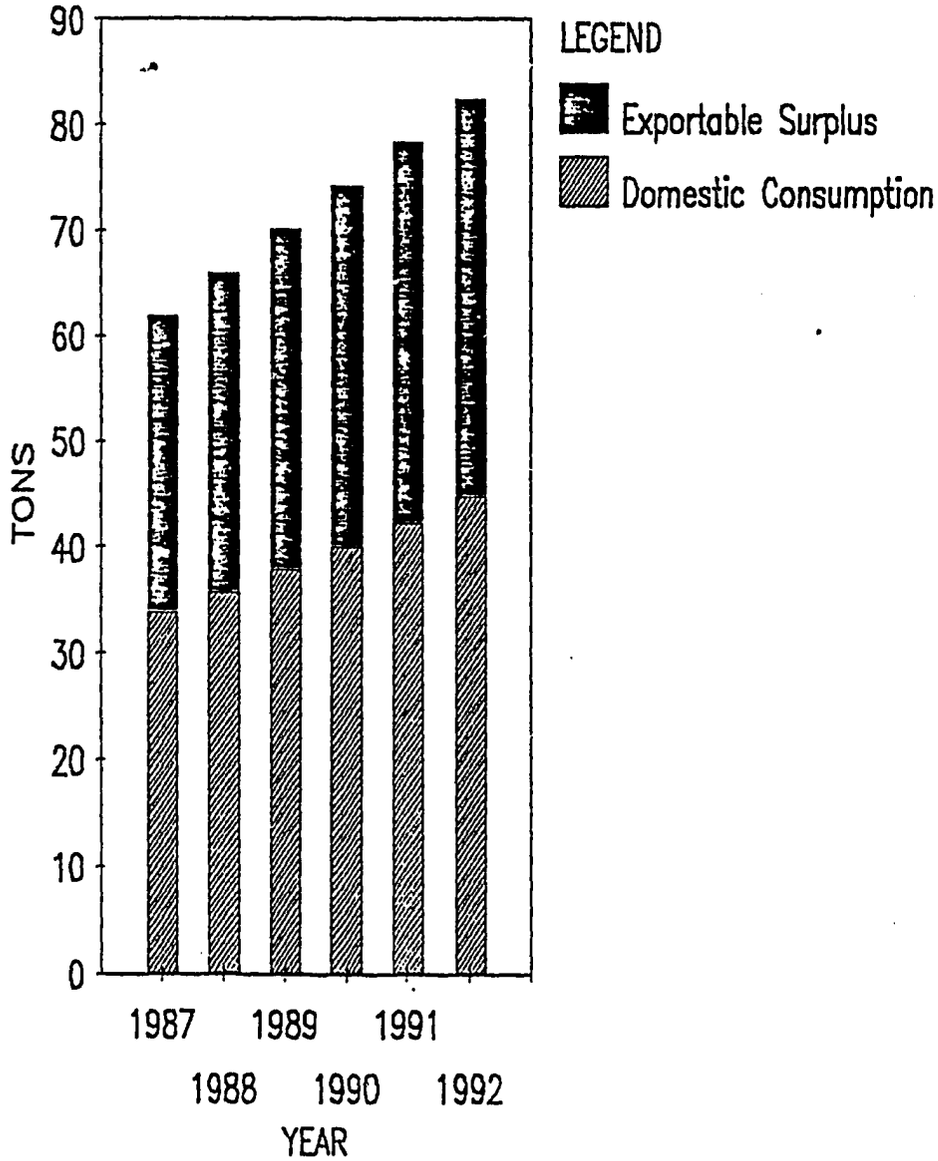



SQUASH
Projections of Domestic Consumption and Exportable Surplus
High Value
LEGEND
Exportable Surplus
Domestic Consumption
TONS
0
10
20
30
40
50
60
70
80
90
1987
1988
1989
1990
1991
1992
YEAR


SQUASH
Projections of Domestic Consumption and Exportable Surplus
Low Value
LEGEND
Exportable Surplus
Domestic Consumption
TONS
0
10
20
30
40
50
60
70
80
90
1987
1988
1989
1990
1991
1992
YEAR

SQUASH

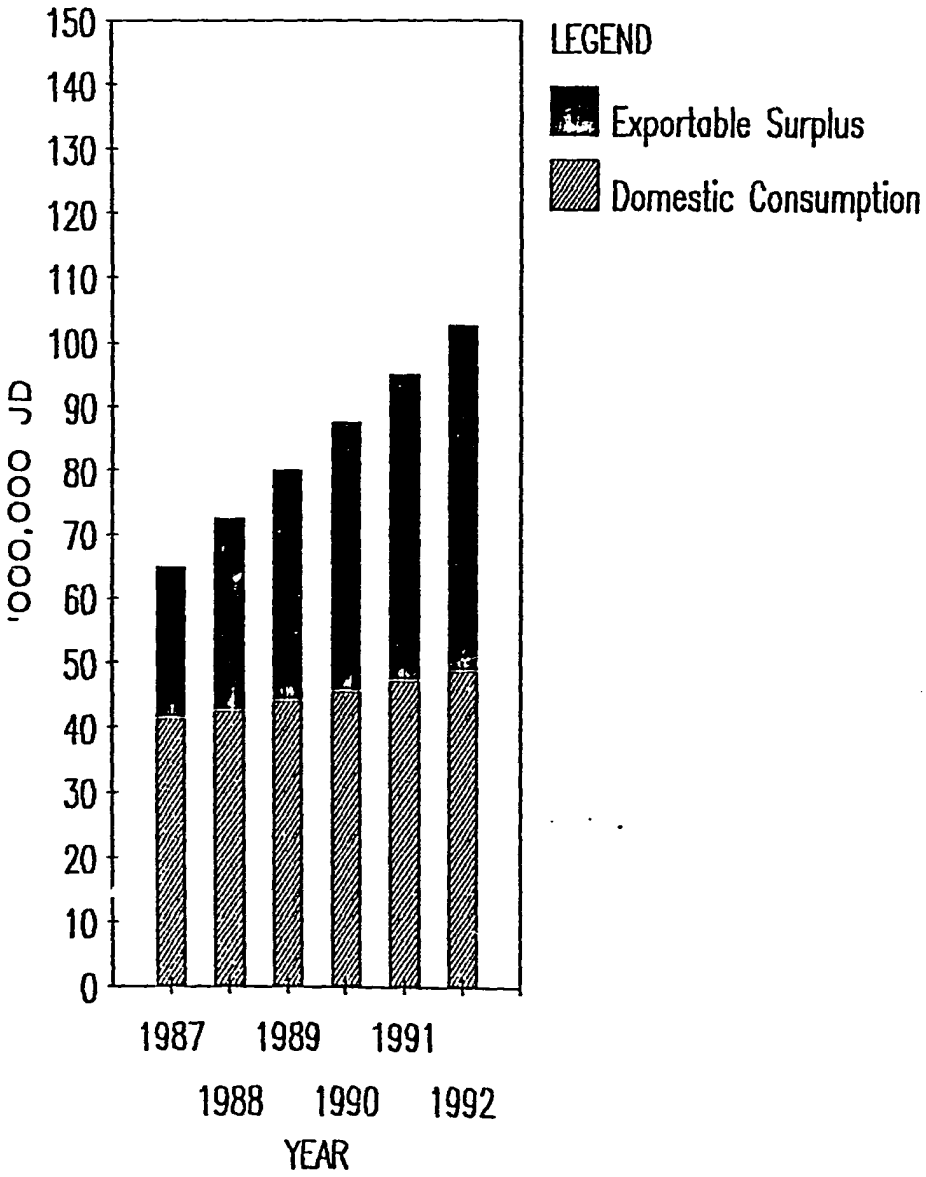
Projections of Domestic Consumption and Exportable Surplus
Average



