# Vegetable production and cooperative marketing in the Elfrida-McNeal area, Cochise County, Arizona

# VEGETABLE PRODUCTION AND COOPERATIVE MARKETING IN THE ELFRIDA-MCNEAL AREA, COCHISE COUNTY, ARIZONA

by

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## ABSTRACT

Farmers in Cochise County are experimenting with high-value fresh market vegetable crops. Like other farmers in Arizona, they are pumping their irrigation water from increasing depths and thus are incurring higher variable costs.

The objective of this study is to determine whether a partial substitution of vegetables for field crops can increase net farm income to the farmers of the Elfrida-McNeal area. To meet this objective, variable and fixed costs as well as gross and net revenues are calculated for a 200-acre representative farm. The marketing component of variable costs for vegetables is studied in detail. Two alternative farm plans for the representative farm are compared, one with traditional field crops and one with a field crop and vegetable mix.

Given the assumptions made here, the study concludes that a farm plan with greater emphasis on vegetable production can increase net farm income to Elfrida-McNeal farmers. In addition, the study finds that the farmers' current cooperative marketing arrangement appears to be a viable option for local farmers. With good management, strict quality control, and adequate operating capital, Elfrida-McNeal farmers can expect to expand vegetable production and increase their net farm income.

# CHAPTER 1

## INTRODUCTION

Over the past several years, increasing numbers of farmers in the Elfrida-McNeal area of Arizona have begun to experiment with high-value vegetable crops. They hope that increased water costs will be offset by higher per acre returns earned by serving the fresh produce market. Furthermore, they believe that vegetable crops may be at least as well suited to growing conditions in the Sulphur Springs Valley as traditional field crops. Some feel that Elfrida could produce on a par with the Imperial Valley in California.

The feasibility of vegetable production and marketing in the Elfrida-McNeal area of Cochise County has not been studied thoroughly. Clearly there is great risk involved. On the production side, farmers are up against volatile weather conditions and a relative lack of familiarity with growing techniques. In recent years they have battled new pepper viruses, harvest labor shortages, and an unusually wet winter.

On the marketing side, farmers face more difficulties. Historically, prices received for fresh vegetables vary widely within and between seasons. Market conditions are always difficult to predict. Unusual weather may alter harvest schedules and cause crops to come off in already glutted markets. When harvestable supply is above normal, fresh market prices may plunge. Even if the climate cooperates

in timing harvests to meet demand, farmers must still develop a reliable network of market contacts. Good sales management must go hand-in-hand with vegetable production.

These are only some of the many problems that need to be examined before Elfrida growers radically alter crop patterns. The specific question addressed here is twofold. First, is vegetable production feasible from an economic point of view in the Elfrida-McNeal area? Second, if the proposed crops are in fact feasible, will a cooperative marketing effort result in an increase in net farm income?

## Characteristics of the Area

From the southeast corner of Arizona to the headwaters of Aravaipa Creek, the Sulphur Springs Valley runs north 130 miles. Thirty miles up from the Mexican border lies the most southern of five agricultural areas in the valley. This is the Elfrida-McNeal area, so-called after the two small farming communities in its center.

The Sulphur Springs Valley is relatively flat and can be furrow-irrigated for the most part. The elevation of the valley floor in the Elfrida-McNeal area is approximately 4,300 feet. South from Elfrida, the valley drains into the Whitewater Draw which is part of the larger Douglas Basin.

Temperatures in the Elfrida-McNeal area range from a winter minimum of 25-35°F degrees to a summer maximum of 90-95°F. The growing season is between 180-200 days from April to November. Average annual rainfall is between 12 and 13 inches, with 50 percent falling in July

and August, and almost 25 percent from December to February. Summer storms are often severe and are characterized by temperature fluctuations, strong winds, damaging rain, and hail (Smith, 1956).[1]

Sandy clay loam is typical of most of the acreage farmed. There is enough potassium in the soil to satisfy the nutrient requirements of local crops. However, supplemental amounts of nitrogen, usually in the form of anhydrous ammonia, urea, or ammonia nitrate, and phosphorus must be applied.

## Previous Work

In the past 20 years, four major studies have been conducted on irrigated agriculture in Cochise County. Three pertain to a larger geographical area than the current study and to the relative profitability of irrigated field crop production. Almond (1962) prepared the first crop budgets for the area and calculated costs and returns to various representative enterprises. He concluded that owner-operated farms earned returns to management of between 1 and 3 percent of gross returns, depending on farm size.

Lee (1967) foresaw the eventual demise of agriculture in the area, given then-current water-use technology. However, several mitigating factors were noted. Lee predicted that the market value of agricultural land would decline due to increased water costs. Therefore, the land component of fixed resources would be valued at a lower

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[1]These climate statistics were recorded at the Pearce weather-observing station, 20 miles northwest of Elfrida, at approximately the same elevation.

opportunity cost, enabling farmers to cover fixed costs on less income. Thus he suggested that agriculture would survive until further investment in pumping equipment was required.

