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JORDAN  
EVALUATION  
OF  
FRUIT AND VEGETABLE PROCESSING

PREPARED BY  
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## EVALUATION OF FRUIT AND VEGETABLE PROCESSING

There are two tomato processing plants and two citrus concentrating plants in Jordan. The two tomato processing plants are owned and operated by the Agricultural Marketing and Processing Company of Jordan (AMPCO). One citrus processing plant is owned by AMPCO and operated adjacent to the larger tomato processing plant. The other citrus processing plant is owned and operated by the Arabian American Food Manufacturing Company (ARAM).

The project team visited all four processing facilities. The two tomato processing facilities are under-utilized and function as an alternative outlet for removing tomatoes from the fresh market during times of excess supplies. The Safi tomato processing plant has a capacity of 15 MT/hour, operates about 60 days/year and produces only bulk tomato paste for re-packaging at the larger processing plant. The larger tomato processing plant, El-Arda, has a capacity of 25 MT/hr. and currently is expanding its evaporator capacity by 12 percent. The products made are tomato paste for domestic and export markets in bulk and cans, crushed tomatoes and tomato juice for the local (Jordan) market. The plant operates about 120 days per year, running 3 shifts/day during the high season of mid-May to early July and 1 or 2 shifts/day, depending upon the volume during late February and March and mid-August to early October.

The AMPCO citrus processing facility is capable of producing citrus concentrate packaged in cans or bulk, fresh juice in cans or Tetra-Pak and citrus jam in jars or single portions. The plant was completed in 1988-89 and only operated a short time because of the inability to secure raw citrus for processing. The El-Arda tomato and citrus processing facilities share the same building. There is a can manufacturing plant adjacent to the processing facility that makes cans from printed tin plate. The processing facility has 5-200 MT cold-storage coolers for storage of finished product and for raw materials (citrus or tomatoes). Total storage capacity is 1000 MT. The capital investment at El-Arda is estimated to be about US \$10 million.

The ARAM plant is in north Jordan close to the Syria border. The plant was completed in 1988-89 at a cost of about US \$15 million. It was designed to use citrus from the West Bank and Gaza Strip, but the political problems between Palestine, Israel and Jordan have suspended entry of product from that area. The facility must import most of its citrus for processing.

The facility is designed to process 16 MT/hr. and has a capacity of 60,000 MT raw product and can produce 6,000 tons of 65 brix concentrate. Storage consists of 200 MT raw products and 7000 cubic meter finished goods cold-storage. It has freezing capability at -35 C and freezer storage at -18 C. Water is available from deep wells. The facility currently produces orange concentrate, orange juice and canned grapefruit sections. To increase plant utilization, ARAM management has added a line for producing canned chick peas and a frozen french fry processing line.

After careful analysis, it is the opinion of the team that no joint venture investment opportunities exist for either tomato or citrus processing. The reasons for that conclusion are the following:

1. Until the political situation stabilizes on the West Bank, all citrus processing must use imported product. Turkey is the primary supplier but raw product costs about \$100/ton plus a tax of 35 percent. Depending upon the time of year (January-March) citrus can be purchased from Lebanon and Syria. It is our opinion that raw product procurement is too unstable to base a joint venture with a multi-national processor.
2. To operate the tomato processing plants at efficient levels would require more than twice the product currently processed. It does not appear to be a good use of scarce resources (Jordan Valley land) to devote 1500 HA to tomato production when the land could be used to produce higher valued crops for export.
3. The tomato processing plants compete with the export market for product. In 1989, tomato exports were reported to have increased to 222,000 MT compared to 118,000 MT in 1988. Under the present conditions, the tomato processing plants will have to increase their raw material costs to obtain products sufficient for efficient operation, thereby greatly reducing their gross margin and subsequent profits.
4. The plants were designed to divert product from the fresh market and to stabilize domestic fresh produce prices. Currently they function well in that mode. To attract a multi-national processor would require larger processing volume which would not be in the best interests of Jordan, since the processing facilities would require larger raw material volumes and reduce the amount available in the local markets.
5. Additional capital investments would be required by the joint venture partner in the tomato processing venture. Such investments would be made to upgrade the facilities to current state-of-the art technical and operating standards.
6. Higher yielding processing tomato varieties would need to be introduced to increase yields and processing volumes. These varieties would require some time to see how well they would perform in the Jordan soil and environment.