102

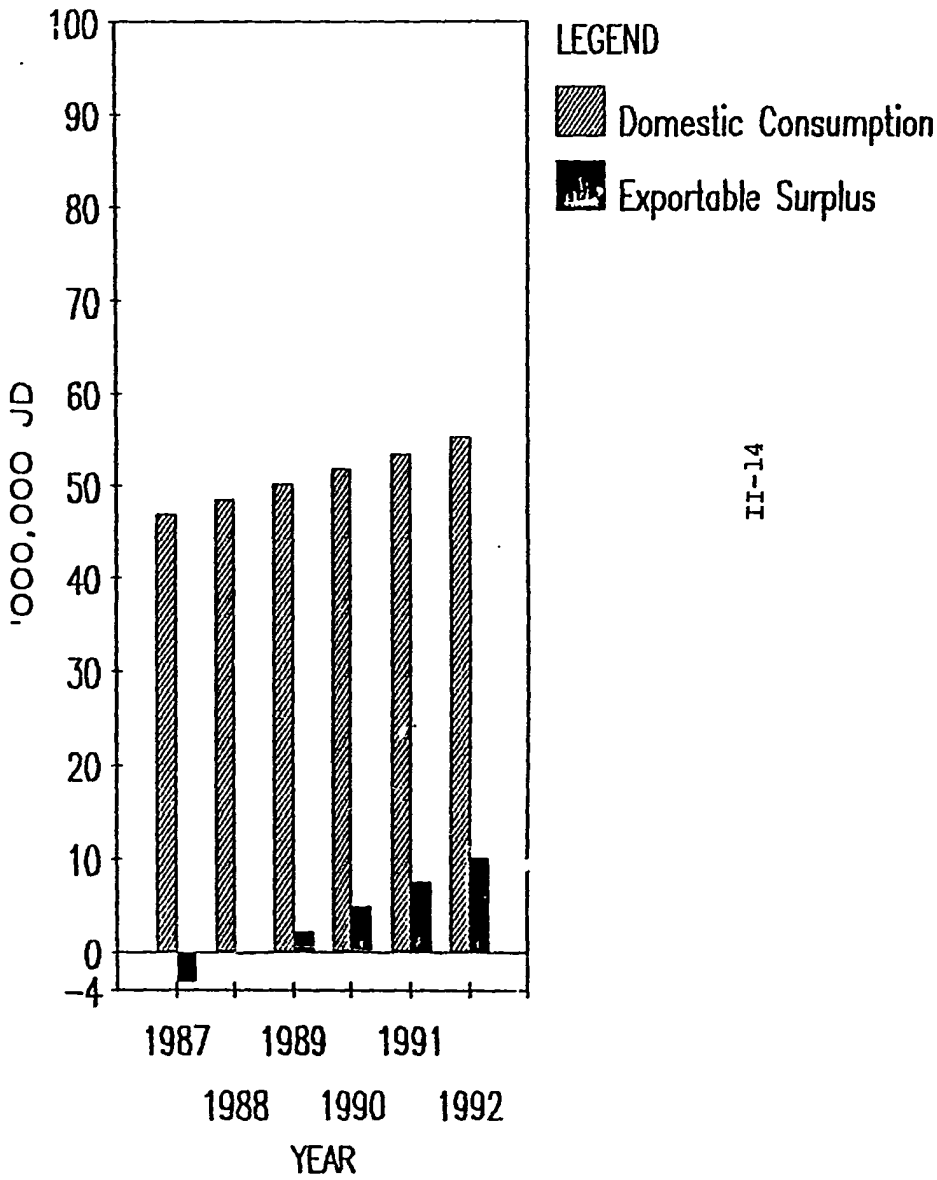
MAIN VEGETABLES

Projections of Domestic Consumption and Exportable Surplus
Low Value



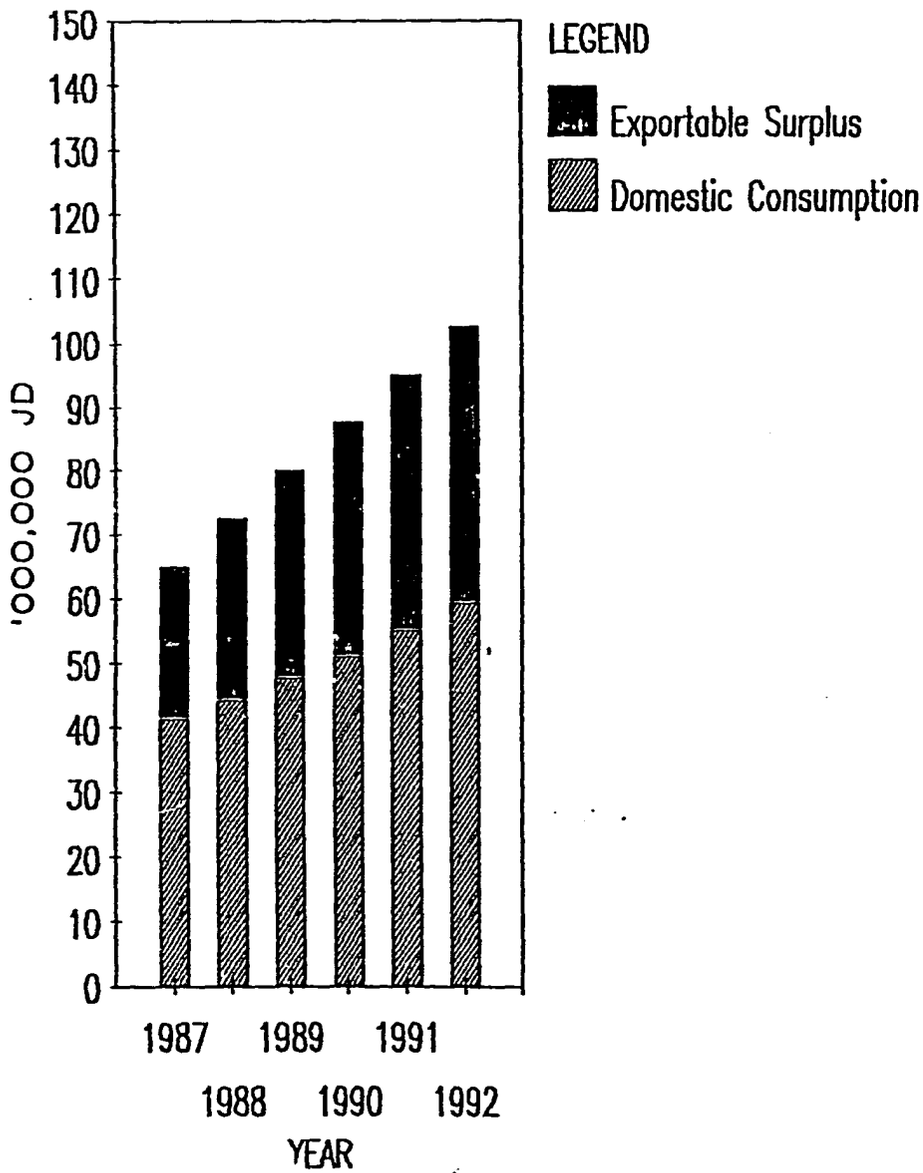
OTHER VEGETABLES

Projections of Domestic Consumption and Exportable Surplus
Low Value



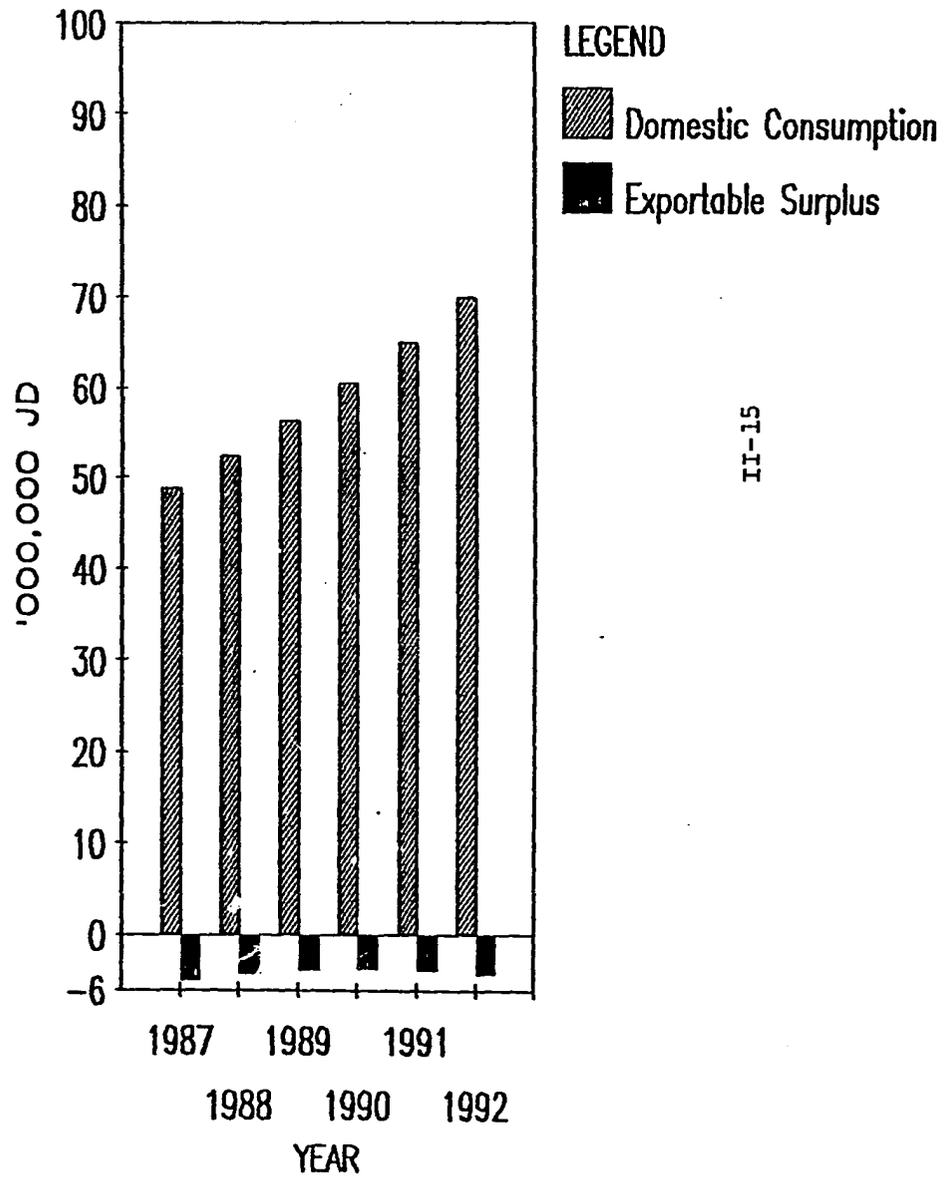
MAIN VEGETABLES

Projections of Domestic Consumption and Exportable Surplus
High Value



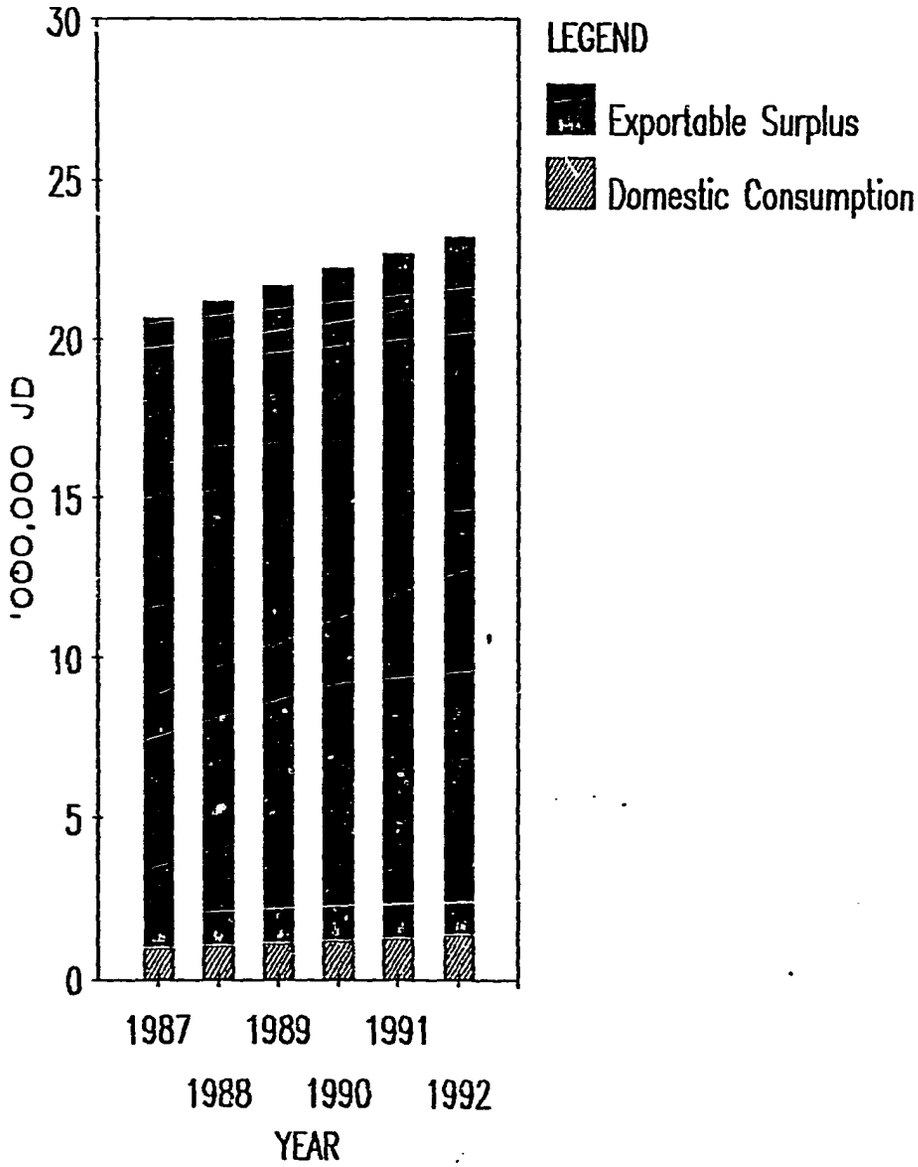
OTHER VEGETABLES

Projections of Domestic Consumption and Exportable Surplus
High Value



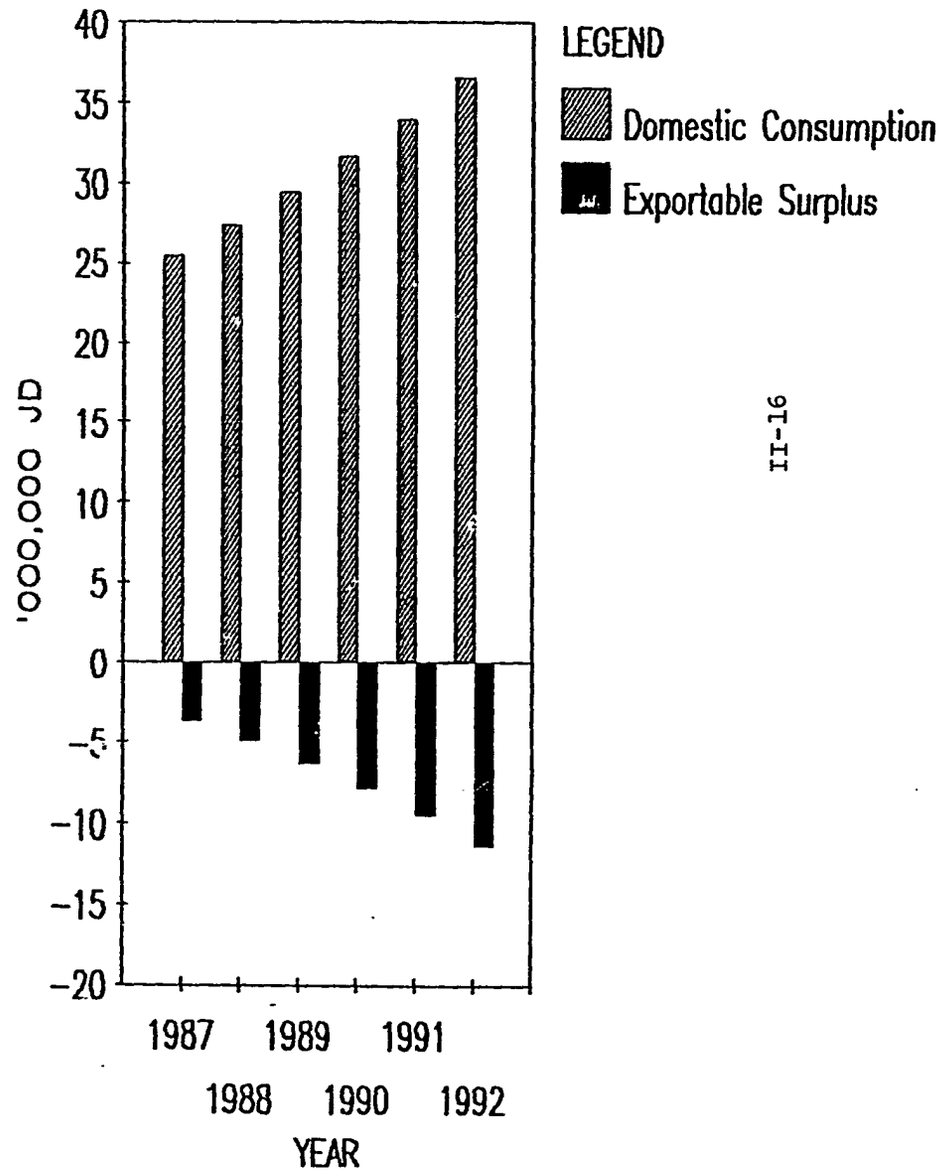
CITRUS

Projections of Domestic Consumption and Exportable Surplus
High Value



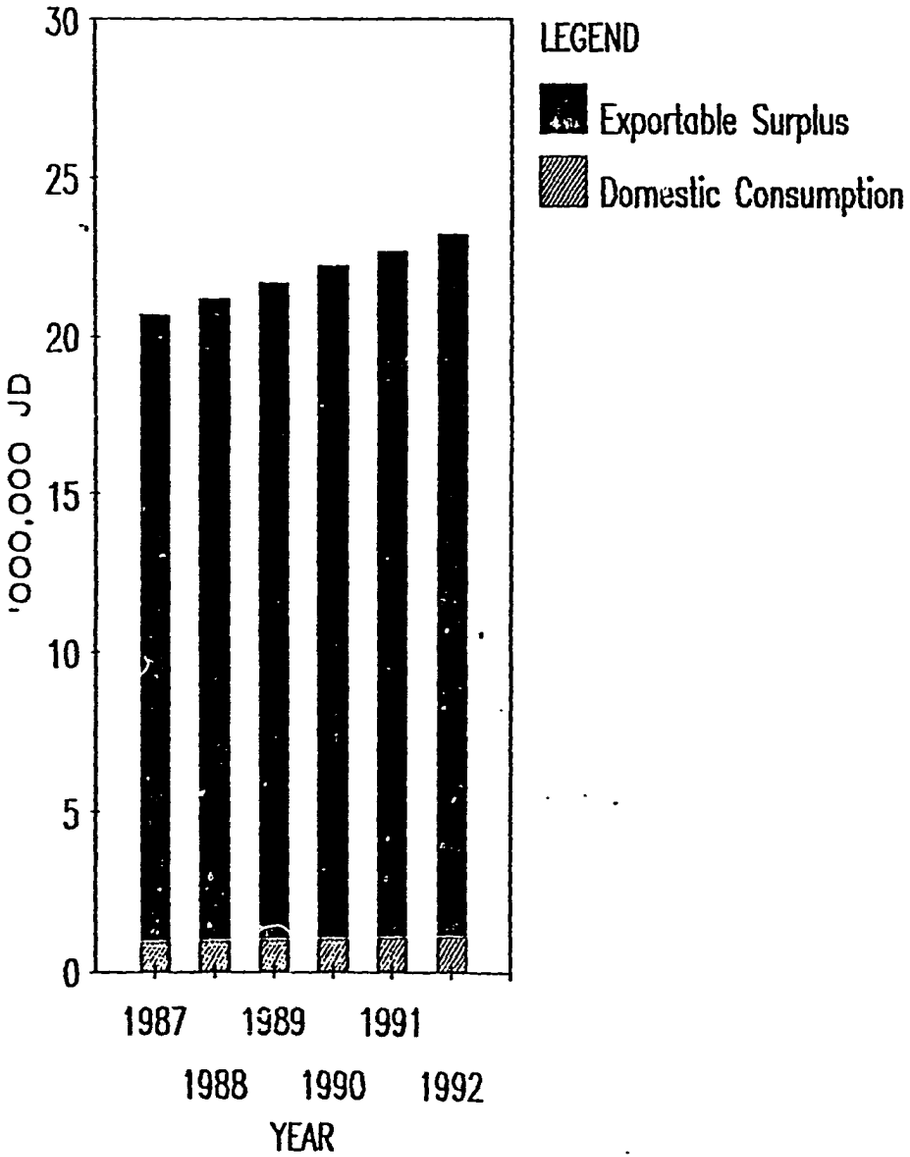
OTHER FRUITS

Projections of Domestic Consumption and Exportable Surplus
High Value



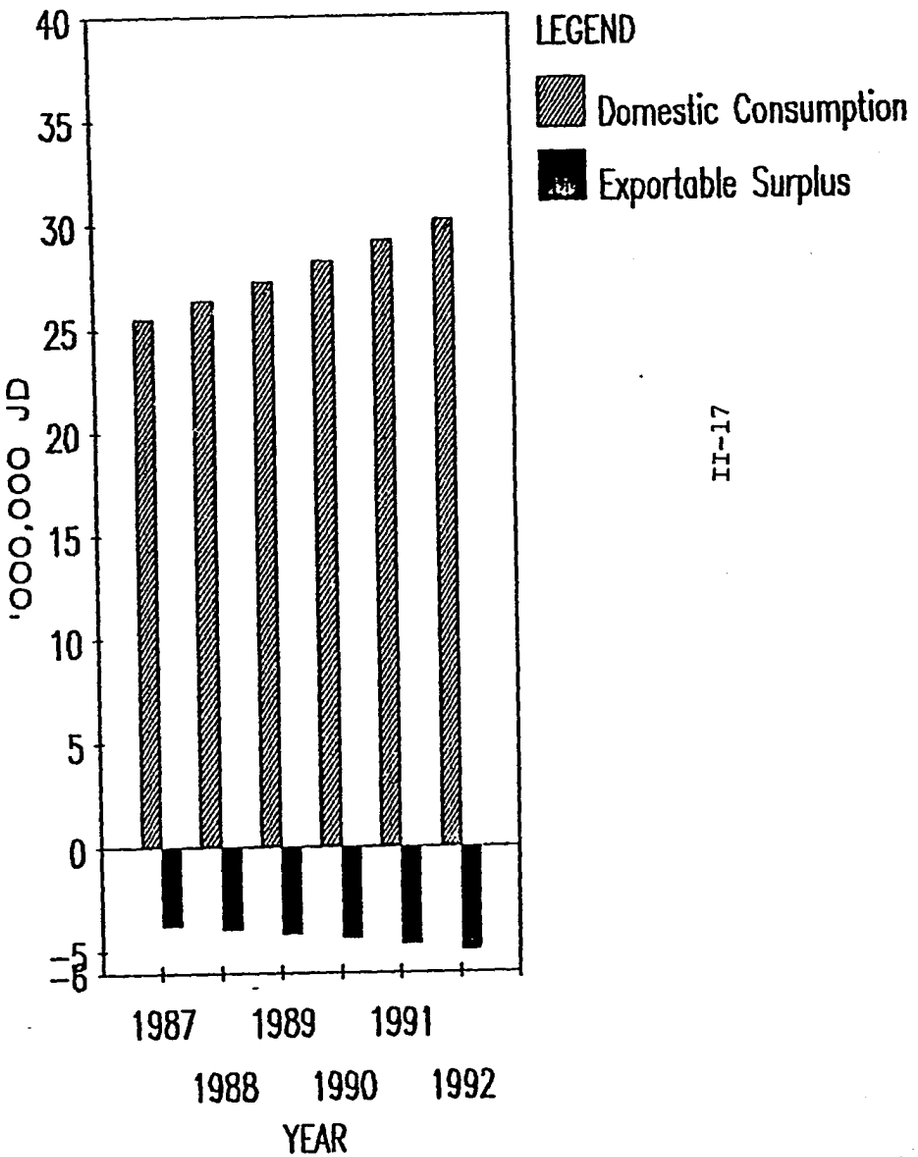
CITRUS

Projections of Domestic Consumption and Exportable Surplus
Low Value



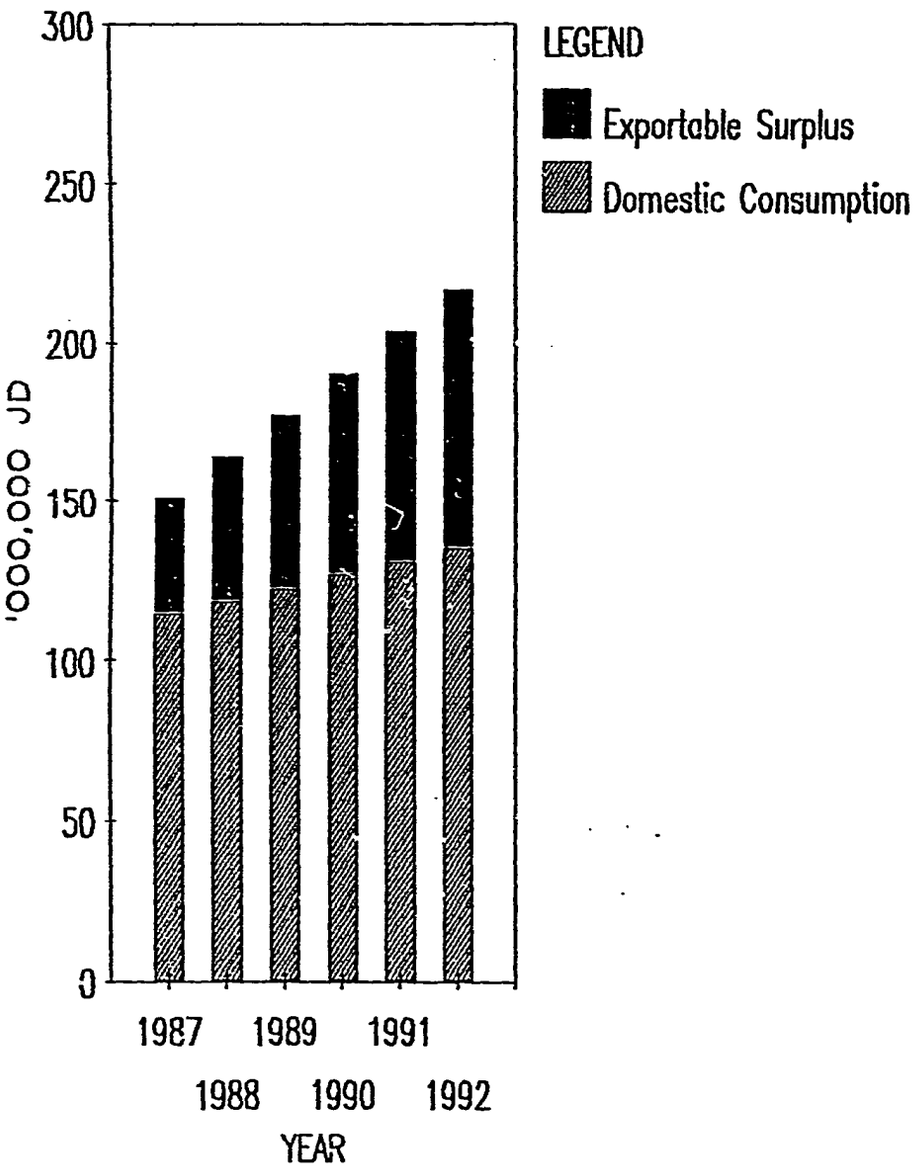
OTHER FRUITS

Projections of Domestic Consumption and Exportable Surplus
Low Value



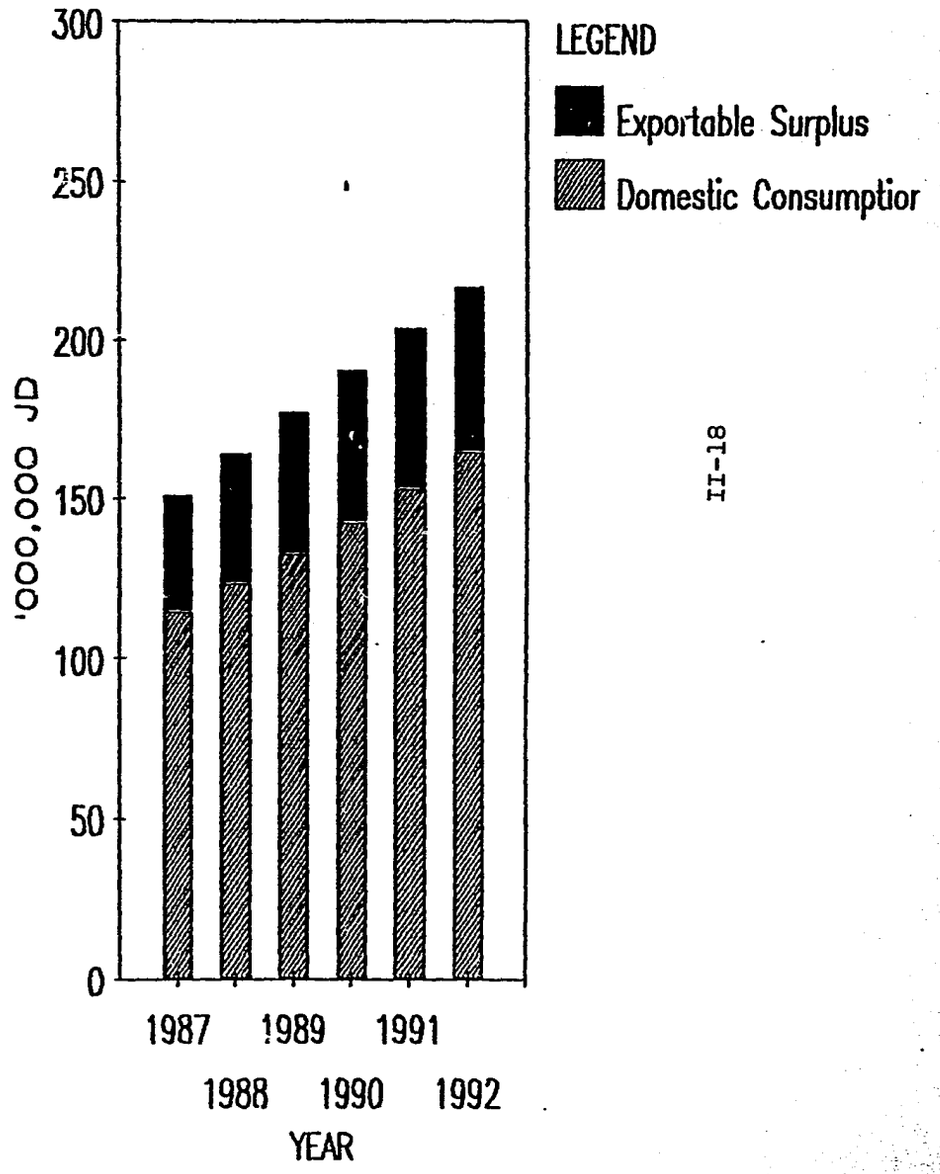
ALL VEGETABLES AND FRUITS COMBINED

Projections of Domestic Consumption and Exportable Surplus
Low Value



ALL VEGETABLES AND FRUITS COMBINED

Projections of Domestic Consumption and Exportable Surplus
High Value



Methodology and Data Sources

Demand

Rate of growth in consumption is calculated as follows: population growth + income elasticity * per capita real income growth.

Per capita real income growth is calculated as follows: GDP or GNP growth minus population growth.

The 4.1% GDP growth is for 1980-1985, and the 5.8% GNP growth is for 1965-1985. Both figures were obtained from the World Bank, World Development Report, 1987.

Demand is assumed to be the difference between production and net exports (i.e., post-harvest as well as marketing losses are not taken into consideration). Base-year (1986) demand is detailed in Table 4.

Value for both demand and supply is in 1986 prices. These prices are provided as Table 1.

Supply

Assumption: supply = production (i.e., post-harvest losses are ignored).

The rate of increase in yields was obtained by regressing yields on a time variable over the period 1974-1986. Since the coefficients were not statistically significant for fruits, average yields over the period 1974-1986 were used for these crops. Detailed yields by crop over the period 1987-1992 are provided as Table 2.

Planned conversion of surface irrigation into pressurized pipe irrigation, as well as new irrigation projects were taken into account (see Table 5 for details).

Conversion is assumed to double the yield.

Since information on conversion and irrigation projects was not available by year, data were averaged for the 1987-1992 period.

The following land use distribution, based on averages for the period 1974-1985, was used:

- vegetable area = fruit area = 50% of total area devoted to fruits and vegetables.

- citrus area = 7% of total area devoted to fruits

- The main vegetable area is 55% of the total area devoted to vegetables and is distributed as follows:

  - 33% for tomatoes;
  - 9% for eggplants;
  - 6% for squash; and
  - 7% for cucumbers.

For details on the base-year and projected area see Table 3.

104

TABLE 1. PRICES (*) USED FOR PROJECTIONS (JD/ton)

FRUITS & VEGETABLES	133.2
VEGETABLES	129.7
MAIN VEGETABLES	129.9
TOMATOES	101.8
EGGPLANT	98.4
SQUASH	146.6
CUCUMBER	192.8
OTHER VEGETABLES	129.4
FRUITS	137.9
CITRUS	133.8
LEMON	136.6
ORANGE	150.9
CLEMENTINE	110.7
OTHER FRUITS	133.1
APPLES	205.2
WATERMELON	97.7
MELON	154.7
PEACHES	397.1
GRAPES	235.1

(*) a. 1986 Amman Wholesale Market prices
b. Prices for aggregate commodities (e.g., main vegetables, other fruits) are weighted by volume.

Source: computations using data from
1. Ministry of Agriculture;
2. Ministry of Supply; and
3. Amman Wholesale Market Report, 1986

110

TABLE 2. YIELDS USED FOR PROJECTIONS (Ton/Dunum)

	1987	1988	1989	1990	1991
MAIN VEGETABLES	2.91	3.04	3.17	3.29	3.42
TOMATOES	3.02	3.17	3.33	3.48	3.63
EGGPLANT	2.82	2.91	3	3.09	3.18
SQUASH	1.74	1.79	1.84	1.89	1.93
CUCUMBER	3.53	3.73	3.94	4.14	4.34
OTHER VEGETABLES	1.69	1.76	1.84	1.91	1.99
CITRUS	2.76	2.76	2.76	2.76	2.76
OTHER FRUITS	0.26	0.26	0.26	0.26	0.26

Source: see Methodology and Data Sources

TABLE 3. BASE-YEAR AND PROJECTED AREA BY CROP (Dunum)

YEAR	TOTAL	VEG.	FRUITS	CITRUS	O.FRUITS	TOMATO	EGGPLANT	SQUASH	CUCUMBER	OTHER VEG.
1986	975681	361715	613966	54165	559801	96420	23817	33758	21602	186118
1987	1035431	391590	643841	56256.25	587584.7	106278.7	26505.75	35550.5	23693.25	199860.5
1988	1050028.	398888.6	710209	60902.01	649306.9	128180.1	32478.87	39532.58	24204.15	230389.7
1989	1064625.	406187.2	776577	65547.77	711029.2	150081.6	38451.99	43514.66	24715.05	260919.0
1990	1079222.	413485.8	842945	70193.53	772751.4	171983.0	44425.11	47496.74	25225.95	291448.3
1991	1093819.	420784.4	909313	74839.29	834473.7	193884.5	50398.23	51478.82	25736.85	321977.6
1992	1108417	428083	975681	79485.05	896195.9	215785.9	56371.35	55460.9	26247.76	352506.9

Source: see Methodology and Data Sources

TABLE 4. BASE-YEAR (1986) DEMAND (ton)

	PRODUCTION	EXPORTS	IMPORTS	NET EXPORTS	DEMAND(*)
MAIN VEGETABLES	459452	193710	0	193710	265742
TOMATOES	305900	98182	0	98182	207718
EGGPLANT	80000	31954	0	31954	48046
SQUASH	51950	19778	0	19778	32172
CUCUMBER	92285	43796	0	43796	48489
OTHER VEGETABLES	402238	88450	37718	50732	351506
CITRUS	108664	102966	1193	101773	6891
OTHER FRUITS	149649	4513	40605	-36092	185741

(*) Demand = production - net exports

Source: Computations using data in Ministry of Agriculture, Directorate of Agricultural Economics & Planning, Annual report 1986.

112

Table 5
Future Irrigation Development Used for Projections:
Conversion of Surface Irrigation into Pressurized Pipe Irrigation,
and New Irrigated Land
(area in Dunum)

Project	Year	Surface Irrig.	Press. Pipe	Total Area
Present Irrigation Area	1986	124,342	103,944	228,286
14.5 KM Extension				
Total area: 59,750 du	1987	124,342	163,694	288,036
Middle Ghors Conversion				
52,574 du conv. 10,620 du new land				
Total area: 63,194 du	1991	7.,768	226,888	298,650
North Ghors Conversion				
55,648 du conv. 5,962 du new land				
Total area: 61,610 du	1992	16,120	288,498	304,618
Adasiya Conversion				
16,120 du conv. 6,234 du new land				
Total area: 22,354 du	1992	0	319,852	310,852
Mukhaibeh Irrigation PR				
Total area: 3,500 du	1992	0	314,352	314,352
Wadi Arab and Qark				
Wadi Arab - 5,940 du Qarn - 12,000 du 17,940 du	1992	0	332,292	332,292
Zor and Sweimeh Land				
Sweimeh Ghor - 17,000 du Qarn - 8,930 du 25,930 du		0	358,222	358,222
Other Area				
Rawda - 2,800 du		0	361,022	361,022
IRRIGATION AREA END OF FIVE-YEAR PLAN			361,022	361,022

Source: The Jordan Valley Authority, The Jordan Valley Development, Amman, February 1987, p. 43.

113

DRAFT-3: JANUARY 8, 1988

Annex III

Estimation of the Comparative Advantage of Jordan in the Production of Tomatoes, Cucumber, Squash, Eggplant, Potatoes and Onions