Ozsabuncuoglu (1977) analyzed the economic and water-conservation impacts of gravity and sprinkler irrigation techniques in the Sulphur Springs Valley. He used a representative farm, mixed-integer programming model, and examined optimal cropping patterns, irrigation methods, and total water consumption. He concluded that a decline in the price of gravity-irrigated cotton, which was the most profitable crop, and increased energy costs would result in the substitution of sprinkler-irrigated field corn. Although the total acreage farmed would not change, less water would be used and net revenue to the farmer would decline.

A fourth study was undertaken by Lytle (1978), a Phoenix-based business consultant. He concentrated on the feasibility of cooperative marketing of vegetables grown in the Elfrida-McNeal area. His recommendations regarding cooperative organization are useful. However, his study did not focus on whether quality vegetables could be produced in quantities necessary for a successful marketing effort. A more thorough production study must precede market analysis.

## Objectives

The objective of this thesis is twofold. The feasibility of introducing high-value vegetable crops to the Elfrida-McNeal area was analyzed from both the production and marketing standpoints. The study involved the following specific objectives:

Production

1. Investigated farm size, type, fixed resources, and operations through personal interviews with farmers.
2. Documented a schedule of operations and inputs involved in local vegetable production.
3. Calculated individual crop budgets for all vegetables produced in the area.
4. Projected a representative farm for the growers who are currently raising vegetables.
5. Determined whether inclusion of vegetable crops in traditional cropping patterns can increase net farm income.
6. Calculated the degree of risk involved in producing and marketing vegetables and how vegetable crops may change overall farm risk.

Marketing

1. Determined what geographical areas will compete with the Elfrida-McNeal area.
2. Investigated geographical and organizational marketing options open to local producers.
3. Made long-run market cost and revenue projections.
4. Determined which, if any, vegetable crops offer local producers the greatest potential return over production and marketing costs.

## Procedure

The following steps were taken to meet the objectives regarding production:

1. Fourteen out of approximately 25 farmers who planted all or part of their acreage in vegetables during 1978 were interviewed. In addition, extensive conversations were held with the local dealer in agricultural seeds and chemicals.
2. A representative farm size and machinery complement were developed.
3. Calendars of operations for seven vegetables were designed according to data received from farmers and the Cooperative Extension Horticultural Specialist at The University of Arizona.
4. Crop budgets were constructed to analyze costs and returns to vegetable production.
5. Vegetable budgets were combined with field crop budgets to calculate returns to land and management for the whole farm.
6. Price, yield, and cost data were analyzed to predict the degree of risk involved in vegetable production.

The following steps were taken to meet the objectives regarding vegetable marketing:

1. Los Angeles and Phoenix market data were analyzed. Major competitive production areas as well as possible markets were identified.

2. Detailed financial analysis was made of the most promising marketing option. Costs and revenues for this option were projected from 1979 to 1980.
3. Four vegetables were selected for potential production on a representative mixed-crop farm in the Elfrida-McNeal area.

## Data Sources

With the help of Mr. Gene Kennedy in February 1979, a list of 14 local farmers who raised vegetables during the 1978 growing season was compiled. During 1978, Mr. Kennedy was a member of a local marketing cooperative called "Cochise Vegetable Growers' Association" and was therefore familiar with most if not all vegetable growers in the area.

The 14 farmers were interviewed in February and March of 1979 to obtain information on farm size, physical assets, crop patterns, and vegetable production practices. Seven vegetables were selected with the help of Dr. Norman Oebker, Cooperative Extension Service Horticultural Specialist, The University of Arizona, as being the best suited for conditions in the Elfrida-McNeal area. Calendars of operations for these seven vegetables were obtained from the farmers and were verified by Dr. Oebker and Mr. Kennedy.

Budget data on alternative field crops were obtained from Hathorn and Sullivan (1979).

A fresh vegetable market analysis of data published by Market News Service, U.S. Department of Agriculture, provided the basis for determining market prices during the likely harvest period of the

Elfrida-McNeal farmers. Vegetable specialists from Market News Service in Phoenix and Los Angeles were contacted to verify this analysis.

Extensive conversations were held with the staff of the Cochise Vegetable Growers' Association (CVGA) for the purpose of projecting market costs. CVGA records from the 1978 operating season were analyzed in detail.

## CHAPTER 2

## PRODUCTION PRACTICES AND VARIABLE COSTS FOR A REPRESENTATIVE ELFRIDA-MCNEAL VEGETABLE FARM

### Physical Resources

The typical farm of the 14 growers surveyed consisted of 200 acres in production. The sample farms ranged from 68 to 1,200 farmed acres, though most clustered around the typical size. Therefore one representative size was deemed sufficient for the analysis. Though several farms had significantly more acreage under production, they were not those with the greatest percentage of land devoted to vegetables.