AMPCO however has several options it could undertake to increase the efficiency of the tomato processing facilities. These options have been discussed briefly in the following section on tomatoes.

TOMATO PROCESSING

TOMATO PRODUCTION AND PRICES

Tomatoes are a major crop in Jordan. Tomato production has varied considerably since 1980, reaching a high of more than 408,000 (MT) in 1983 from 206,000 (MT) in 1980 (Table E-1). Production declined in the late 1980's primarily as a result of low market prices in 1987 and the Agriculture Ministry's Cropping Patterns. The land area devoted to tomato production declined nearly 46 percent between 1985 and 1988, from 137,067 dunums to 74,1000 dunums respectively.

Schermerhorn, et.al., attributed the production decline to a number of factors. In the early 1980's, the technology for growing tomatoes changed as the result of introducing drip irrigation and plastic greenhouse production in the Jordan Valley. In addition, producers might have expected the new Jordan Valley processing plants (completed in 1983) to provide profitable outlets for their products. When prices declined in the mid-1980s and the impact of the processing facilities did not reach producer expectations, the farmers shifted the production to more profitable cash crops.

TABLE NO. E-1

TOMATO BALANCE SHEET FOR SELECTED YEARS 1985-1988

	1975	1980	1985	1986	1987	1988
PRODUCTION	151.8	206.2	392.3	305.9	268.4	290.8
W. BANK IMPORTS	0.2	3.2	21.7	16.1	4.6	1.1
	-	0.09	-	-	-	-
EXPORTS	52.9	105.2	104.5	98.2	92.6	118.3
PROCESSED	-	-	45.6	19.2	44.6	49.1
CONSUMERS AREA	99.1	104.3	263.9	204.6	135.8	124.5
(DUNUMS)	133,746	136,643	137,067	91,405	78,116	74,100

Source: Schermerhorn, et.al., 1988, Annual Agricultural Statistics and AMO.

Thus, while tomatoes are a major crop in Jordan, farmers will continue production only if prices received provide greater net returns than alternative vegetable crops.

A brief survey of tomato prices for the 1987-1988 crop year indicated that farmgate prices varied from a low of JD 39/MT in May to a high JD 142/MT in November. March and April prices also were near the annual high at JD 141/MT. However, the bulk of the production is between May and July, and prices for that period were JD 39/MT, JD 55/MT and JD 50/MT for the months of May, June and July, respectively. Farmgate prices in February and March were JD 54/MT and JD 56/MT, respectively, while the late season crop received higher prices during September and October of JD 64/MT and JD 74/MT, respectively.

The total cost of producing tomatoes according to Schermerhorn et.al., in 1988 was about JD 45/MT. Thus, with the exception of May, farmers made a net profit (at the farmgate) of about JD 11/MT for the bulk of the 1988 tomato production. Realizing that using average costs and revenues excludes the extremes on either side of the mean, the data indicate that while tomato production may be profitable at the farmgate, marketing costs could quickly reduce the profit to a marginal enterprise and may explain why production area is shifting from tomatoes into other crops.

#### TOMATO PROCESSING

There are two tomato processing facilities in the Jordan Valley. The larger plant, El-Arda, produces crushed tomatoes, tomato juice and tomato paste and has a capacity of 25 tons/hour. The smaller plant at Safi produces only tomato paste and has a capacity of 15 tons/hour. Both plants are under-utilized because of the inability to procure a sufficient volume of tomatoes throughout the production year. For example, in 1985, the plants produced more than 45,000 (MT) of finished products and the El-Arda plant operated the equivalent of 100 days, 2 shifts per day. In 1986, El-Arda operated the equivalent of 40 days (2 shifts), 99 days (2 shifts) in 1987, 121 days (2 shifts) in 1988, and 126 days (2 shifts) in 1989. If production (receipt of raw material) could be scheduled by contract, it would not be unreasonable to assume the El-Arda plant could operate 180 days at between 2 and 3 shifts each day.