The domestic resource cost (DRC) approach was used to measure comparative advantage of Jordan in production of fruits and vegetables. The domestic resource cost is essentially a measure of the efficiency of domestic production relative to world markets. For any commodity produced locally, the DRC is calculated as the ratio of the domestic cost of production and the difference between the border price of the commodity and foreign cost of component of producing it.

$$DRC = \frac{\text{Domestic Costs in Shadow Prices per Unit of Output}}{\text{(Border Price of Output)} - \text{Foreign Costs per Unit of Output in Border Prices}}$$

Central to the estimation of DRCs is the concept of border prices. If there are no government interventions which affect domestic prices, world (border) prices for both inputs and outputs should then be very close to domestic prices. Import tariffs, subsidies, unaligned exchange rate, import restrictions and similar policies cause domestic prices to diverge from world (border) prices. To arrive at the true (opportunity) cost of domestic production, domestic input and output prices must be devoid of all policy-created distortions.

The domestic resource cost of producing a commodity indicates the rate at which the country is exchanging domestic resources for each unit of foreign exchange it saves by not importing that commodity. Comparative advantage is estimated by dividing the domestic resource cost by the shadow exchange rate. This ratio is evaluated as follows:

If less than 1 : the country has an advantage
If equal to 1 : the advantage is neutral
If greater than 1 : the country has a disadvantage

If the country is paying in domestic resources more than the foregone exchange it would spend in buying the commodity in the world market, this country is definitely not making a wise decision.

Although comparative advantage is widely used to assess the competitiveness of a country in the production of particular commodities, we consider it important to put these results in the right perspective. One needs to consider first of all that comparative advantage is dynamic. It changes with yield increases, substitution of imported inputs for domestic ones and exogeneous changes in world prices. In this vein, one has to be very careful in asserting that a country should not produce a commodity for which at a particular point in time it does not have a comparative advantage.

The border prices of inputs and outputs are affected by the efficiency with which domestic marketing functions are carried out. If port charges and domestic surface transportation happen to be high, the border price of a commodity at the main selling point in the country will tend to be high too. Changes in these components will alter a country's comparative advantage without there being any substantial changes in its intrinsic productive structure.

The border prices used to gauge comparative advantage may themselves be distorted by subsides (direct and indirect) given by exporting countries. Thus, one cannot blindly use these source-distorted prices to recommend a country whether it should produce a given commodity domestically or should import it.

This brings us to the fact that comparative advantage is not an indicator of the capacity of the country to compete in export markets. A country can have advantage in the production of a commodity but the marketing system can prove unable to profitably move the commodity to potential importing countries. Thus comparative advantage provides clues on the ability of a country to compete in the export market.

If a country lacks a comparative advantage for producing a commodity, the logical conclusion is that it should produce other commodities for which it does have advantage. Subsumed in this conclusion is the assumption that the region where that commodity is produced can produce something else. Yet, it is quite possible that the region, because of resource endowments, does not have other production options, hence comparative advantage is no guide to improve efficiency in the use of the region's resources.

This analysis considers one crop at a time. At the farm, these crops are produced in combination. When produced in a farm system, productivity and complementarities among crops are not captured by the individual crop budgets used here.

In its best sense, comparative advantage is an indicator of how well a country is using its resources given its trade opportunities. It really evaluates domestic production using international prices as the yardstick for comparison.

Comparative Advantage Versus Competitiveness

Because these two concepts are closely related they are often confused. Competitiveness is a price issue. To sell in the international markets a country has to offer its product at a comparable price to that offered by other countries (assuming equivalent quality). Competitiveness can be artificially created by subsides and other means which will allow exporters from one country to offer lower prices than its competitors.

Comparative advantage, on the other hand, says whether a country should be producing a particular commodity when it can import it cheaper. It bespeaks of the intrinsic ability of the country to produce other commodities. These other commodities can be tradeables or non-tradables.

If a country has comparative advantage in the production of a commodity, it means that it produces it cheaper than other countries can produce and export it. In this sense, such a country can have comparative advantage but, nonetheless, still not be competitive in the international markets. As mentioned before, if in the country in question marketing functions are performed at a high cost, competitiveness can be obliterated.

In a nutshell comparative advantage is a necessary but not sufficient condition for export competitiveness and it should be interpreted this way.

Sources and Limitations of the Data Used

Cost of Production Data

The crop budgets used in this analysis came all from secondary sources. These budgets are national averages although it would have been preferable to distinguish different production systems (drip irrigation, surface irrigation, sprinkler, rainfed) as well as regions.

In line with the general focus of this study tomatoes, cucumber, squash and eggplant were given preeminence. Potatoes and onions were included because of the emphasis they have been receiving as import substitution crops.

The crop budgets used in the analysis were gathered through sample survey by the primary source. That is, they are not based on recommended technical packages as has been the case of studies on this same topic recently conducted for other countries. The main sources are the Jordan Valley Agricultural Services Project (identified in the tables as JVASP), the Arab Organization for Agricultural Development (identified as AOAD), the German Technical Assistance Agency (GTZ). Each of these organizations collected information for different cropping seasons. The cost of production data according to source is provided in appendix A.

It was not possible to assess the consistency of the cost components of the different sources. It is very likely that each source included quite disparate elements within each cost component. Nor did we have access to the sampling methodology and other indicators of the reliability of the sample figures available.