Water needs were typically supplied by three wells per farm with pumps powered by natural gas. Pumping depth averaged between 300 and 340 feet. The upper limit of this range (340 feet) was used for purposes of calculating pumping costs.

One representative machinery complement was designed (Table 1). The complement does not include harvesting equipment since custom-picking services are a more economical alternative for a 200-acre farm. An adjustment was made in the Hathorn and Sullivan (1979) field crop budgets to reflect the substitution of custom-picking costs for ownership-picking costs.

A second adjustment was made in water cost calculations to reflect pumping depth in the Elfrida-McNeal area. Hathorn and Sullivan

Table 1. Machinery Complement for Representative 200-acre Farm, Elfrida-McNeal Area, 1979

| Type of Equipment | Machine Code[a] | Number of Each Type of Equipment |
|---|---|---|
| **Tractors and Trucks** | | |
| Wheel tractor (60 hp) | 1 | 1 |
| Wheel tractor (100 hp) | 2 | 1 |
| Wheel tractor (125 hp) | 3 | 1 |
| Pickups, 1/2 ton | 4 | 2 |
| Truck, 1-ton flatbed | 5 | 1 |
| **Tillage** | | |
| Cultivator, 6-row sweep | 6 | 1 |
| Disc, 12-ft offset | 7 | 1 |
| Float, 12 ft x 35 ft | 8 | 1 |
| Harrow, 3 section | 9 | 1 |
| Lister, 5 bottom | 10 | 1 |
| V-ripper, 7 shank | 11 | 1 |
| Moldboard plow, 4-16 2-way | 12 | 1 |
| Mulcher, 4 row | 13 | 1 |
| **Planting** | | |
| Planter, hilldrop, 6 row | 14 | 1 |
| **Miscellaneous** | | |
| Cotton trailer, 30 ft x 8 ft x 6 ft | 15 | 1 |
| Ditcher, 2 ft x 5 ft | 16 | 1 |
| Rowbuck, 16 ft | 17 | 1 |
| Stalkcutter, 2 row rotary | 18 | 1 |
| Sprayer, 2 saddle tanks | 19 | 1 |
| Fertilizer spreader (broadcast) | 20 | 1 |
| Fertilizer sidedresser, 4 row | 21 | 1 |

(1979) used a 400-foot pumping lift. This analysis assumes a 340-foot lift.

The majority of farmers interviewed had one garage or shed used for storing farm equipment and tools. The average size was approximately 600 square feet.

In all cases, physical resources for the representative farm were chosen according to data collected during personal interviews. Tillage and other trailed equipment were sized according to the capacity of tractors in the complement.

## Calendars of Operations and Variable Costs

Calendars and costs for field crops were drawn primarily from Hathorn and Sullivan (1979). The costs are summarized in Table 2. Variable components are machinery, labor, service, and materials. Except for cotton harvesting equipment, the machinery complement used by farmers interviewed for this study differs only slightly from that assumed by Hathorn and Sullivan.

Information on vegetable production practices was gathered from Elfrida-McNeal growers, the local agricultural seed and chemical dealer, and the University of Arizona Extension Service. Fourteen growers supplied calendars for those vegetable crop(s) with which they had been most successful. In cases where there were conflicting data regarding operation sequence and material inputs, the author followed recommendations by the farm supply dealer and the Extension vegetable specialist.

Table 2. Variable Cost Summary: Field Crops, Elfrida-McNeal Area, 1979[a]

| | Costs per Acre ($) | | | | |
|---|---|---|---|---|---|
| | Machinery[b] | Labor[b] | Service | Materials | Total |
| Upland cotton[c] | 108.71 | 28.61 | 115.69 | 43.06 | 296.07 |
| Sorghum | 120.04 | 26.18 | 14.78 | 46.28 | 207.28 |
| Field corn | 105.94 | 24.92 | 26.60 | 87.88 | 245.34 |
| Pinto beans | 63.98 | 15.56 | 84.21 | 22.42 | 186.17 |
| Alfalfa hay | 153.17 | 35.68 | 5.84 | 8.70 | 209.39 |

[a]Based on Hathorn and Sullivan (1979).

[b]Extension Service estimates as published have been adjusted to reflect variable water pumping costs in the Elfrida-McNeal area.

[c]Variable costs for cotton have been adjusted to reflect custom charge of picking 18.12 cwt at $3/cwt seed cotton.