A tomato processing plant is necessary if one is to have a stable tomato production in the Kingdom's agricultural economy. The processing plant provides an alternative product outlet, thereby preventing an over-supply situation in the fresh tomato market. One processing facility could handle most of the excess production, particularly if the production base were contracted with growers. If El-Arda operated 180 days (3 shifts), it would use more than 37 percent of the tomatoes produced in Jordan in 1988. If both El-Arda and Safi operated 180 days each, the two facilities would consume nearly 53 percent of the 1988 Jordan tomato production.

For the tomato processing plants to operate efficiently, they are going to have to enter into contracts with tomato producers. Contracting begins with the correct choice of processing tomato (one that produces tonnage and total solids), scheduling farmer planting, and directing harvesting so that only ripe fruit is harvested and scheduling shipment to the processing facility. The contract becomes a working relationship between the processor and the grower that results in efficient utilization of the processing facility and good returns to the grower.

Currently the farmer plants tomatoes at his choice of time. Since farmers want the highest prices available in the fresh market, they attempt to produce for the high price window in April and early May. But Nature is not always predictable and tomatoes mature at different rates depending upon the variety. When prices drop in the fresh market, growers take their product to the processing facility. Some days a lot of product will appear, other days little product will appear. The plant scheduling and operating becomes highly inefficient because there is little or no coordination between

processor and grower product flows. Under current conditions, it does not make good economic sense to encourage additional tomato production for processing. In fact, it might benefit Jordan more if some of the land now used for tomato production in the Jordan Valley were used to produce higher value vegetables for export. Consider the following example:

In 1988, there was sufficient tomato production to meet domestic consumption and export requirements (Table E-1). The 1988 tomato production was sufficient to keep the El-Arda plant operating 121 days (2 shifts). For efficient operation, a tomato processing plant should operate a minimum of 150 days and preferably 220 days (for simplicity let's use 180 days of operation (3 shifts). For the El-Arda plant to operate, an additional 59 days would require 59,600 (MT) of tomatoes. The land required to produce that volume would be more than 15,200 dunums or 20 percent more land than was devoted for tomatoes in 1988. This example presumes that product flows could be coordinated to effect efficient plant operations. In reality, such conditions probably would not occur in Jordan under the present system.

An alternative solution may be to contract production of processing tomatoes with the pivot farms in south Jordan - Disi and Mudawara areas. These operators understand the contracting process and would work with the processing facilities to effect smooth product flows. On one pivot of 55 HA, for example, tomatoes could be produced by overhead irrigation and, depending on the soil salinity and the varieties planted, yields could equal as much as 45 (MT)/HA. Harvesting would be by machine and the tomatoes trucked in large bins (purchased by AMPCO) to El-Arda for processing. Excess production could be stored for short periods in the cold-storage rooms at El-Arda to await production. Depending upon the weather, it would appear that two tomato crops could be grown each year. Using these assumptions, 12 pivots would provide the excess tomato production to keep the El-Arda tomato processing plant operating 180 days. AMPCO would purchase the tomatoes FOB south Jordan and pay the transportation costs to El-Arda.

While it is unlikely that AMPCO could contract for 12 pivots of tomato production, it is possible that 3 or 4 pivots could be contracted as a demonstration of the contracting process to other farmers, particularly those farmers in the Jordan Valley. With the technical assistance and administration of the contract process as described earlier, AMPCO could be assured of orderly product flows and more efficient plant operation.

During discussion with the Ministry of Agriculture, AMPCO management and others, it was discovered that construction of a third tomato processing facility is being considered for the Highlands excess production. Time did not permit examination and confirmation of these facts. If such a plan is being considered, it is an unwise use of capital for Jordan. Excess production can be transported by trucks to the El-Arda plant for processing. If capacity at El-Arda is a problem, then expand the evaporator capacity rather than build a facility that would be used 6 to 10 weeks per year. Another solution would be to work with ARAM and utilize that private sector facility for several months each year, if necessary. Discussions with ARAM management indicate that a tomato paste processing line could be added to the existing facilities for between \$100,000 and \$150,000. Such a plan is a more efficient and effective use of capital rather than to build another tomato processing facility that will be under-utilized.

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