Commodity Border Prices

Jordan does not normally import tomatoes, cucumber, squash and eggplant. Import of these commodities is prohibited by law. To be able to assess Jordan's comparative advantage we had to estimate what it would cost to import these commodities from countries that produce and export them. The export volume and its value in US Dollars were obtained from the Market Information Division of the Food and Agriculture Organization (FAO). From these two pieces of data the FOB price for the various commodities at the country of origin was estimated (appendix B).

The total lack of quality reference in the FOB price used is the most obvious limitation of this data. It is clear from appendix B that for all commodities listed, Jordan has the lowest FOB prices. Although it is commonly accepted that Jordanian vegetables are of lower quality, it is impossible to gauge a discount factor in price which will make them comparable.

We did not have reliable information on air and land transport cost for vegetables from the producing countries to Jordan. Many assumptions could be made on this respect. To avoid introducing too many complicating factors in the estimation of comparative advantage, we decided to compare the FOB price at the country of origin with Jordan's cost of production. The failure to add to the FOB price of potential imports the cost of transport --point of origin to Aqaba--, port handling and local transport (which would have raised this price) was made up by not correcting the price of Jordanian produce downward to account for lower quality.

Corrections Used to Estimate Economic Prices

LABOR

The labor market in Jordan is relatively free. Immigration is possible but controlled. The most important feature of the market is the absence of unions and the non-existence of minimum wage legislation. In 1983 there were 66.3 thousand hired laborers in Jordan who supplied a total of 29 thousand man years of work. Sixty percent of the hired laborers are non-Jordanians with 90 percent of them coming from Egypt. They are most likely found in intensive agriculture such as citrus, greenhouse agriculture, dairy and poultry.

No corrections were made on the financial cost of labor to arrive at its economic cost. Under present conditions laborers must be paid very close to their marginal value product. Based on the composition of the labor force, Sixty percent (60%) of the cost of labor was assumed to be foreign. The balance was taken to be domestic component.

WATER

The government cost to supply irrigation water has always been a contended point in the calculation of the true cost of production of agricultural commodities in Jordan. In a recent report by the World Bank in 1986 the possibilities of increasing agroindustrial production was dismissed on account of the heavy subsidy that irrigation water was receiving.

More recently in a study by Nippon Koei Co. Ltd. Consulting Engineers from Tokyo, Japan, the estimation of revenues from a project for Mujib and Souther Ghors concluded that on a charge of 3 fils per cubic meter for irrigation water and 400 fils per cubic meter for industrial water the revenues were insufficient to cover operation and maintenance as well as repayment of the construction cost of the project. Two alternatives were contemplated. The first one was to make the cost of irrigation water equal to

50 fils per cubic meter which will prove enough to cover operation and maintenance costs. The second alternative was to make these charges equal to 140 fils per cubic meter in order to cover capital cost as well as operation and maintenance. It is important to emphasize that these calculations are based on completely new investment at 1987 prices.

For existing systems the Jordan Valley Authority has calculated the water charges which will be necessary to operate the systems on a sounder financial basis. They estimate that between 1973 and 1980 the total cost of irrigation projects including design, construction and supervision is around 65 million JD. Assuming project life of 30 to 50 years a figure for annual capital recovery was estimated using interest rates from 3 to 10 percent.

The average annual cost for operation and maintenance for all irrigation projects between 1982 and 1985 amounted to 2.553 million JD. Similarly, around 150 million cubic meters of water are sold in the Jordan Valley Region and 40 million cubic meters in the Southern Ghor. As a result, to cover operation and maintenance on the existing systems in these areas a cubic meter of water must be sold at 13.44 fils.

To calculate the charge which is necessary to recover the capital investment cost, the annualized capital cost was divided by the amount of water sold in the Valley and in the Southern Ghor as indicated in the previous paragraph. At an interest rate of 3 per cent and with a life project life of 50 years, 16.63 fils per cubic meter of water must be charged to recover capital cost. With project life of 30 years and the same interest rate this charge should be 21.83 fils per cubic meter.

In summary, to recover the operation and maintenance costs of irrigation infrastructure water should be priced at around 13.5 fils per cubic meter. To include recovery for capital investment the charge of water should be in the neighborhood of 30 fils per cubic meter. Since farmers presently pay 3 fils per cubic meter the subsidy extended by the government to water

users is 10.5 fils if operation and maintenance costs only are included. The subsidy increases to 27 fils per cubic meter when capital recovery is included.

Thus, for the purpose of reflecting the economic price of water in our calculations of comparative advantage the cost of water in the crop budgets was based on a subsidy of 10.5 fils. Using the higher subsidy of 27 fils would still not invalidate the basic conclusions reached.

FERTILIZER

As explained in the input supply policies, there are no binding quantitative controls on chemical fertilizers and the marketing of the same is mostly in private hands. The same applies to organic fertilizer.

Despite there being a small number of important agricultural input distributors, the market is quite competitive. We were able to independently estimate the marketing margin charged by fertilizer distributors. Using custom returns to derive the import price of fertilizer and retail prices as indicators of prices charged to farmers, we were able to conclude that marketing margins are narrow (see table next page). This same information was used to break down the cost of production into its domestic and foreign components.

All agricultural inputs are exempt from custom duties. They are charged, however, a 7.2% fee which is levied on all imports (not only agricultural imports) not assessed a specific duty. This fee represents the most important correction effected on fertilizer cost to arrive at its border price.

INTEREST RATE

Agriculture has access to financial resources at a subsidized interest rate. Agricultural loans pay 8.75% when the going market rate is around 10.5% for comparable activities. This subsidy of 1.75% was added back

to the interest cost component of the financial cost of production in order to arrive at its economic cost.

SEEDS

Vegetable seeds carry a brand name. It was thus not possible to exactly estimate marketing margins with the same accuracy as was done for fertilizers. This kind of analysis would have required access to confidential business data which distributors are rightly reluctant to make available. We thus used the same correction factors as those used for fertilizers in order to convert financial prices into border prices.

PROTECTION

This heading in the cost of production data generally includes pesticides, fungicides and similar chemicals. The approach as described for seeds was used to estimate the economic price of this cost item.

MACHINERY AND EQUIPMENT

The same correction factor as for fertilizer was used for this cost category.

FOREIGN AND DOMESTIC COSTS

The following table summarizes the parameters used to break down the cost of production into its foreign and domestic components.

RESULTS

Production of tomatoes, cucumber, squash, eggplant, potatoes and onions makes efficient use of domestic resources even under the various sources of data considered here (appendix C). Based on these data sources and using an exchange rate of one US Dollar equivalent to .343 Jordanian Dinars, Jordan does have a comparative advantage in production of the vegetables listed above.

Estimated C.I.F. Aqaba Jordan for selected fertilizers (JD/Ton)

Fertilizer	1980	1981	1982	1983	1984	1985	1986
Ammonium Sulphate		55.1	83.5	81.4	47.4	48.3	41.2
Supper Phosphate	71.0	90.6	42.7	54.1	63.8	64.7	58.5
Urea		80.3	79.1	56.0	66.4	72.7	46.1
Pesticides							
Weed and Fungicide	1287.6	1455.8	1200.2	1511.0	1807.2	1998.2	2066.0
All other kinds		996.3	965.2	769.0	1028.3	1310.1	n/a

Border Prices of Fertilizer 1986

	C.I.F. Price
Amonium Sulphate	41.2
Import Tariff	3.0
Inland Transport	7.0
Marketing margin	3.8
Average Retail Price	55.0
Foreign Component (%)	74.9%
Untaxed Price	52.0
Correction Factor (for cost of Production)	0.95

Border Prices of Fertilizer 1986

	C.I.F. Price
Super Phosphate	58.5
Import Tariff	4.2
Inland Transport	7.0
Marketing margin	5.3
Average Retail Price	75.0
Foreign Component (%)	78.0%
Untaxed Price	70.8
Correction Factor (for cost of Production)	0.94

Border Prices of Fertilizer 1986

	C.I.F. Price
Urea	46.7
Import Tariff	3.4
Inland Transport	7.0
Marketing margin	0.9
Average Retail Price	58.0
Foreign Component (%)	80.5%
Untaxed Price	54.6
Correction Factor (for cost of Production)	0.94

Average Foreign Component 77.81%

Average Correction Factor 94.40%

124

Parameters for calculating Economic costs and foreign/local components

	Correction factor for economic cost	Percent of costs foreign	local
Seeds	94.4	85	15
Seedlings	1	0	100
Organic Fertilizer	1	0	100
Chemical Fertilizer	94.4	77.81	22.19
Protection	94.4	77.81	22.19
Water	(3/13.5)	85	15
Mulch and Dip.	94.4	85	15
Labor (Mechanical and Manual)	1	60	40
Interest	(8.75/10.5)	0	100
Machinery and Equipment	94.4	77.81	22.19
Miscellaneous	1	0	100
Land Rent	1	0	100

125

Summary of Resource Cost Ratios for Selected
Vegetables based on Cost of Production
Data from Various Sources.

	JVASP 84/85	AOAD 1985 Surface Irrigation Nth & Mid	Surface Irrigation Sth	Surface Irrigation Hglnds	Drip Irrigation Nth & Mid	Drip Irrigation Sth	Drip Irrigation Hglnds	GTZ-1986 Low Level	GTZ-1986 High Level	JVASP 86/87
Tomatoes										
Border price US $204	0.073	0.147	0.185	0.152	0.118	0.117	0.093	0.088	0.137	0.105
Eggplant										
Border price US $180	0.076	0.101	0.173	0.291	0.132	0.165	0.122	0.114	0.160	0.147
Squash										
Border Price US $153	0.271	0.312	-	0.393	0.280	-	0.202	0.078	0.139	0.136
Cucumber										
Border Price US $269	0.135	0.263	-	0.152	0.244	0.255	0.138	0.112	0.136	0.090
Potatoes										
Border Price US $155	0.165	0.289	-	0.224	-	-	-	0.155	0.149	0.151
Onions										
Border Price US $132	0.102	0.546	-	-	-	-	-	-	-	-

126

Appendix A

Cost of Production Data

127

TOMATOES

COST OF PRODUCTION IN JORDANIAN DINARS (JDs) FOR 1984/85 - 1986/87 FROM VARIOUS SOURCES

	JVASP 84/85	AOAD - 1985 SURFACE IRRIGATION			DRIP IRRIGATION			GTZ - 1986		JVASP 86/87
	Open Field	Nth & Mid	Sth	Hglnds	Nth & Mid	Sth	Hglnds	LOW LEVEL	HIGH LEVEL	Open Field
Production Requisites	114.300	30.900	14.740	50.730	91.430	70.880	85.360	56.600	151.600	73.000
Seed (gm)		2.820	3.130	2.800	11.850	4.000	3.890	3.000	3.000	
Seedlings (No.)	15.000	0.000	0.000	0.000	0.000	0.000	0.000		7.500	10.800
Org. Fert. (cub. mts)	5.500	2.900	2.450	2.710	20.890	8.400	10.720	27.000	54.000	25.200
Chemical Fert. (Kg)	16.700	16.180	4.030	12.110	12.740	13.070	11.600	13.800	63.600	9.000
Protection	71.150	6.390	2.520	5.510	11.800	10.130	9.540	8.000	10.000	16.000
Water (cub. met)	5.950	2.610	2.610	27.600	1.310	1.570	16.560	4.800	3.000	12.000
Mulch and Dep.		0.000	0.000	0.000	32.840	33.710	33.050		10.500	
Mech. Labor	2.000	5.100	3.570	4.840	7.520	5.510	8.010	2.000	2.000	5.000
Land Prep.	2.000	3.120	3.300	3.640	4.100	3.440	4.930	2.000	2.000	5.000
Husbandry		1.980	0.270	1.200	3.420	2.070	3.080			
Manual Labor	80.000	31.570	19.290	30.400	35.190	29.650	28.600	37.000	46.000	27.400
Land Prep.	1.000	1.460	2.220	3.050	5.180	3.440	5.920	1.000	1.000	
Sowing	3.000	2.440	2.070	2.060	3.140	2.070	2.740			2.400
Husbandry	31.000	15.130	10.600	13.220	11.090	10.240	8.140			10.000
Harvesting	45.000	12.540	4.400	12.070	15.780	13.900	11.800	36.000	45.000	15.000
Interest		2.700	1.500	3.440	5.370	4.230	4.880			
Machinery & Equip.										20.000
Miscellaneous								9.600	19.900	
Land Rent		31.000	26.000	34.400	31.000	26.000	34.400			20.000
I:Production Cost	196.300	101.270	65.100	123.810	170.510	136.270	161.250	105.200	219.500	125.400
Marketing	148.500	58.840	29.130	61.590	101.880	85.920	121.560	0.000	0.000	86.072
Packages	148.500	31.090	12.930	31.600	50.070	47.030	69.660			55.440
Transport		8.900	5.200	12.000	16.600	12.500	20.800			15.400
Commission		18.850	11.000	17.990	35.210	26.390	31.100			15.232
II:Prodtn. & Mktng Cost	344.800	160.110	94.230	185.400	272.390	222.190	282.810	105.200	219.500	211.472
Avg. Yield (Tons)	5.400	2.049	1.196	2.768	3.827	2.866	4.785	3.500	4.500	4.000
Prdtn. Cost(I)/Ton	36.352	49.424	54.431	44.729	44.554	47.514	33.699	30.057	48.778	31.350
Prodtn&Mktng Cost(II)/Ton	63.852	78.141	78.788	66.980	71.176	77.472	59.103	30.057	48.778	52.868
III:Prdtn.Cost w/o Int&Lnd	196.300	67.570	37.600	85.970	134.140	106.040	121.970	95.600	199.600	85.400
Var. Cost (III)/Ton	36.352	32.977	31.438	31.059	35.051	36.974	25.490	27.314	44.356	21.350

128

EGGPLANT

COST OF PRODUCTION IN JORDANIAN DINARS (JDs) FOR 1984/85 - 1986/87 FROM VARIOUS SOURCES

	JVASP 84/85	AOAD - 1985 SURFACE IRRIGATION			DRIP IRRIGATION			GTZ - 1986		JVASP 86/87
	Open Field	Nth & Mid	Sth	Hglnds	Nth & Mid	Sth	Hglnds	LOW LEVEL	HIGH LEVEL	Open Field
Production Requisites	32.250	31.700	12.050	50.690	83.360	78.920	92.370	62.600	125.400	70.700
Seed (gm)	1.600	2.230	[illegible]		9.780		2.500	10.000	10.000	
Seedlings (No.)				3.120		4.530			12.000	12.500
Org. Fert. (cub. mts)	10.000	3.470	1.03[illegible]		28.330	13.340	11.250	27.000	54.000	25.200
Chemical Fert. (Kg)	10.250	15.640	2.790	10.620	10.820	12.610	15.630	12.800	25.900	9.000
Protection	7.400	7.180	3.080	7.050	9.520	12.820	12.000	8.000	10.000	12.000
Water (cub. met)	3.000	3.180	3.180	29.900	1.590	1.910	17.940	4.800	3.000	12.000
Mulch and Dep.					23.320	33.710	33.050		10.500	
Mech. Labor	3.000	5.840	3.510	6.700	7.300	6.590	5.000	2.000	2.000	5.000
Land Prep.	3.000	3.460	2.210	5.000	3.420	4.890	4.000	2.000	2.000	5.000
Husbandry		2.380	1.300	1.700	3.880	1.700	1.000			
Manual Labor	38.700	36.360	22.220	35.090	41.290	23.440	38.330	31.000	37.000	33.900
Land Prep.	1.000	2.430	2.320	3.000	4.760	3.320	9.380	1.000	1.000	
Sowing	5.950	2.320	1.450	2.000	2.640	1.910	3.130			2.400
Husbandry	25.500	19.690	12.520	18.950	12.990	9.720	10.440			13.500
Harvesting	6.250	11.920	5.930	11.140	20.900	8.490	15.380	30.000	36.000	18.000
Interest		2.960	1.510	3.700	5.280	4.360	5.400			
Machinery & Equip.										20.000
Miscellaneous								9.600	16.400	
Land Rent		31.000	26.000	34.400	31.000	26.000	34.400			25.000
I:Production Cost	73.950	107.860	65.290	130.580	168.230	139.310	175.500	105.200	180.800	134.600
Marketing	14.530	90.920	46.320	50.870	131.880	80.020	138.300	0.000	0.000	128.700
Packages	14.530	41.120	26.050	24.620	73.190	43.340	75.000			81.000
Transport		23.600	9.600	12.400	27.800	17.400	30.000			22.500
Commission		26.200	10.670	13.850	30.890	19.280	33.300			25.200
II:Prodtn. & Mktng Cost	88.480	198.780	111.610	181.450	300.110	219.330	313.800	105.200	180.800	263.300
Avg. Yield (Tons)	2.500	3.540	1.442	1.871	4.174	2.605	4.500	3.000	4.000	3.600
Prdtn. Cost(I)/Ton	29.580	30.469	45.277	69.792	40.304	53.478	39.000	35.067	45.200	37.389
Prodtn&Mktng Cost(II)/Ton	35.392	56.153	77.399	96.980	71.900	84.196	69.733	35.067	45.200	73.139
III:Prdtn.Cost w/o Int&Lnd	73.950	73.900	37.780	92.480	131.950	108.950	135.700	95.600	164.400	89.600
Var. Cost (III)/Ton	29.580	20.876	26.200	49.428	31.612	41.823	30.156	31.867	41.100	24.889