Several characteristics of the Elfrida-McNeal growing area necessitate special production practices. For example, soil preparation in other areas of Arizona usually involves a preplant flood irrigation to leach out excess salinity. In the Elfrida-McNeal area, however, crop land is not level enough to allow irrigation before row formation. Most growers therefore list the land before preplant irrigation. Furthermore, the climate in Elfrida-McNeal is conducive to a variety of hearty pest infestations. For this reason, calendars for all vegetables include pesticide application. The growers are experimenting with different formulas and application rates.

Interviews with Elfrida-McNeal farmers regarding calendars of operations and inputs for vegetables indicate a range of familiarity with production techniques. For example, some farmers have been raising watermelons for 5 to 10 years. They have had time to improve yields by experimenting with varieties and cultural practices. Other growers raised their first crop of vegetables in 1978. As might be expected, they had severe problems with selection of marketable varieties, insect control, water application rates, etc. Yields and operations varied significantly from farmer to farmer.

For these reasons vegetable budgets in this report are first approximations. Detail and accuracy of the budgets can be increased as farmers themselves perfect their production. Explanatory notes for the budgets are in Table 3, and the seven budgets prepared for this report are in Tables 4 to 10. Refer to Table 11 for input and custom service prices.

## Water Cost Calculations

Because water constitutes a significant part of total variable costs and because water cost may be expected to increase over time, it is important to set forth exactly how estimates used in this study are derived.

Data from Arizona Pump Water Budgets (Hathorn, 1978) were used to calculate water costs for the Elfrida-McNeal farmers. In the crop budgets (Tables 4-10), the variable components of irrigation costs per acre-foot (AF) are energy (Column 7) and machinery repair (Column 12), where:

Table 3. Explanatory Notes: Calendar and Variable Costs of Operations for Vegetables, Elfrida-McNeal Area, 1979

| Column Number | Column Heading | Explanation |
|---|---|---|
| (1) | Operation | Self-explanatory. |
| (2) | Times | Number of times operation is performed each growing season. |
| (3) | Month | Month(s) in which operation is performed. Timing will vary according to weather conditions, etc. |
| (4, 5) | Machine Code | See Table 1. Code refers to tractor size and type and size of equipment. |
| (6) | Acres | Number of acres that can be worked one time in one hour. |
| | Per Acre Inputs | |
| (7) | Energy[a] | Quantity of fuel required to complete operation on one acre (all times). D = gallons of diesel. G = gallons of gasoline. NG = therms of natural gas. |
| (8) | Machinery[a] | Number of hours machinery is used for each operation per acre (all times). Machinery hours = .9 x labor hours. |
| (9) | Labor[a] | Number of person-hours required to complete each operation on one acre (all times). |
| (10) | Materials | Quantity of material inputs required for each operation on one acre (all times). |
| | Per Acre Costs | |
| (11) | Machinery[a] | Cost of fuel plus cost of repairs and maintenance, i.e., variable costs of machinery operation. |
| (12) | Labor[a] | See Table 10. |
| (13) | Materials | See Table 10. |
| (14) | Service | Cost of custom operations. See table 10. |
| (15) | Total Variable Costs | Total variable cost per acre. |

[a]Hathorn and Sullivan (1979).

# Table 4. Calendar and Variable Costs of Operations for Pumpkins, Elfrida-McNeal Area, 1979

| (1) Operation | (2) Times | (3) Month | Machine Code (4) Power | Machine Code (5) Tool | Acres/ Hour | Per Acre Inputs (hours) (7) Energy | (8) Machinery | (9) Labor | (10) Materials | Per Acre Costs ($) (11) Machinery | (12) Labor | (13) Materials | (14) Service | (15) Total Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Disc | 1 | May | 3 | 9 | 5.25 | 1.5D | 0.171 | 0.190 | | 1.37 | 0.84 | | | 2.21 |
| Plow | 1 | May | 2 | 14 | 2.50 | 2.4D | .360 | .400 | | 2.83 | 1.77 | | | 4.60 |
| Disc | 1 | May | 3 | 9 | 5.25 | 1.5D | .171 | .190 | | 1.37 | .84 | | | 2.21 |
| Float | 1 | May | 3 | 10 | 5.00 | 1.2D | .180 | .200 | | 1.41 | .88 | | | 2.29 |
| Fertilize | 1 | May | 2 | 20 | 15.00 | .4D | .060 | .067 | 170 lbs. 11-48-0 | .58 | .29 | 17.42 | | 18.29 |
| Herb/disc | 1 | May | 2 | 19,9 | 5.20 | 1.0D | .173 | .192 | 1 pt. Treflan | 1.78 | .84 | 3.52 | | 6.14 |
| List | 1 | May | 3 | 12 | 5.00 | 1.5D | .180 | .200 | | 1.51 | .88 | | | 2.39 |
| Buck rows | 5 | June-Sep. | 2 | 17 | 40.00 | .8D | .112 | .125 | | .75 | .55 | | | 1.30 |
| Pre-irrigate | 1 | June | | | 3.58 | 26NG | | .28 | 4 AI | 5.50 | 1.15 | | | 6.65 |
| Plant | 1 | June | 2 | 7 | 6.0 | 1.0D | .150 | .167 | 4 lbs. seed | 1.78 | .74 | 15.18 | | 17.70 |
| Remove cap | 1 | June | 2 | 11 | 6.0 | 1.0D | .150 | .167 | | .92 | .74 | | | 1.66 |
| Irrigate | 6 | June-Oct. | | | 3.58 | 171NG | | 1.68 | 2 AF | 33.00 | 6.89 | | | 39.89 |
| Cultivate | 2 | July | 2 | 8 | 1.0 | 12.0D | 1.80 | 2.00 | | 12.64 | 8.84 | | | 21.48 |
| Fertilizer | 1 | July | 2 | 21 | 3.75 | 1.6D | .300 | .333 | 175 lbs. Urea 46 | 2.37 | 1.37 | 15.02 | | 18.76 |
| Fungicide | 1 | Aug. | | | | | | | .5 lb. Benlate | | | 5.60 | 2.50 | 8.10 |
| Prepare ends | 1 | Oct. | 2 | 9 | 40.0 | .2D | .023 | .025 | | .22 | .11 | | | .33 |
| Harvest | 1-2 | Oct. | ($22/ton) | | | | | | | | 264.00 | | | 264.00 |
| Haul | (70 miles) | | 5 | | | | | | | 18.08 | 10.25 | | | 28.33 |
| Turn vines under | 1 | Oct. | 2 | 9 | 5.0 | 1.2D | .180 | .200 | | 1.55 | .62 | | | 2.17 |
| Subtotal | | | | | | | | | | 87.66 | 301.60 | 56.74 | 2.50 | 448.50 |
| Pickup use | (30 miles) | | | | | 5.0G | | | | 4.18 | | | | 4.18 |
| Crop insurance | | | | | | | | | | | | | 15.00 | 15.00 |
| Subtotal | | | | | | | | | | 91.84 | 301.60 | 56.74 | 17.50 | 467.68 |
| Interest (production credit at 11.5% interest on 50% of total variable costs/acre) | | | | | | | | | | | | | | 26.89 |
| Total | | | | | | | | | | | | | | 494.57 |

Table 5. Calendar and Variable Costs of Operations for Cucumbers, Elfrida-McNeal Area, 1979

| (1) Operation | (2) Times | (3) Month | Machine Code (4) Power | Machine Code (5) Tool | Acres/ Hour | Per Acre Inputs (hours) (7) Energy | (8) Machinery | (9) Labor | (10) Materials | Per Acre Costs ($) (11) Machinery | (12) Labor | (13) Materials | (14) Service | (15) Total Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Disc | 1 | Mar. | 3 | 9 | 5.25 | 1.5D | 0.171 | 0.190 | | 1.37 | 0.84 | | | 2.21 |
| Plow | 1 | Mar. | 2 | 14 | 2.50 | 2.4D | .360 | .400 | | 2.83 | 1.77 | | | 4.60 |
| Disc | 1 | Mar. | 3 | 9 | 5.25 | 1.5D | .171 | .190 | | 1.37 | .84 | | | 2.21 |
| Float | 1 | Mar. | 3 | 10 | 5.00 | 1.2D | .180 | .200 | | 1.41 | .88 | | | 2.29 |
| Fertilize | 1 | Mar. | 2 | 20 | 15.00 | .4D | .060 | .067 | 170 lbs. 11-48-0 | .58 | .29 | 17.42 | | 18.29 |
| Herb/disc | 1 | Mar. | 2 | 19,9 | 5.20 | 1.0D | .173 | .192 | 1 pt. Treflan | 1.78 | .84 | 3.52 | | 6.14 |
| List | 1 | Mar. | 3 | 12 | 5.00 | 1.5D | .180 | .200 | | 1.51 | .88 | | | 2.39 |
| Buck rows | 5 | Mar.-June | 2 | 17 | 40.00 | .8D | .112 | .125 | | .75 | .55 | | | 1.30 |
| Pre-irrigate | 1 | Mar. | | | 1.18 | 86NG | | .85 | 1 AF | 16.50 | 3.49 | | | 19.99 |
| Plant | 1 | Apr. | 2 | 7 | 6.0 | 1.0D | .150 | .167 | 3 lbs. seed | 1.78 | .74 | 15.60 | | 18.12 |
| Remove cap | 1 | Apr. | 2 | 11 | 6.0 | 1.0D | .150 | .167 | | .92 | .74 | | | 1.66 |
| Irrigate | 5 | Apr.-June | | | 2.36 | 214NG | | .42 | 2.5 AF | 41.25 | 8.61 | | | 49.85 |
| Cultivate | 2 | Apr.-May | 2 | 8 | 1.0 | 12.0D | 1.80 | 2.00 | | 12.64 | 8.84 | | | 21.48 |
| Fertilize | 1 | May | 2 | 21 | 3.75 | 1.6D | .300 | .333 | 175 lbs. Urea 46 | 2.37 | 1.47 | 15.02 | | 18.86 |
| Prepare ends | 1 | June | 2 | 9 | 40.0 | .2D | .023 | .025 | | .22 | .11 | | | .33 |
| Harvest | 15 | June | ($35/ton) | | | | | | | | | 152.00 | | 152.00 |
| Haul | (30 miles) | | 5 | | | | | | | 7.24 | 4.10 | | | 11.34 |
| Disc vines | 1 | July | 2 | 9 | 5.0 | 1.2D | .180 | .200 | | 1.55 | .62 | | | 2.17 |
| Subtotal | | | | | | | | | | 96.07 | 35.61 | 203.56 | 00 | 335.24 |
| Pickup use (30 miles) | | | | | | 5.0G | | | | 4.18 | | | | 4.18 |
| Crop insurance | | | | | | | | | | | | | 15.00 | 15.00 |
| Subtotal | | | | | | | | | | 100.25 | 35.61 | 203.56 | 15.00 | 354.42 |
| Interest (production credit at 11.5% interest on 50% of total variable costs/acre) | | | | | | | | | | | | | | 20.38 |
| Total | | | | | | | | | | | | | | 374.80 |