129

SQUASH

COST OF PRODUCTION IN JORDANIAN DINARS (JDs) FOR 1984/85 - 1986/87 FROM VARIOUS SOURCES

	JVASP 84/85	AOAD - 1985 SURFACE IRRIGATION			DRIP IRRIGATION			GTZ - 1986 LOW	HIGH	JVASP 86/87
	Open Field	Nth & Mid	Sth	Hglnds	Nth & Mid	Sth	Hglnds	LEVEL	LEVEL	Open Field
Production Requisites	50.420	27.240		42.930	82.750		65.370	19.000	56.800	53.400
Seed (gm)	10.500	6.900		8.420	9.130		5.200	6.500	6.500	12.000
Seedlings (No.)									16.000	
Org. Fert. (cub. mts)	15.000	2.470		5.560	24.960		7.560			8.400
Chemical Fert. (Kg)	20.400	9.250		8.920	6.790		8.960	5.500	17.500	9.000
Protection	3.320	7.420		8.530	8.190		3.700	4.000	4.500	12.000
Water (cub. met)	1.200	1.200		11.500	0.840		6.900	3.000	1.800	12.000
Mulch and Dep.					32.840		33.050		10.500	
Mech. Labor	3.000	4.940		5.850	4.950		4.380	2.000	2.000	5.000
Land Prep.	3.000	3.020		4.550	4.200		2.680	2.000	2.000	5.000
Husbandry		1.920		1.300	0.750		1.700			
Manual Labor	42.700	23.100		35.290	27.300		30.390	25.000	28.000	19.800
Land Prep.	1.000	1.490		3.310	4.400		4.590	1.000	1.000	
Sowing	4.200	1.940		1.960	3.060		2.280			2.400
Husbandry	22.500	10.690		16.540	9.140		5.520			9.900
Harvesting	15.000	8.980		13.480	10.700		18.000	24.000	27.000	7.500
Interest		2.110		3.360	4.600		4.060			
Machinery & Equip.										19.000
Miscellaneous								4.600	8.700	
Land Rent		31.000		34.400	31.000		34.400			10.000
I:Production Cost	96.120	88.390		121.830	150.600		138.600	50.600	95.500	88.200
Marketing	11.380	41.280		53.600	67.530		93.470	0.000	0.000	59.257
Packages	11.380	20.140		29.180	29.760		52.220			33.840
Transport		6.600		9.700	11.800		14.400			9.400
Commission		14.540		14.720	25.970		26.850			16.017
II:Prodtn. & Mktng Cost	107.500	129.670		175.430	218.130		232.070	50.600	95.500	147.457
Avg. Yield (Tons)	1.120	1.194		1.421	2.132		2.592	1.800	2.250	2.250
Prdtn. Cost(I)/Ton	85.821	74.028		85.735	70.638		53.472	28.111	42.444	39.200
Prodtn&Mktng Cost(II)/Ton	95.982	108.601		123.455	102.312		89.533	28.111	42.444	65.536
III:Prdtn.Cost w/o Int&Lnd	96.120	55.280		84.070	115.000		100.140	46.000	86.800	59.200
Var. Cost (III)/Ton	85.821	46.298		59.163	53.940		38.634	25.556	38.578	26.311

CUCUMBERS

COST OF PRODUCTION IN JORDANIAN DINARS (JDs) FOR 1984/85 - 1986/87 FROM VARIOUS SOURCES

	JVASP 84/85	AOAD - 1985						GTZ - 1986		JVASP 86/87
		SURFACE IRRIGATION			DRIP IRRIGATION			LOW	HIGH	
	Open Field	Nth & Mid	Sth	Hglnds	Nth & Mid	Sth	Hglnds	LEVEL	LEVEL	Open Field
Production Requisites	52.090	23.960		36.750	88.420	96.520	84.720	60.600	101.200	63.400
Seed (gm)	7.650	6.600		3.180	7.100	6.750	7.310	6.000	6.000	9.000
Seedlings (No.)									20.000	
Org. Fert. (cub. mts)	15.000	2.980		2.140	27.500	30.000	16.000	27.000	27.000	8.400
Chemical Fert. (Kg)	18.450	9.060		13.110	9.160	13.250	11.960	16.600	25.900	9.000
Protection	9.790	4.120		6.820	11.100	12.750	9.500	8.000	10.000	12.000
Water (cub. met)	1.200	1.200		11.500	0.720	0.720	6.900	3.000	1.800	25.000
Mulch and Dep.					32.840	33.050	33.050		10.500	
Mech. Labor	3.000	4.350		5.020	5.730	1.200	5.980	2.000	2.000	5.000
Land Prep.	3.000	2.980		4.120	3.930		3.810	2.000	2.000	5.000
Husbandry		1.370		0.900	1.800	1.200	2.170			
Manual Labor	40.900	20.210		23.580	23.410	36.550	28.330	31.000	37.000	16.500
Land Prep.	1.000	0.920		1.250	4.310	8.500	4.710	1.000	1.000	
Sowing	4.200	2.420		2.610	3.460	2.500	2.160			3.000
Husbandry	22.400	11.640		10.610	5.740	8.300	7.920			6.000
Harvesting	13.300	5.230		9.110	9.900	17.250	13.540	30.000	36.000	7.500
Interest		1.940		2.610	4.700	10.740	4.760			
Machinery & Equip.										18.000
Miscellaneous								9.400	14.000	
Land Rent		31.000		34.400	31.000	26.000	34.400			4.500
I:Production Cost	95.990	81.460		102.360	153.260	171.010	158.190	103.000	154.200	89.400
Marketing	12.060	28.230		42.470	53.270	55.880	89.630	0.000	0.000	58.830
Packages	12.060	12.010		18.210	24.250	25.000	39.380			29.880
Transport		4.200		6.500	7.800	8.300	13.400			8.300
Commission		12.020		17.760	21.220	22.580	36.850			20.650
II:Prodtn. & Mktng Cost	108.050	109.690		144.830	206.530	226.890	247.820	103.000	154.200	148.230
Avg. Yield (Tons)	1.200	0.763		1.664	1.410	1.500	2.415	2.000	2.500	2.000
Prdtn. Cost(I)/Ton	79.992	106.763		61.514	108.695	114.007	65.503	51.500	61.680	44.700
Prodtn&Mktng Cost(II)/Ton	90.042	143.761		87.037	146.475	151.260	102.617	51.500	61.680	74.115
III:Prdtn.Cost w/o Int&Lnd	95.990	48.520		65.350	117.560	134.270	119.030	93.600	140.200	66.900
Var. Cost (III)/Ton	79.992	63.591		39.273	83.376	89.513	49.288	46.800	56.080	33.450

131

POTATOES

COST OF PRODUCTION IN JORDANIAN DINARS (JDs) FOR 1984/85 - 1986/87 FROM VARIOUS SOURCES

	JVASP 84/85	AOAD - 1985 SURFACE IRRIGATION			AOAD - 1985 DRIP IRRIGATION			GTZ - 1986		JVASP 86/87
	Open Field	Nth & Mid	Sth	Hglnds	Nth & Mid	Sth	Hglnds	LOW LEVEL	HIGH LEVEL	Open Field
Production Requisites	115.530	102.980		97.660				82.600	107.600	99.400
Seed (gm)	85.750	65.900		58.640				36.000	48.000	60.000
Seedlings (No.)										
Org. Fert. (cub. mts)	5.800	14.450		5.210				27.000	27.000	8.400
Chemical Fert. (Kg)	19.380	15.220		18.300				11.200	23.100	9.000
Protection	3.340	5.970		1.710				6.000	8.000	10.000
Water (cub. met)	1.260	1.440		13.800				2.400	1.500	12.000
Mulch and Dep.										
Mech. Labor	3.000	6.570		4.600				2.000	2.000	4.000
Land Prep.	3.000	3.820		4.350				2.000	2.000	4.000
Husbandry		2.750		0.250						
Manual Labor	57.950	28.280		29.670				19.000	22.000	26.100
Land Prep.	1.000	2.170		2.250				1.000	1.000	
Sowing	9.450	2.030		3.380						6.000
Husbandry	29.500	11.920		11.710						9.900
Harvesting	18.000	12.160		12.330				18.000	21.000	10.200
Interest		5.510		5.250						
Machinery & Equip.										17.000
Miscellaneous								10.400	13.200	
Land Rent		31.000		34.400						10.000
I:Production Cost	176.480	174.340		171.580				114.000	144.800	156.500
Marketing	17.500	46.460		54.080				0.000	0.000	27.028
Packages	17.500	12.600		10.690						4.000
Transport		13.580		17.790						6.000
Commission		20.280		25.600						17.028
II:Prodtn. & Mktng Cost	193.980	220.800		225.660				114.000	144.800	183.528
Avg. Yield (Tons)	2.200	2.036		2.668				2.500	3.000	2.500
Prdtn. Cost(I)/Ton	80.218	85.629		64.310				45.600	48.267	62.600
Prodtn&Mktng Cost(II)/Ton	88.173	108.448		84.580				45.600	48.267	73.411
III:Prdtn.Cost w/o Int&Lnd	176.480	137.830		131.930				103.600	131.600	129.500
Var. Cost (III)/Ton	80.218	67.696		49.449				41.440	43.867	51.800

132

ONION

COST OF PRODUCTION IN JORDANIAN DINARS (JDs) FOR 1084/85 - 1986/87 FROM VARIOUS SOURCES

	JVASP 84/85	AOAD - 1985						GTZ - 1986		JVASP 86/87
		SURFACE IRRIGATION			DRIP IRRIGATION			LOW	HIGH	
	Open Field	Nth & Mid	Sth	Hglnds	Nth & Mid	Sth	Hglnds	LEVEL	LEVEL	Open Field
Production Requisites	30.260	21.880								
Seed (gm)	9.000	5.770								
Seedlings (No.)										
Org. Fert. (cub. mts)	0.800	1.340								
Chemical Fert. (Kg)	16.540	8.580								
Protection	0.420	4.940								
Water (cub. met)	3.500	1.250								
Mulch and Dep.										
Mech. Labor	3.000	4.580								
Land Prep.	3.000	3.400								
Husbandry		1.180								
Manual Labor	44.950	30.030								
Land Prep.	1.000	3.630								
Sowing	10.500	7.910								
Husbandry	25.750	10.310								
Harvesting	7.700	8.180								
Interest		2.260								
Machinery & Equip.										
Miscellaneous										
Land Rent		31.000								
I:Production Cost	78.210	89.750								
Marketing	7.700	17.900								
Packages	7.700	3.550								
Transport		8.400								
Commission		5.950								
II:Prodtn. & Mktng Cost	85.910	107.650								
Avg. Yield (Tons)	2.200	0.850								
Prdtn. Cost(I)/Ton	35.550	105.588								
Prodtn&Mktng Cost(II)/Ton	39.050	126.647								
III:Prdtn.Cost w/o Int&Lnd	78.210	56.490								
Var. Cost (III)/Ton	35.550	66.459								

Appendix B

International Prices of Selected Commodities

F.O.B. PRICE OF SELECTED COMMODITIES FOR COUNTRIES THAT COMPETE WITH JORDAN

TOMATOES

	CYPRUS	EGYPT	GAZA STRP	JORDAN	MOROCCO	TURKEY	OMAN
1980	$891	$479	$272	$171	$655	$268	$385
1981	$899	$493	$210	$197	$486	$255	
1982	$803	$496	$253	$137	$454	$180	$417
1983	$866	$424	$238	$132	$473	$199	$538
1984	$472	$312	$183	$126	$359	$208	$488
1985	$815	$256	$148	$125	$340	$191	$460
1986	$719	$400	$200	$133	$427	$201	$310
AVG 80-86 (UNWEIGHT)	$781	$409	$215	$146	$456	$215	$433
AVG 80-86 (WEIGHTED)	$763	$384	$204	$149	$456	$204	$425

SQUASH

	CYPRUS	IRAQ	JORDAN	MOROCCO
1980	$732	$152	$154	$471
1981	$593	$145	$145	$393
1982	$585	$152	$146	$400
1983	$507	$150	$132	$318
1984	$520	$156	$139	$209
1985	$471	$158	$132	$264
1986	$668	$156	$148	$340
AVG 80-86 (UNWEIGHT)	$582	$153	$142	$342
AVG 80-86 (WEIGHTED)	$585	$153	$142	$389

CUCUMBERS

	CYPRUS	GAZA STRP	IRAQ	JORDAN
1980	$894	$487	$222	$130
1981	$757	$393	$250	$137
1982	$792	$276	$263	$145
1983	$760	$299	$275	$138
1984	$670	$261	$286	$138
1985	$619	$250	$286	$131
1986	$729	$250	$286	$147
AVG 80-86 (UNWEIGHT)	$746	$317	$267	$138
AVG 80-86 (WEIGHTED)	$741	$359	$269	$138

135

F.O.B. PRICE OF SELECTED COMMODITIES FOR COUNTRIES THAT COMPETE WITH JORDAN (Cont.)

EGGPLANTS

	GAZA STRP	IRAQ	JORDAN	TURKEY
1980	$334	$162	$154	$317
1981	$244	$169	$148	$234
1982	$229	$179	$141	$275
1983	$248	$186	$123	$334
1984	$277	$187	$124	$308
1985	$280	$187	$116	$255
1986	$280	$191	$132	$333
AVG 80-86 (UNWEIGHT)	$270	$180	$134	$294
AVG 80-86 (WEIGHTED)	$258	$180	$134	$287

POTATOES

	CYPRUS	EGYPT	GAZA STRP	JORDAN	MOROCCO	TURKEY	SYRIA
1980	$222	$226	$303	$256	$349	$189	$416
1981	$242	$266	$300	$227	$209	$233	$281
1982	$287	$271	$229	$230	$336	$148	$288
1983	$144	$219	$327	$223	$402	$130	$257
1984	$296	$276	$382	$170	$275	$149	$253
1985	$172	$211	$333	$161	$281	$154	$286
1986	$274	$225	$360	$170	$278	$142	$267
AVG 80-86 (UNWEIGHT)	$234	$242	$319	$206	$304	$164	$293
AVG 80-86 (WEIGHTED)	$238	$242	$339	$205	$302	$155	$275

ONIONS

	CYPRUS	EGYPT	GAZA STRP	JORDAN	TURKEY	SYRIA
1980	$899	$277		$199	$207	$189
1981	$917	$343	$271	$209	$198	$247
1982	$888	$415	$199	$192	$149	$264
1983	$718	$332	$235	$163	$121	$266
1984	$826	$326	$253	$147	$143	$261
1985	$779	$361	$217	$96	$112	
1986	$905	$390	$240	$148	$76	$454
AVG 80-86 (UNWEIGHT)	$847	$349	$236	$165	$144	$280
AVG 80-86 (WEIGHTED)	$842	$337	$234	$191	$132	$328

C.I.F. PRICE OF SELECTED COMMODITIES FOR COUNTRIES THAT IMPORT FROM JORDAN

TOMATOES

	BAHRAIN	IRAQ	KUWAIT	QATAR	SAUDI	SYRIA	OMAN	U.A.E
1980	$469	$290	$410		$229	$178	$652	$325
1981	$544	$263	$434	$1,160	$261	$167	$862	$338
1982	$443	$250	$411	$556	$185	$131	$1,063	$346
1983	$376	$200	$386	$412	$193	$167	$733	$354
1984	$344	$274	$353	$398	$197	$519	$765	$317
1985	$300	$256	$321	$268	$185	$502	$767	$286
1986	$368	$325	$354	$400	$238	$513	$885	$375
AVG 80-86 (UNWEIGHT)	$406	$266	$381	$532	$213	$311	$818	$334
AVG 80-86 (WEGHTED)	$395	$266	$374	$357	$207	$231	$785	$336

SQUASH

	BAHRAIN	KUWAIT	SAUDI
1980	$571	$382	$176
1981	$706	$390	$154
1982	$618	$409	$174
1983	$486	$389	$182
1984	$511	$389	$173
1985	$520	$431	$167
1986			$191
AVG 80-86 (UNWEIGHT)	$569	$398	$174
AVG 80-86 (WEGHTED)	$550	$400	$173

CUCUMBER

	BAHRAIN	KUWAIT	SYRIA
1980	$1,771	$385	$190
1981	$1,964	$399	$191
1982	$954	$408	$168
1983	$624	$386	$192
1984	$626	$394	$467
1985		$436	$506
1986		$488	
AVG 80-86 (UNWEIGHT)	$1,188	$414	$285
AVG 80-86 (WEGHTED)	$1,021	$418	$199

C.I.F. PRICE OF SELECTED COMMODITIES FOR COUNTRIES THAT IMPORT FROM JORDAN (Cont.)