Table 6. Calendar and Variable Costs of Operations for Sweet Corn, Elfrida-McNeal Area, 1979

| (1) Operation | (2) Times | (3) Month | Machine Code (4) Power | Machine Code (5) Tool | Acres/ Hour | Per Acre Inputs (hours) (7) Energy | (8) Machinery | (9) Labor | (10) Materials | Per Acre Costs ($) (11) Machinery | (12) Labor | (13) Materials | (14) Service | (15) Total Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Disc | 1 | March | 3 | 9 | 5.25 | 1.5D | 0.171 | 0.190 | | 1.37 | 0.84 | | | 2.21 |
| Plow | 1 | May | 2 | 14 | 2.50 | 2.4D | .360 | .400 | | 2.83 | 1.77 | | | 4.60 |
| Disc | 1 | May | 3 | 9 | 5.25 | 1.5D | .171 | .190 | | 1.37 | .84 | | | 2.21 |
| Float | 1 | May | 3 | 10 | 5.00 | 1.2D | .180 | .200 | | 1.41 | .88 | | | 2.29 |
| Fertilize | 1 | June | 2 | 20 | 15.00 | .4D | .060 | .067 | 150 lbs. 11-48-0 | .58 | .29 | 15.37 | | 16.24 |
| Herb/disc | 1 | June | 2 | 19,9 | 5.20 | 1.0D | .173 | .192 | 3 pts. Sutan Plus | 1.78 | .84 | 7.78 | | 10.40 |
| List | 1 | June | 3 | 12 | 5.00 | 1.5D | .180 | .200 | | 1.51 | .88 | | | 2.39 |
| Buck rows | 5 | June-Sep. | 2 | 17 | 40.00 | .8D | .112 | .125 | | .75 | .55 | | | 1.30 |
| Pre-irrigate | 1 | June | | | 2.36 | 43NG | | .42 | 6 AI | 8.25 | 1.72 | | | 9.97 |
| Plant | 1 | June | 2 | 7 | 6.0 | 1.0D | .150 | .167 | 21,000 seeds w/ 10 lbs. Furadan | 1.78 | .74 | 24.70 | | 27.22 |
| Remove cap | 1 | June | 2 | 11 | 6.0 | 1.0D | .150 | .167 | | .92 | .74 | | | 1.66 |
| Cultivate | 4 | June-July | 2 | 8 | 1.00 | 24.0D | 3.60 | 4.00 | | 25.58 | 17.68 | | | 43.26 |
| Irrigate | 6 | June-Sep. | | | 2.36 | 257NG | | .42 | 3 AF | 49.50 | 10.33 | | | 59.83 |
| Fertilize | 1 | July | 2 | 21 | 3.75 | 1.6D | .300 | .333 | 200 lbs. Urea 46 | 2.37 | 1.47 | 20.49 | | 24.33 |
| Pesticide | 3 | July-Sep. | | | | | | | 4.5 lbs. Sevin | | | 10.30 | 7.50 | 17.80 |
| Prepare ends | 1 | Sep. | 2 | 9 | 40.0 | .2D | .023 | .025 | | .22 | .11 | | | .33 |
| Harvest haul | 4 | Sep.-Oct. | (mechanical harvester) | | | | | | | | | | | 25.00 |
| Cut stalks | 1 | Oct. | 2 | 18 | 2.0 | 3.0D | .450 | .500 | | 2.76 | 1.54 | | | 4.30 |
| Subtotal | | | | | | | | | | 102.98 | 41.22 | 78.64 | 7.50 | 230.34 |
| Pickup use (30 miles) | | | | | | 5.0G | | | | 4.18 | | | | 4.18 |
| Crop insurance | | | | | | | | | | | | | 15.00 | 15.00 |
| Subtotal | | | | | | | | | | 107.16 | 41.22 | 78.64 | 22.50 | 249.52 |
| Interest (production credit at 11.5% interest on 50% of total variable cost/acre) | | | | | | | | | | | | | | 14.35 |
| Total | | | | | | | | | | | | | | 263.87 |

Table 7. Calendar and Variable Costs of Operations for Cantaloupes, Elfrida-McNeal Area, 1979

| (1) Operation | (2) Times | (3) Month | Machine Code (4) Power | Machine Code (5) Tool | Acres/ Hour | Per Acre Inputs (hours) (7) Energy | (8) Machinery | (9) Labor | (10) Materials | Per Acre Costs ($) (11) Machinery | (12) Labor | (13) Materials | (14) Service | (15) Total Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Disc | 1 | May | 3 | 9 | 5.25 | 1.5D | 0.171 | 0.190 | | 1.37 | 0.84 | | | 2.21 |
| Plow | 1 | May | 2 | 14 | 2.50 | 2.4D | .360 | .400 | | 2.83 | 1.77 | | | 4.60 |
| Disc | 1 | May | 3 | 9 | 5.25 | 1.5D | .171 | .190 | | 1.37 | .84 | | | 2.21 |
| Float | 1 | May | 3 | 10 | 5.00 | 1.2D | .180 | .200 | | 1.41 | .88 | | | 2.29 |
| Fertilize | 1 | May | 2 | 20 | 15.00 | .4D | .060 | .067 | 150 lbs. 11-48-0 | .58 | .29 | 15.37 | | 16.24 |
| Herb/disc | 1 | May | 2 | 19,9 | 5.20 | 1.0D | .173 | .192 | 1 pt. Treflan | 1.78 | .84 | 3.52 | | 6.14 |
| List | 1 | May | 3 | 12 | 5.00 | 1.5D | .180 | .200 | | 1.51 | .88 | | | 2.39 |
| Buck rows | 5 | May-Aug. | 2 | 17 | 40.00 | .8D | .112 | .125 | | .75 | .55 | | | 1.30 |
| Pre-irrigate | 1 | May | | | 1.18 | 86NG | | .85 | 1 AF | 16.50 | 3.49 | | | 19.99 |
| Plant | 1 | June | 2 | 7 | 6.0 | 1.0D | .150 | .167 | 2 lbs. seed | 1.78 | .74 | 4.84 | | 7.36 |
| Remove cap | 1 | June | 2 | 11 | 6.0 | 1.0D | .150 | .167 | | .92 | .74 | | | 1.66 |
| Thin | 1 | June | | | | | | | | | 15.28 | | | 15.28 |
| Irrigate | 4 | June-Sep. | | | 2.36 | 171NG | | .42 | 2 AF | 33.0 | 6.89 | | | 39.89 |
| Cultivate | 2 | June-July | 2 | 8 | 1.0 | 12.0D | 1.80 | 2.00 | | 12.64 | 8.84 | | | 21.48 |
| Fertilize | 1 | June | 2 | 21 | 3.75 | 1.6D | .300 | .333 | 70 lbs. Urea 46 | 2.37 | 1.47 | 6.01 | | 9.85 |
| Prepare ends | 1 | Sep. | 2 | 9 | 40.0 | .8D | .023 | .025 | | .22 | .11 | | | .33 |
| Harvest | 2-3 | Sep. ($27/ton) | | | | | | | | | 108.00 | | | 108.00 |
| Haul (30 miles) | | Sep. | 5 | | | | | | | 7.23 | 4.10 | | | 11.33 |
| Turn vines under | 1 | Oct. | 2 | 9 | 5.0 | 1.2D | .180 | .200 | | 1.55 | .62 | | | 2.17 |
| Subtotal | | | | | | | | | | 87.81 | 157.17 | 29.74 | 00 | 274.72 |
| Pickup use (30 miles) | | | | | | 5.0G | | | | 4.18 | | | | 4.18 |
| Crop insurance | | | | | | | | | | | | | 15.00 | 15.00 |
| Subtotal | | | | | | | | | | 91.99 | 157.17 | 29.74 | 15.00 | 293.90 |
| Interest (production credit at 11.50% interest on 50% of total variable cost/acre) | | | | | | | | | | | | | | 16.90 |
| | | | | | | | | | | | | | | 310.80 |