EGGPLANTS

	BAHRAIN	KUWAIT	SAUDI	SYRIA
1980	$951	$370	$189	$181
1981	$1,124	$385	$160	$187
1982	$1,182	$381	$178	$151
1983	$555	$357	$187	$225
1984	$622	$357	$181	$507
1985	$700	$410	$170	$509
1986		$411	$190	
AVG 80-86 (UNWEIGHT)	$856	$382	$179	$293
AVG 80-86 (WEGHTED)	$777	$383	$179	$228

POTATOES

	BAHRAIN	IRAQ	JORDAN	KUWAIT	QATAR	SAUDI	SYRIA	OMAN	U.A.E
1980	$143	$280	$291	$316	$489	$249	$401	$635	$286
1981	$190	$248	$294	$336	$410	$208	$412	$868	$279
1982	$167	$270	$284	$349	$427	$187	$474	$802	$277
1983	$164	$250	$235	$338	$439	$191	$337	$470	$286
1984	$157	$276	$280	$321	$264	$179	$519	$304	$270
1985	$150	$250	$286	$279	$187	$210	$684	$303	$233
1986	$153	$350	$384	$331	$210	$253	$494	$313	$270
AVG 80-86 (UNWEIGHT)	$161	$275	$293	$324	$346	$211	$475	$528	$271
AVG 80-86 (WEGHTED)	$161	$270	$287	$324	$291	$205	$481	$342	$271

ONIONS

	BAHRAIN	IRAQ	JORDAN	KUWAIT	QATAR	SAUDI	U.A.E
1980	$118		$279	$279	$285	$273	$196
1981	$173	$206	$256	$246	$291	$234	$183
1982	$182	$209	$229	$235	$217	$193	$182
1983	$214	$204	$231	$232	$280	$164	$135
1984	$236	$250	$237	$213	$179	$163	$136
1985	$200	$316	$262	$200	$161	$159	$125
1986	$220	$333	$317	$217	$170	$148	$150
AVG 80-86 (UNWEIGHT)	$192	$253	$259	$232	$226	$191	$158
AVG 80-86 (WEGHTED)	$195	$249	$254	$229	$228	$188	$154

Appendix C

Comparative Advantage Tables

TOMATOES
Comparative Advantage Calculation

	JVASP 1984/85				AOAD - 1985 North and Middle Ghor Surface Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	114.300	134.625	90.727	43.897	30.900	39.894	29.832	10.062
Seed (gm)		0.000	0.000	0.000	2.820	2.803	2.383	0.420
Seedlings (No.)	15.000	15.000	0.000	15.000	0.000	0.000	0.000	0.000
Org. Fert. (cub. mts)	5.500	5.500	0.000	5.500	2.900	2.900	0.000	2.900
Chemical Fert. (Kg)	16.700	16.600	12.916	3.683	16.180	16.083	12.514	3.569
Protection	71.150	70.723	55.030	15.693	6.390	6.352	4.942	1.409
Water (cub. met)	5.950	26.802	22.782	4.020	2.610	11.757	9.993	1.764
Mulch and Dep.		0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mech. Labor	2.000	2.000	1.200	0.800	5.100	5.100	3.060	2.040
Land Prep.	2.000	2.000	1.200	0.800	3.120	3.120	1.872	1.248
Husbandry		0.000	0.000	0.000	1.980	1.980	1.188	0.792
Manual Labor	80.000	80.000	48.000	32.000	31.570	31.570	18.942	12.628
Land Prep.	1.000	1.000	0.600	0.400	1.460	1.460	0.876	0.584
Sowing	3.000	3.000	1.800	1.200	2.440	2.440	1.464	0.976
Husbandry	31.000	31.000	18.600	12.400	15.130	15.130	9.078	6.052
Harvesting	45.000	45.000	27.000	18.000	12.540	12.540	7.524	5.016
Interest		0.000	0.000	0.000	2.700	3.240	0.000	3.240
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent		0.000	0.000	0.000	31.000	31.000	0.000	31.000
I:Production Cost	196.300	216.625	139.927	76.697	101.270	110.804	51.834	58.970
Avg. Yield (Tons)	5.400	5.400	5.400	5.400	2.049	2.049	2.049	2.049
Prdtn. Cost(I)/Ton	36.352	40.116	25.912	14.203	49.424	54.077	25.297	28.780
Comparative Advantage Indicator				0.073				0.147

Border Price
Tomatoes 204.000

140

TOMATOES
Comparative Advantage Calculation

	AOAD - 1985 South Ghor Surface Irrigation				AOAD - 1985 Highlands Surface Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	14.740	23.829	17.704	6.125	50.730	147.332	121.669	25.663
Seed (gm)	3.130	3.111	2.645	0.467	2.800	2.783	2.366	0.417
Seedlings (No.)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Org. Fert. (cub. mts)	2.450	2.450	0.000	2.450	2.710	2.710	0.000	2.710
Chemical Fert. (Kg)	4.030	4.006	3.117	0.889	12.110	12.037	9.366	2.671
Protection	2.520	2.505	1.949	0.556	5.510	5.477	4.262	1.215
Water (cub. met)	2.610	11.757	9.993	1.764	27.600	124.324	105.676	18.649
Mulch and Dep.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mech. Labor	3.570	3.570	2.142	1.428	4.840	4.840	2.904	1.936
Land Prep.	3.300	3.300	1.980	1.320	3.640	3.640	2.184	1.456
Husbandry	0.270	0.270	0.162	0.108	1.200	1.200	0.720	0.480
Manual Labor	19.290	19.290	11.574	7.716	30.400	30.400	18.240	12.160
Land Prep.	2.220	2.220	1.332	0.888	3.050	3.050	1.830	1.220
Sowing	2.070	2.070	1.242	0.828	2.060	2.060	1.236	0.824
Husbandry	10.600	10.600	6.360	4.240	13.220	13.220	7.932	5.288
Harvesting	4.400	4.400	2.640	1.760	12.070	12.070	7.242	4.828
Interest	1.500	1.800	0.000	1.800	3.440	4.128	0.000	4.128
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent	26.000	26.000	0.000	26.000	34.400	34.400	0.000	34.400
I:Production Cost	65.100	74.489	31.420	43.069	123.810	221.100	142.813	78.287
Avg. Yield (Tons)	1.196	1.196	1.196	1.196	2.768	2.768	2.768	2.768
Prdtn. Cost(I)/Ton	54.431	62.282	26.271	36.011	44.729	79.877	51.594	28.283
Comparative Advantage Indicator				0.185				0.152

Border Price
Tomatoes 204.000

141

TOMATOES
Comparative Advantage Calculation

	AOAD - 1985 North and Middle Ghor Drip Irrigation				AOAD - 1985 South Ghor Drip Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	91.430	95.606	61.754	33.851	70.880	76.017	55.816	20.201
Seed (gm)	11.850	11.779	10.012	1.767	4.000	3.976	3.380	0.596
Seedlings (No.)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Org. Fert. (cub. mts)	20.890	20.890	0.000	20.890	8.400	8.400	0.000	8.400
Chemical Fert. (Kg)	12.740	12.664	9.854	2.810	13.070	12.992	10.109	2.883
Protection	11.800	11.729	9.126	2.603	10.130	10.069	7.835	2.234
Water (cub. met)	1.310	5.901	5.016	0.885	1.570	7.072	6.011	1.061
Mulch and Dep.	32.840	32.643	27.747	4.896	33.710	33.508	28.482	5.026
Mech. Labor	7.520	7.520	4.512	3.008	5.510	5.510	3.306	2.204
Land Prep.	4.100	4.100	2.460	1.640	3.440	3.440	2.064	1.376
Husbandry	3.420	3.420	2.052	1.368	2.070	2.070	1.242	0.828
Manual Labor	35.190	35.190	21.114	14.076	29.650	29.650	17.790	11.860
Land Prep.	5.180	5.180	3.108	2.072	3.440	3.440	2.064	1.376
Sowing	3.140	3.140	1.884	1.256	2.070	2.070	1.242	0.828
Husbandry	11.090	11.090	6.654	4.436	10.240	10.240	6.144	4.096
Harvesting	15.780	15.780	9.468	6.312	13.900	13.900	8.340	5.560
Interest	5.370	6.444	0.000	6.444	4.230	5.076	0.000	5.076
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent	31.000	31.000	0.000	31.000	26.000	26.000	0.000	26.000
I:Production Cost	170.510	175.760	87.380	88.379	136.270	142.253	76.912	65.341
Avg. Yield (Tons)	3.827	3.827	3.827	3.827	2.868	2.868	2.868	2.868
Prdtn. Cost(I)/Ton	44.554	45.926	22.833	23.094	47.514	49.600	26.817	22.783
Comparative Advantage Indicator				0.118				0.117

Border Price
Tomatoes 204.000

142

TOMATOES
Comparative Advantage Calculation

	AOAD - 1985 Highlands Drip Irrigation				GTZ - 1986 Low Level			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	85.360	143.046	110.966	32.080	56.600	73.273	37.774	35.499
Seed (gm)	3.890	3.867	3.287	0.580	3.000	2.982	2.535	0.447
Seedlings (No.)	0.000	0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	10.720	10.720	0.000	10.720	27.000	27.000	0.000	27.000
Chemical Fert. (Kg)	11.600	11.530	8.972	2.559	13.800	13.717	10.673	3.044
Protection	9.540	9.483	7.379	2.104	8.000	7.952	6.187	1.765
Water (cub. met)	16.560	74.595	63.405	11.189	4.800	21.622	18.378	3.243
Mulch and Dep.	33.050	32.852	27.924	4.928		0.000	0.000	0.000
Mech. Labor	8.010	8.010	4.806	3.204	2.000	2.000	1.200	0.800
Land Prep.	4.930	4.930	2.958	1.972	2.000	2.000	1.200	0.800
Husbandry	3.080	3.080	1.848	1.232		0.000	0.000	0.000
Manual Labor	28.600	28.600	17.160	11.440	37.000	37.000	22.200	14.800
Land Prep.	5.920	5.920	3.552	2.368	1.000	1.000	0.600	0.400
Sowing	2.740	2.740	1.644	1.096		0.000	0.000	0.000
Husbandry	8.140	8.140	4.884	3.256		0.000	0.000	0.000
Harvesting	11.800	11.800	7.080	4.720	36.000	36.000	21.600	14.400
Interest	4.880	5.856	0.000	5.856		0.000	0.000	0.000
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000	9.600	9.600	0.000	9.600
Land Rent	34.400	34.400	0.000	34.400		0.000	0.000	0.000
I:Production Cost	161.250	219.912	132.932	86.980	105.200	121.873	61.174	60.699
Avg. Yield (Tons)	4.785	4.785	4.785	4.785	3.500	3.500	3.500	3.500
Prdtn. Cost(I)/Ton	33.699	45.959	27.781	18.178	30.057	34.821	17.478	17.343
Comparative Advantage Indicator				0.093				0.088

Border Price
Tomatoes 204.000

143

TOMATOES
Comparative Advantage Calculation

	GTZ - 1986 High Level				JVASP 1986/87			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	151.600	161.591	79.817	81.774	73.000	114.904	65.282	49.622
Seed (gm)	3.000	2.982	2.535	0.447		0.000	0.000	0.000
Seedlings (No.)	7.500	7.500	0.000	7.500	10.800	10.800	0.000	10.800
Org. Fert. (cub. mts)	54.000	54.000	0.000	54.000	25.200	25.200	0.000	25.200
Chemical Fert. (Kg)	63.600	63.218	49.190	14.028	9.000	8.946	6.961	1.985
Protection	10.000	9.940	7.734	2.206	16.000	15.904	12.375	3.529
Water (cub. met)	3.000	13.514	11.486	2.027	12.000	54.054	45.946	8.108
Mulch and Dep.	10.500	10.437	8.871	1.566		0.000	0.000	0.000
Mech. Labor	2.000	2.000	1.200	0.800	5.000	5.000	3.000	2.000
Land Prep.	2.000	2.000	1.200	0.800	5.000	5.000	3.000	2.000
Husbandry		0.000	0.000	0.000		0.000	0.000	0.000
Manual Labor	46.000	46.000	27.600	18.400	27.400	27.400	16.440	10.960
Land Prep.	1.000	1.000	0.600	0.400		0.000	0.000	0.000
Sowing		0.000	0.000	0.000	2.400	2.400	1.440	0.960
Husbandry		0.000	0.000	0.000	10.000	10.000	6.000	4.000
Harvesting	45.000	45.000	27.000	18.000	15.000	15.000	9.000	6.000
Interest	.	0.000	0.000	0.000		0.000	0.000	0.000
Machinery & Equip.		0.000	0.000	0.000	20.000	19.880	15.469	4.411
Miscellaneous	19.900	19.900	0.000	19.900		0.000	0.000	0.000
Land Rent		0.000	0.000	0.000	20.000	20.000	0.000	20.000
Production Cost	219.500	229.491	108.617	120.874	125.400	167.304	84.722	82.582
Avg. Yield (Tons)	4.500	4.500	4.500	4.500	4.000	4.000	4.000	4.000
Prdtn. Cost(I)/Ton	48.778	50.998	24.137	26.861	31.350	41.826	21.180	20.646
Comparative Advantage Indicator				0.137				0.105

Border Price
Tomatoes 204.000

144

EGGPLANT
Comparative Advantage Calculation

	JVASP 1984/85				AOAD - 1985 North and Middle Ghor Surface Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	32.250	42.648	26.489	16.159	31.700	42.694	31.710	10.985
Seed (gm)	1.600	1.590	1.352	0.239	2.230	2.217	1.884	0.332
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	10.000	10.000	0.000	10.000	3.470	3.470	0.000	3.470
Chemical Fert. (Kg)	10.250	10.189	7.928	2.261	15.640	15.546	12.096	3.450
Protection	7.400	7.356	5.723	1.632	7.180	7.137	5.553	1.584
Water (cub. met)	3.000	13.514	11.486	2.027	3.180	14.324	12.176	2.149
Mulch and Dep.		0.000	0.000	0.000		0.000	0.000	0.000
Mech. Labor	3.000	3.000	1.800	1.200	5.840	5.840	3.504	2.336
Land Prep.	3.000	3.000	1.800	1.200	3.460	3.460	2.076	1.384
Husbandry		0.000	0.000	0.000	2.380	2.380	1.428	0.952
Manual Labor	38.700	38.700	23.220	15.480	36.360	36.360	21.816	14.544
Land Prep.	1.000	1.000	0.600	0.400	2.430	2.430	1.458	0.972
Sowing	5.950	5.950	3.570	2.380	2.320	2.320	1.392	0.928
Husbandry	25.500	25.500	15.300	10.200	19.690	19.690	11.814	7.876
Harvesting	6.250	6.250	3.750	2.500	11.920	11.920	7.152	4.768
Interest		0.000	0.000	0.000	2.960	3.552	0.000	3.552
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent		0.000	0.000	0.000	31.000	31.000	0.000	31.000
I:Production Cost	73.950	84.348	51.509	32.839	107.860	119.446	57.030	62.417
Avg. Yield (Tons)	2.500	2.500	2.500	2.500	3.540	3.540	3.540	3.540
Prdtn. Cost(I)/Ton	29.580	33.739	20.604	13.135	30.469	33.742	16.110	17.632
Comparative Advantage Indicator				0.076				0.101

Border Price
Eggplant 180.000

143

EGGPLANT
Comparative Advantage Calculation

	AOAD - 1985 South Ghor Surface Irrigation				AOAD - 1985 Highlands Surface Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	12.050	23.147	18.380	4.767	50.690	155.369	128.149	27.220
Seed (gm)	1.970	1.958	1.664	0.294		0.000	0.000	0.000
Seedlings (No.)		0.000	0.000	0.000	3.120	3.120	0.000	3.120
Org. Fert. (cub. mts)	1.030	1.030	0.000	1.030		0.000	0.000	0.000
Chemical Fert. (Kg)	2.790	2.773	2.158	0.615	10.620	10.556	8.214	2.342
Protection	3.080	3.062	2.382	0.679	7.050	7.008	5.453	1.555
Water (cub. met)	3.180	14.324	12.176	2.149	29.900	134.685	114.482	20.203
Mulch and Dep.		0.000	0.000	0.000		0.000	0.000	0.000
Mech. Labor	3.510	3.510	2.106	1.404	6.700	6.700	4.020	2.680
Land Prep.	2.210	2.210	1.326	0.884	5.000	5.000	3.000	2.000
Husbandry	1.300	1.300	0.780	0.520	1.700	1.700	1.020	0.680
Manual Labor	22.220	22.220	13.332	8.888	35.090	35.090	21.054	14.036
Land Prep.	2.320	2.320	1.392	0.928	3.000	3.000	1.800	1.200
Sowing	1.450	1.450	0.870	0.580	2.000	2.000	1.200	0.800
Husbandry	12.520	12.520	7.512	5.008	18.950	18.950	11.370	7.580
Harvesting	5.930	5.930	3.558	2.372	11.140	11.140	6.684	4.456
Interest	1.510	1.812	0.000	1.812	3.700	4.440	0.000	4.440
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent	26.000	26.000	0.000	26.000	34.400	34.400	0.000	34.400
I:Production Cost	65.290	76.689	33.818	42.871	130.580	235.999	153.223	82.776
Avg. Yield (Tons)	1.442	1.442	1.442	1.442	1.871	1.871	1.871	1.871
Prdtn. Cost(I)/Ton	45.277	53.183	23.452	29.730	69.792	126.135	81.893	44.242
Comparative Advantage Indicator				0.173				0.291

Border Price
Eggplant 180.000

146

EGGPLANT
Comparative Advantage Calculation

	AOAD - 1985 North and Middle Ghor Drip Irrigation				AOAD - 1985 South Ghor Drip Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	83.360	88.612	49.786	38.826	78.920	85.259	55.463	29.796
Seed (gm)	9.780	9.721	8.263	1.458		0.000	0.000	0.000
Seedlings (No.)		0.000	0.000	0.000	4.530	4.530	0.000	4.530
Org. Fert. (cub. mts)	28.330	28.330	0.000	28.330	13.340	13.340	0.000	13.340
Chemical Fert. (Kg)	10.820	10.755	8.369	2.387	12.610	12.534	9.753	2.781
Protection	9.520	9.463	7.363	2.100	12.820	12.743	9.915	2.828
Water (cub. met)	1.590	7.162	6.088	1.074	1.910	8.604	7.313	1.291
Mulch and Dep.	23.320	23.180	19.703	3.477	33.710	33.508	28.482	5.026
Mech. Labor	7.300	7.300	4.380	2.920	6.590	6.590	3.954	2.636
Land Prep.	3.420	3.420	2.052	1.368	4.890	4.890	2.934	1.956
Husbandry	3.880	3.880	2.328	1.552	1.700	1.700	1.020	0.680
Manual Labor	41.290	41.290	24.774	16.516	23.440	23.440	14.064	9.376
Land Prep.	4.760	4.760	2.856	1.904	3.320	3.320	1.992	1.328
Sowing	2.640	2.640	1.584	1.056	1.910	1.910	1.146	0.764
Husbandry	12.990	12.990	7.794	5.196	9.720	9.720	5.832	3.888
Harvesting	20.900	20.900	12.540	8.360	8.490	8.490	5.094	3.396
Interest	5.280	6.336	0.000	6.336	4.360	5.232	0.000	5.232
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent	31.000	31.000	0.000	31.000	26.000	26.000	0.000	26.000
I:Production Cost	168.230	174.538	78.940	95.598	139.310	146.521	73.481	73.040
Avg. Yield (Tons)	4.174	4.174	4.174	4.174	2.605	2.605	2.605	2.605
Prdtn. Cost(I)/Ton	40.304	41.815	18.912	22.903	53.478	56.246	28.208	28.038
Comparative Advantage Indicator				0.132				0.165

Border Price
Eggplant 180.000

147

EGGPLANT
Comparative Advantage Calculation

	AOAD - 1985 Highlands Drip Irrigation				GTZ - 1986 Low Level			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	92.370	154.862	120.095	34.766	62.600	79.237	42.915	36.322
Seed (gm)	2.500	2.485	2.112	0.373	10.000	9.940	8.449	1.491
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	11.250	11.250	0.000	11.250	27.000	27.000	0.000	27.000
Chemical Fert. (Kg)	15.630	15.536	12.089	3.447	12.800	12.723	9.900	2.823
Protection	12.000	11.928	9.281	2.647	8.000	7.952	6.187	1.765
Water (cub. met)	17.940	80.811	68.689	12.122	4.800	21.622	18.378	3.243
Mulch and Dep.	33.050	32.852	27.924	4.928		0.000	0.000	0.000
Mech. Labor	5.000	5.000	3.000	2.000	2.000	2.000	1.200	0.800
Land Prep.	4.000	4.000	2.400	1.600	2.000	2.000	1.200	0.800
Husbandry	1.000	1.000	0.600	0.400		0.000	0.000	0.000
Manual Labor	38.330	38.330	22.998	15.332	31.000	31.000	18.600	12.400
Land Prep.	9.380	9.380	5.628	3.752	1.000	1.000	0.600	0.400
Sowing	3.130	3.130	1.878	1.252		0.000	0.000	0.000
Husbandry	10.440	10.440	6.264	4.176		0.000	0.000	0.000
Harvesting	15.380	15.380	9.228	6.152	30.000	30.000	18.000	12.000
Interest	5.400	6.480	0.000	6.480		0.000	0.000	0.000
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000	9.600	9.600	0.000	9.600
Land Rent	34.400	34.400	0.000	34.400		0.000	0.000	0.000
I:Production Cost	175.500	239.072	146.093	92.978	105.200	121.837	62.715	59.122
Avg. Yield (Tons)	4.500	4.500	4.500	4.500	3.000	3.000	3.000	3.000
Prdtn. Cost(I)/Ton	39.000	53.127	32.465	20.662	35.067	40.612	20.905	19.707
Comparative Advantage Indicator				0.122				0.114

Border Price
Eggplant 180.000

148

EGGPLANT
Comparative Advantage Calculation

	GTZ - 1986 High Level				JVASP 1986/87			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	125.400	135.575	56.573	79.002	70.700	112.628	62.188	50.440
Seed (gm)	10.000	9.940	8.449	1.491		0.000	0.000	0.000
Seedlings (No.)	12.000	12.000	0.000	12.000	12.500	12.500	0.000	12.500
Org. Fert. (cub. mts)	54.000	54.000	0.000	54.000	25.200	25.200	0.000	25.200
Chemical Fert. (Kg)	25.900	25.745	20.032	5.713	9.000	8.946	6.961	1.985
Protection	10.000	9.940	7.734	2.206	12.000	11.928	9.281	2.647
Water (cub. met)	3.000	13.514	11.486	2.027	12.000	54.054	45.946	8.108
Mulch and Dep.	10.500	10.437	8.871	1.566		0.000	0.000	0.000
Mech. Labor	2.000	2.000	1.200	0.800	5.000	5.000	3.000	2.000
Land Prep.	2.000	2.000	1.200	0.800	5.000	5.000	3.000	2.000
Husbandry		0.000	0.000	0.000		0.000	0.000	0.000
Manual Labor	37.000	37.000	22.200	14.800	33.900	33.900	20.340	13.560
Land Prep.	1.000	1.000	0.600	0.400		0.000	0.000	0.000
Sowing		0.000	0.000	0.000	2.400	2.400	1.440	0.960
Husbandry		0.000	0.000	0.000	13.500	13.500	8.100	5.400
Harvesting	36.000	36.000	21.600	14.400	18.000	18.000	10.800	7.200
Interest		0.000	0.000	0.000		0.000	0.000	0.000
Machinery & Equip.		0.000	0.000	0.000	20.000	19.880	15.469	4.411
Miscellaneous	16.400	16.400	0.000	16.400		0.000	0.000	0.000
Land Rent		0.000	0.000	0.000	25.000	25.000	0.000	25.000
I:Production	180.800	130.975	79.973	111.002	134.600	176.528	85.528	91.000
Avg. Yield (Ton)	4.000	4.000	4.000	4.000	3.600	3.600	3.600	3.600
Prdtn. Cost(I)/Ton	45.200	47.744	19.993	27.750	37.389	49.036	23.758	25.278
Comparative Advantage Indicator				0.160				0.147

Border Price
Eggplant 180.000

SQUASH

Comparative Advantage Calculation

	JVASP 1984/85				AOAD - 1985 North and Middle Ghor Surface Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	50.420	54.420	31.812	22.608	27.240	31.304	23.318	7.986
Seed (gm)	10.500	10.437	8.871	1.566	6.900	6.859	5.830	1.029
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	15.000	15.000	0.000	15.000	2.470	2.470	0.000	2.470
Chemical Fert. (Kg)	20.400	20.278	15.778	4.500	9.250	9.195	7.154	2.040
Protection	3.320	3.300	2.568	0.732	7.420	7.375	5.739	1.637
Water (cub. met)	1.200	5.405	4.595	0.811	1.200	5.405	4.595	0.811
Mulch and Dep.		0.000	0.000	0.000		0.000	0.000	0.000
Mech. Labor	3.000	3.000	1.800	1.200	4.940	4.940	2.964	1.976
Land Prep.	3.000	3.000	1.800	1.200	3.020	3.020	1.812	1.208
Husbandry		0.000	0.000	0.000	1.920	1.920	1.152	0.768
Manual Labor	42.700	42.700	25.620	17.080	23.100	23.100	13.860	9.240
Land Prep.	1.000	1.000	0.600	0.400	1.490	1.490	0.894	0.596
Sowing	4.200	4.200	2.520	1.680	1.940	1.940	1.164	0.776
Husbandry	22.500	22.500	13.500	9.000	10.690	10.690	6.414	4.276
Harvesting	15.000	15.000	9.000	6.000	8.980	8.980	5.388	3.592
Interest		0.000	0.000	0.000	2.110	2.532	0.000	2.532
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent		0.000	0.000	0.000	31.000	31.000	0.000	31.000
I:Production Cost	96.120	100.120	59.232	40.888	88.390	92.876	40.142	52.734
Avg. Yield (Tons)	1.120	1.120	1.120	1.120	1.194	1.194	1.194	1.194
Prdtn. Cost(I)/Ton	85.821	89.393	52.886	36.507	74.028	77.786	33.619	44.166
Comparative Advantage Indicator				0.271				0.312

Border Price
Squash 153.000

150

SQUASH
Comparative Advantage Calculation

	AOAD - 1985 Highlands Surface Irrigation				AOAD - 1985 North and Middle Ghor Drip Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	42.930	83.077	64.642	18.435	82.750	85.352	50.263	35.089
Seed (gm)	8.420	8.369	7.114	1.255	9.130	9.075	7.714	1.361
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	5.560	5.560	0.000	5.560	24.960	24.960	0.000	24.960
Chemical Fert. (Kg)	8.920	8.866	6.899	1.967	6.790	6.749	5.252	1.498
Protection	8.530	8.479	6.597	1.881	8.190	8.141	6.334	1.806
Water (cub. met)	11.500	51.802	44.032	7.770	0.840	3.784	3.216	0.568
Mulch and Dep.		0.000	0.000	0.000	32.840	32.643	27.747	4.896
Mech. Labor	5.850	5.850	3.510	2.340	4.950	4.950	2.970	1.980
Land Prep.	4.550	4.550	2.730	1.820	4.200	4.200	2.520	1.680
Husbandry	1.300	1.300	0.780	0.520	0.750	0.750	0.450	0.300
Manual Labor	35.290	35.290	21.174	14.116	27.300	27.300	16.380	10.920
Land Prep.	3.310	3.310	1.986	1.324	4.400	4.400	2.640	1.760
Sowing	1.960	1.960	1.176	0.784	3.060	3.060	1.836	1.224
Husbandry	16.540	16.540	9.924	6.616	9.140	9.140	5.484	3.656
Harvesting	13.480	13.480	8.088	5.392	10.700	10.700	6.420	4.280
Interest	3.360	4.032	0.000	4.032	4.600	5.520	0.000	5.520
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent	34.400	34.400	0.000	34.400	31.000	31.000	0.000	31.000
I:Production Cost	121.830	162.649	89.326	73.323	150.600	154.122	69.613	84.509
Avg. Yield (Tons)	1.421	1.421	1.421	1.421	2.132	2.132	2.132	2.132
Prdtn. Cost(I)/Ton	85.735	114.461	62.861	51.599	70.638	72.290	32.651	39.639
Comparative Advantage Indicator				0.393				0.280

Border Price
Squash 153.000

151

SQUASH
Comparative Advantage Calculation

	AOAD - 1985 Highlands Drip Irrigation				GTZ - 1986 Low Level			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	65.370	89.246	68.528	20.718	19.000	29.418	24.326	5.092
Seed (gm)	5.200	5.169	4.393	0.775	6.500	6.461	5.492	0.969
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	7.560	7.560	0.000	7.560		0.000	0.000	0.000
Chemical Fert. (Kg)	8.960	8.906	6.930	1.976	5.500	5.467	4.254	1.213
Protection	3.700	3.678	2.862	0.816	4.000	3.976	3.094	0.882
Water (cub. met)	6.900	31.081	26.419	4.662	3.000	13.514	11.486	2.027
Mulch and Dep.	33.050	32.852	27.924	4.928		0.000	0.000	0.000
Mech. Labor	4.380	4.380	2.628	1.752	2.000	2.000	1.200	0.800
Land Prep.	2.680	2.680	1.608	1.072	2.000	2.000	1.200	0.800
Husbandry	1.700	1.700	1.020	0.680		0.000	0.000	0.000
Manual Labor	30.390	30.390	18.234	12.156	25.000	25.000	15.000	10.000
Land Prep.	4.590	4.590	2.754	1.836	1.000	1.000	0.600	0.400
Sowing	2.280	2.280	1.368	0.912		0.000	0.000	0.000
Husbandry	5.520	5.520	3.312	2.208		0.000	0.000	0.000
Harvesting	18.000	18.000	10.800	7.200	24.000	24.000	14.400	9.600
Interest	4.060	4.872	0.000	4.872		0.000	0.000	0.000
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000	4.600	4.600	0.000	4.600
Land Rent	34.400	34.400	0.000	34.400		0.000	0.000	0.000
I:Production Cost	138.600	163.288	89.390	73.898	50.600	61.018	40.526	20.492
Avg. Yield (Tons)	2.592	2.592	2.592	2.592	1.800	1.800	1.800	1.800
Prdtn. Cost(I)/Ton	53.472	62.997	34.487	28.510	28.111	33.899	22.514	11.384
Comparative Advantage Indicator				0.202				0.078

Border Price
Squash 153.000

SQUASH
Comparative Advantage Calculation

	GTZ - 1986 High Level				JVASP 1986/87			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	56.800	62.874	38.271	24.603	53.400	95.256	72.327	22.929
Seed (gm)	6.500	6.461	5.492	0.969	12.000	11.928	10.139	1.789
Seedlings (No.)	16.000	16.000	0.000	16.000		0.000	0.000	0.000
Org. Fert. (cub. mts)		0.000	0.000	0.000	8.400	8.400	0.000	8.400
Chemical Fert. (Kg)	17.500	17.395	13.535	3.860	9.000	8.946	6.961	1.985
Protection	4.500	4.473	3.480	0.993	12.000	11.928	9.281	2.647
Water (cub. met)	1.800	8.108	6.892	1.216	12.000	54.054	45.946	8.108
Mulch and Dep.	10.500	10.437	8.871	1.566		0.000	0.000	0.000
Mech. Labor	2.000	2.000	1.200	0.800	5.000	5.000	3.000	2.000
Land Prep.	2.000	2.000	1.200	0.800	5.000	5.000	3.000	2.000
Husbandry		0.000	0.000	0.000		0.000	0.000	0.000
Manual Labor	28.000	28.000	16.800	11.200	19.800	19.800	11.880	7.920
Land Prep.	1.000	1.000	0.600	0.400		0.000	0.000	0.000
Sowing		0.000	0.000	0.000	2.400	2.400	1.440	0.960
Husbandry		0.000	0.000	0.000	9.900	9.900	5.940	3.960
Harvesting	27.000	27.000	16.200	10.800	7.500	7.500	4.500	3.000
Interest		0.000	0.000	0.000		0.000	0.000	0.000
Machinery & Equip.		0.000	0.000	0.000	19.000	18.886	14.695	4.191
Miscellaneous	8.700	8.700	0.000	8.700		0.000	0.000	0.000
Land Rent		0.000	0.000	0.000	10.000	10.000	0.000	10.000
I:Production Cost	95.500	101.574	56.271	45.303	88.200	130.056	87.207	42.849
Avg. Yield (Tons)	2.250	2.250	2.250	2.250	2.250	2.250	2.250	2.250
Prdtn. Cost(I)/Ton	42.444	45.144	25.009	20.135	39.200	57.803	38.759	19.044
Comparative Advantage Indicator				0.139				0.136

Border Price
Squash 153.000

153

CUCUMBERS
Comparative Advantage Calculation

	JVASP 1984/85				AOAD - 1985 North and Middle Ghor Surface Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	52.090	56.080	32.900	23.180	23.960	28.047	20.365	7.682
Seed (gm)	7.650	7.604	6.463	1.141	6.600	6.560	5.576	0.984
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	15.000	15.000	0.000	15.000	2.980	2.980	0.000	2.980
Chemical Fert. (Kg)	18.450	18.339	14.270	4.069	9.060	9.006	7.007	1.998
Protection	9.790	9.731	7.572	2.159	4.120	4.095	3.187	0.909
Water (cub. met)	1.200	5.405	4.595	0.811	1.200	5.405	4.595	0.811
Mulch and Dep.		0.000	0.000	0.000		0.000	0.000	0.000
Mech. Labor	3.000	3.000	1.800	1.200	4.350	4.350	2.610	1.740
Land Prep.	3.000	3.000	1.800	1.200	2.980	2.980	1.788	1.192
Husbandry		0.000	0.000	0.000	1.370	1.370	0.822	0.548
Manual Labor	40.900	40.900	24.540	16.360	20.210	20.210	12.126	8.084
Land Prep.	1.000	1.000	0.600	0.400	0.920	0.920	0.552	0.368
Sowing	4.200	4.200	2.520	1.680	2.420	2.420	1.452	0.968
Husbandry	22.400	22.400	13.440	8.960	11.640	11.640	6.984	4.656
Harvesting	13.300	13.300	7.980	5.320	5.230	5.230	3.138	2.092
Interest		0.000	0.000	0.000	1.940	2.328	0.000	2.328
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent		0.000	0.000	0.000	31.000	31.000	0.000	31.000
I:Production Cost	95.990	99.980	59.240	40.740	81.460	85.935	35.101	50.834
Avg. Yield (Tons)	1.200	1.200	1.200	1.200	0.763	0.763	0.763	0.763
Prdtn. Cost(I)/Ton	79.992	83.317	49.366	33.950	106.763	112.627	46.004	66.624
Comparative Advantage Indicator				0.135				0.263

Border Price
Cucumber 269.000

CUCUMBERS
Comparative Advantage Calculation

	AOAD - 1985 Highlands Surface Irrigation				AOAD - 1985 North and Middle Ghor Drip Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	36.750	76.913	62.133	14.780	88.420	90.582	52.172	38.410
Seed (gm)	3.180	3.161	2.687	0.474	7.100	7.057	5.999	1.059
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	2.140	2.140	0.000	2.140	27.500	27.500	0.000	27.500
Chemical Fert. (Kg)	13.110	13.031	10.140	2.892	9.160	9.105	7.085	2.020
Protection	6.820	6.779	5.275	1.504	11.100	11.033	8.585	2.448
Water (cub. met)	11.500	51.802	44.032	7.770	0.720	3.243	2.757	0.486
Mulch and Dep.		0.000	0.000	0.000	32.840	32.643	27.747	4.896
Mech. Labor	5.020	5.020	3.012	2.008	5.730	5.730	3.438	2.292
Land Prep.	4.120	4.120	2.472	1.648	3.930	3.930	2.358	1.572
Husbandry	0.900	0.900	0.540	0.360	1.800	1.800	1.080	0.720
Manual Labor	23.580	23.580	14.148	9.432	23.410	23.410	14.046	9.364
Land Prep.	1.250	1.250	0.750	0.500	4.310	4.310	2.586	1.724
Sowing	2.610	2.610	1.566	1.044	3.460	3.460	2.076	1.384
Husbandry	10.610	10.610	6.366	4.244	5.740	5.740	3.444	2.296
Harvesting	9.110	9.110	5.466	3.644	9.900	9.900	5.940	3.960
Interest	2.610	3.132	0.000	3.132	4.700	5.640	0.000	5.640
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent	34.400	34.400	0.000	34.400	31.000	31.000	0.000	31.000
I:Production Cost	102.360	143.045	79.293	63.752	153.260	156.362	69.656	86.706
Avg. Yield (Tons)	1.664	1.664	1.664	1.664	1.410	1.410	1.410	1.410
Prdtn. Cost(I)/Ton	61.514	85.965	47.652	38.313	108.695	110.895	49.401	61.494
Comparative Advantage Indicator				0.152				0.244

Border Price
Cucumber 269.000

155

CUCUMBERS
Comparative Advantage Calculation

	AOAD - 1985 South Ghor Drip Irrigation				AOAD - 1985 Highlands Drip Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	96.520	98.648	56.493	42.155	84.720	108.530	77.117	31.413
Seed (gm)	6.750	6.710	5.703	1.006	7.310	7.266	6.176	1.090
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	30.000	30.000	0.000	30.000	16.000	16.000	0.000	16.000
Chemical Fert. (Kg)	13.250	13.171	10.248	2.923	11.960	11.888	9.250	2.638
Protection	12.750	12.674	9.861	2.812	9.500	9.443	7.348	2.095
Water (cub. met)	0.720	3.243	2.757	0.486	6.900	31.081	26.419	4.662
Mulch and Dep.	33.050	32.852	27.924	4.928	33.050	32.852	27.924	4.928
Mech. Labor	1.200	1.200	0.720	0.480	5.980	5.980	3.588	2.392
Land Prep.		0.000	0.000	0.000	3.810	3.810	2.286	1.524
Husbandry	1.200	1.200	0.720	0.480	2.170	2.170	1.302	0.868
Manual Labor	36.550	36.550	21.930	14.620	28.330	28.330	16.998	11.332
Land Prep.	8.500	8.500	5.100	3.400	4.710	4.710	2.826	1.884
Sowing	2.500	2.500	1.500	1.000	2.160	2.160	1.296	0.864
Husbandry	8.300	8.300	4.980	3.320	7.920	7.920	4.752	3.168
Harvesting	17.250	17.250	10.350	6.900	13.540	13.540	8.124	5.416
Interest	10.740	12.888	0.000	12.888	4.760	5.712	0.000	5.712
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent	26.000	26.000	0.000	26.000	34.400	34.400	0.000	34.400
I:Production Cost	171.010	175.286	79.143	96.143	158.190	182.952	97.703	85.249
Avg. Yield (Tons)	1.500	1.500	1.500	1.500	2.415	2.415	2.415	2.415
Prdtn. Cost(I)/Ton	114.007	116.858	52.762	64.096	65.503	75.757	40.457	35.300
Comparative Advantage Indicator				0.255				0.138

Border Price
Cucumber 269.000

96

CUCUMBERS

Comparative Advantage Calculation

	GTZ -1986 Low Level				GTZ -1986 High Level			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	60.600	70.930	35.582	35.348	101.200	107.194	48.599	58.595
Seed (gm)	6.000	5.964	5.069	0.895	6.000	5.964	5.069	0.895
Seedlings (No.)		0.000	0.000	0.000	20.000	20.000	0.000	20.000
Org. Fert. (cub. mts)	27.000	27.000	0.000	27.000	27.000	27.000	0.000	27.000
Chemical Fert. (Kg)	16.600	16.500	12.839	3.661	25.900	25.745	20.032	5.713
Protection	8.000	7.952	6.187	1.765	10.000	9.940	7.734	2.206
Water (cub. met)	3.000	13.514	11.486	2.027	1.800	8.108	6.892	1.216
Mulch and Dep.		0.000	0.000	0.000	10.500	10.437	8.871	1.566
Mech. Labor	2.000	2.000	1.200	0.800	2.000	2.000	1.200	0.800
Land Prep.	2.000	2.000	1.200	0.800	2.000	2.000	1.200	0.800
Husbandry		0.000	0.000	0.000		0.000	0.000	0.000
Manual Labor	31.000	31.000	18.600	12.400	37.000	37.000	22.200	14.800
Land Prep.	1.000	1.000	0.600	0.400	1.000	1.000	0.600	0.400
Sowing		0.000	0.000	0.000		0.000	0.000	0.000
Husbandry		0.000	0.000	0.000		0.000	0.000	0.000
Harvesting	30.000	30.000	18.000	12.000	36.000	36.000	21.600	14.400
Interest		0.000	0.000	0.000.		0.000	0.000	0.000
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous	9.400	9.400	0.000	9.400	14.000	14.000	0.000	14.000
Land Rent		0.000	0.000	0.000		0.000	0.000	0.000
I:Production Cost	103.000	113.330	55.382	57.948	154.200	160.194	71.999	88.195
Avg. Yield (Tons)	2.000	2.000	2.000	2.000	2.500	2.500	2.500	2.500
Prdtn. Cost(I)/Ton	51.500	56.665	27.691	28.974	61.680	64.077	28.800	35.278
Comparative Advantage Indicator				0.112				0.136

Border Price
Cucumber 269.000

157

CUCUMBERS
Comparative Advantage Calculation

JVASP
1984/85

	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	63.400	150.833	119.567	31.266
Seed (gm)	9.000	8.946	7.604	1.342
Seedlings (No.)		0.000	0.000	0.000
Org. Fert. (cub. mts)	8.400	8.400	0.000	8.400
Chemical Fert. (Kg)	9.000	8.946	6.961	1.985
Protection	12.000	11.928	9.281	2.647
Water (cub. met)	25.000	112.613	95.721	16.892
Mulch and Dep.		0.000	0.000	0.000
Mech. Labor	5.000	5.000	3.000	2.000
Land Prep.	5.000	5.000	3.000	2.000
Husbandry		0.000	0.000	0.000
Manual Labor	16.500	16.500	9.900	6.600
Land Prep.		0.000	0.000	0.000
Sowing	3.000	3.000	1.800	1.200
Husbandry	6.000	6.000	3.600	2.400
Harvesting	7.500	7.500	4.500	3.000
Interest		0.000	0.000	0.000
Machinery & Equip.	18.000	17.892	13.922	3.970
Miscellaneous			0.000	
Land Rent	4.500	4.500	0.000	4.500
I:Production Cost	89.400	176.833	132.467	44.366
Avg. Yield (Tons)	2.000	2.000	2.000	2.000
Prdtn. Cost(I)/Ton	44.700	88.416	66.233	22.183
Comparative Advantage Indicator				0.090

Border Price
Cucumber 269.000

158

POTATOES
Comparative Advantage Calculation

	JVASP 1984/85				AOAD - 1985 North and Middle Ghor Surface Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	115.530	119.295	94.847	24.448	102.980	107.504	77.581	29.923
Seed (gm)	85.750	85.236	72.450	12.785	65.900	65.505	55.679	9.826
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	5.800	5.800	0.000	5.800	14.450	14.450	0.000	14.450
Chemical Fert. (Kg)	19.380	19.264	14.989	4.275	15.220	15.129	11.772	3.357
Protection	3.340	3.320	2.583	0.737	5.970	5.934	4.617	1.317
Water (cub. met)	1.260	5.676	4.824	0.851	1.440	6.486	5.514	0.973
Mulch and Dep.		0.000	0.000	0.000		0.000	0.000	0.000
Mech. Labor	3.000	3.000	1.800	1.200	6.570	6.570	3.942	2.628
Land Prep.	3.000	3.000	1.800	1.200	3.820	3.820	2.292	1.528
Husbandry		0.000	0.000	0.000	2.750	2.750	1.650	1.100
Manual Labor	57.950	57.950	34.770	23.180	28.280	28.280	16.968	11.312
Land Prep.	1.000	1.000	0.600	0.400	2.170	2.170	1.302	0.868
Sowing	9.450	9.450	5.670	3.780	2.030	2.030	1.218	0.812
Husbandry	29.500	29.500	17.700	11.800	11.920	11.920	7.152	4.768
Harvesting	18.000	18.000	10.800	7.200	12.160	12.160	7.296	4.864
Interest		0.000	0.000	0.000	5.510	6.612	0.000	6.612
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent		0.000	0.000	0.000	31.000	31.000	0.000	31.000
I:Production Cost	176.480	180.245	131.417	48.828	174.340	179.966	98.491	81.475
Avg. Yield (Tons)	2.200	2.200	2.200	2.200	2.036	2.036	2.036	2.036
Prdtn. Cost(I)/Ton	80.218	81.929	59.735	22.195	85.629	88.392	48.375	40.017
Comparative Advantage Indicator				0.165				0.289

Border Price
Potatoes 155.000

159

POTATOES
Comparative Advantage Calculation

	AOAD - 1985 Highlands Surface Irrigation				GTZ - 1986 Low Level			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	97.660	145.550	117.859	27.691	82.600	90.692	52.909	37.783
Seed (gm)	58.640	58.288	49.545	8.743	36.000	35.784	30.416	5.368
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	5.210	5.210	0.000	5.210	27.000	27.000	0.000	27.000
Chemical Fert. (Kg)	18.300	18.190	14.154	4.036	11.200	11.133	8.662	2.470
Protection	1.710	1.700	1.323	0.377	6.000	5.964	4.641	1.323
Water (cub. met)	13.800	62.162	52.838	9.324	2.400	10.811	9.189	1.622
Mulch and Dep.		0.000	0.000	0.000		0.000	0.000	0.000
Mech. Labor	4.600	4.600	2.760	1.840	2.000	2.000	1.200	0.800
Land Prep.	4.350	4.350	2.610	1.740	2.000	2.000	1.200	0.800
Husbandry	0.250	0.250	0.150	0.100		0.000	0.000	0.000
Manual Labor	29.670	29.670	17.802	11.868	19.000	19.000	11.400	7.600
Land Prep.	2.250	2.250	1.350	0.900	1.000	1.000	0.600	0.400
Sowing	3.380	3.380	2.028	1.352		0.000	0.000	0.000
Husbandry	11.710	11.710	7.026	4.684		0.000	0.000	0.000
Harvesting	12.330	12.330	7.398	4.932	18.000	18.000	10.800	7.200
Interest	5.250	6.300	0.000	6.300		0.000	0.000	0.000
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000	10.400	10.400	0.000	10.400
Land Rent	34.400	34.400	0.000	34.400		0.000	0.000	0.000
I:Production Cost	171.580	220.520	138.421	82.099	114.000	122.092	65.509	56.583
Avg. Yield (Tons)	2.668	2.668	2.668	2.668	2.500	2.500	2.500	2.500
Prdtn. Cost(I)/Ton	64.310	82.654	51.882	30.772	45.600	48.837	26.203	22.633
Comparative Advantage Indicator				0.224				0.155

Border Price
Potatoes 155.000

POTATOES
Comparative Advantage Calculation

	GTZ - 1986 High Level				JVASP 1986/87			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	107.600	112.382	70.352	42.030	99.400	140.980	111.335	29.645
Seed (gm)	48.000	47.712	40.555	7.157	60.000	59.640	50.694	8.946
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	27.000	27.000	0.000	27.000	8.400	8.400	0.000	8.400
Chemical Fert. (Kg)	23.100	22.961	17.866	5.095	9.000	8.946	6.961	1.985
Protection	8.000	7.952	6.187	1.765	10.000	9.940	7.734	2.206
Water (cub. met)	1.500	6.757	5.743	1.014	12.000	54.054	45.946	8.108
Mulch and Dep.		0.000	0.000	0.000		0.000	0.000	0.000
Mech. Labor	2.000	2.000	1.200	0.800	4.000	4.000	2.400	1.600
Land Prep.	2.000	2.000	1.200	0.800	4.000	4.000	2.400	1.600
Husbandry		0.000	0.000	0.000		0.000	0.000	0.000
Manual Labor	22.000	22.000	13.200	8.800	26.100	26.100	15.660	10.440
Land Prep.	1.000	1.000	0.600	0.400		0.000	0.000	0.000
Sowing		0.000	0.000	0.000	6.000	6.000	3.600	2.400
Husbandry		0.000	0.000	0.000	9.900	9.900	5.940	3.960
Harvesting	21.000	21.000	12.600	8.400	10.200	10.200	6.120	4.080
Interest		0.000	0.000	0.000		0.000	0.000	0.000
Machinery & Equip.		0.000	0.000	0.000	17.000	16.898	13.148	3.750
Miscellaneous	13.200	13.200	0.000	13.200		0.000	0.000	0.000
Land Rent		0.000	0.000	0.000	10.000	10.000	0.000	10.000
I:Production Cost	144.800	149.582	84.752	64.830	156.500	181.080	129.395	51.685
Avg. Yield (Tons)	3.000	3.000	3.000	3.000	2.500	2.500	2.500	2.500
Prdtn. Cost(I)/Ton	48.267	49.861	28.251	21.610	62.600	72.432	51.758	20.674
Comparative Advantage Indicator				0.149				0.151

Border Price
Potatoes 155.000

161

ONIONS
Comparative Advantage Calculation

	JVASP 1984/85				AOAD - 1985 North and Middle Ghor Surface Irrigation			
	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT	FINANCIAL COST	ECONOMIC COST	FOREIGN COMPONENT	LOCAL COMPONENT
Production Requisites	30.260	42.370	34.122	8.248	21.880	26.145	20.118	6.027
Seed (gm)	9.000	8.946	7.604	1.342	5.770	5.735	4.875	0.860
Seedlings (No.)		0.000	0.000	0.000		0.000	0.000	0.000
Org. Fert. (cub. mts)	0.800	0.800	0.000	0.800	1.340	1.340	0.000	1.340
Chemical Fert. (Kg)	16.540	16.441	12.793	3.648	8.580	8.529	6.636	1.892
Protection	0.420	0.417	0.325	0.093	4.940	4.910	3.821	1.090
Water (cub. met)	3.500	15.766	13.401	2.365	1.250	5.631	4.786	0.845
Mulch and Dep.		0.000	0.000	0.000		0.000	0.000	0.000
Mech. Labor	3.000	3.000	1.800	1.200	4.580	4.580	2.748	1.832
Land Prep.	3.000	3.000	1.800	1.200	3.400	3.400	2.040	1.360
Husbandry		0.000	0.000	0.000	1.180	1.180	0.708	0.472
Manual Labor	44.950	44.950	26.970	17.980	30.030	30.030	18.018	12.012
Land Prep.	1.000	1.000	0.600	0.400	3.630	3.630	2.178	1.452
Sowing	10.500	10.500	6.300	4.200	7.910	7.910	4.746	3.164
Husbandry	25.750	25.750	15.450	10.300	10.310	10.310	6.186	4.124
Harvesting	7.700	7.700	4.620	3.080	8.180	8.180	4.908	3.272
Interest		0.000	0.000	0.000	2.260	2.712	0.000	2.712
Machinery & Equip.		0.000	0.000	0.000		0.000	0.000	0.000
Miscellaneous		0.000	0.000	0.000		0.000	0.000	0.000
Land Rent		0.000	0.000	0.000	31.000	31.000	0.000	31.000
I:Production Cost	78.210	90.320	62.892	27.428	89.750	94.467	40.884	53.583
Avg. Yield (Tons)	2.200	2.200	2.200	2.200	0.850	0.850	0.850	0.850
Prdtn. Cost(I)/Ton	35.550	41.055	28.587	12.467	105.588	111.138	48.099	63.039
Comparative Advantage Indicator				0.102				0.546

Border Price
Onions 132.000

162