Table 8. Calendar and Variable Costs of Operations for Banana Squash, Elfrida-McNeal Area, 1979

| (1) Operation | (2) Times | (3) Month | Machine Code (4) Power | Machine Code (5) Tool | Acres/ Hour | Per Acre Inputs (hours) (7) Energy | (8) Machinery | (9) Labor | (10) Materials | Per Acre Costs ($) (11) Machinery | (12) Labor | (13) Materials | (14) Service | (15) Total Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Disc | 1 | May | 3 | 9 | 5.25 | 1.5D | 0.171 | 0.190 | | 1.37 | 0.84 | | | 2.21 |
| Plow | 1 | May | 2 | 14 | 2.50 | 4.2D | .360 | .400 | | 2.83 | 1.77 | | | 4.60 |
| Disc | 1 | May | 3 | 9 | 5.25 | 1.5D | .171 | .190 | | 1.37 | .84 | | | 2.21 |
| Float | 1 | May | 3 | 10 | 5.00 | 1.2D | .180 | .200 | | 1.41 | .88 | | | 2.29 |
| Fertilize | 1 | May | 2 | 20 | 15.00 | .4D | .060 | .067 | 170 lbs. 11-48-0 | .58 | .29 | 17.42 | | 18.29 |
| Herb/disc | 1 | May | 2 | 19,9 | 5.20 | 1.0D | .173 | .192 | 1 pt. Treflan | 1.78 | .84 | 3.52 | | 6.14 |
| List | 1 | May | 3 | 12 | 5.00 | 1.5D | .180 | .200 | | 1.51 | .88 | | | 2.39 |
| Buck rows | 5 | June-Sep. | 2 | 17 | 40.00 | .8D | .112 | .125 | | .75 | .55 | | | 1.30 |
| Pre-irrigate | 1 | June | | | 3.58 | 26NG | | .28 | | 5.50 | 1.15 | | | 6.65 |
| Plant | 1 | June | 2 | 7 | 6.0 | 1.0D | .150 | .167 | 4 lbs. seed | 1.78 | .74 | 22.88 | | 25.40 |
| Remove cap | 1 | June | 2 | 11 | 6.0 | 1.0D | .150 | .167 | | .92 | .74 | | | 1.66 |
| Irrigate | 6 | June-Oct. | | | 3.58 | 171NG | | 1.68 | 2 AF | 33.00 | 6.89 | | | 39.89 |
| Cultivate | 2 | July | 2 | 8 | 1.0 | 12.0D | 1.80 | 2.00 | | 12.64 | 8.84 | | | 21.48 |
| Fertilize | 1 | July | 2 | 21 | 3.75 | 1.6D | .300 | .333 | 175 lbs. Urea 46 | 2.37 | 1.37 | 15.02 | | 18.76 |
| Fungicide | 1 | Aug. | | | | | | | .5 lb. Benlate | | | 5.60 | 2.50 | 8.10 |
| Prepare ends | 1 | Oct. | 2 | 9 | 40.0 | .2D | .023 | .025 | | .22 | .11 | | | .33 |
| Harvest | 1-2 | Oct. | ($22/ton) | | | | | | | | 275.00 | | | 275.00 |
| Haul | (70 miles) | | 5 | | | | | | | 18.08 | 10.25 | | | 28.33 |
| Turn vines under | 1 | | 2 | 9 | 5.0 | 1.2D | .180 | .200 | | 1.55 | .62 | | | 2.17 |
| Subtotal | | | | | | | | | | 87.66 | 312.60 | 64.44 | 2.50 | 467.20 |
| Pickup use (30 miles) | | | | | | 5.0G | | | | 4.18 | | | | 4.18 |
| Crop insurance | | | | | | | | | | | | | 15.00 | 15.00 |
| Subtotal | | | | | | | | | | 91.84 | 312.60 | 64.44 | 17.15 | 486.38 |
| Interest (production credit at 11.5% interest on total variable cost/acre) | | | | | | | | | | | | | | 27.97 |
| Total | | | | | | | | | | | | | | 514.35 |

Table 9. Calendar and Variable Costs of Operations for Bell Peppers, Elfrida-McNeal Area, 1979

| (1) Operation | (2) Times | (3) Month | Machine Code (4) Power | (5) Tool | Acres/ Hour | Per Acre Inputs (hours) (7) Energy | (8) Machinery | (9) Labor | (10) Materials | Per Acre Costs ($) (11) Machinery | (12) Labor | (13) Materials | (14) Service | (15) Total Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Disc | 1 | March | 3 | 9 | 5.25 | 1.5D | 0.171 | 0.190 | | 1.37 | 0.84 | | | 2.21 |
| Plow | 1 | March | 2 | 14 | 2.50 | 2.4D | .360 | .400 | | 2.83 | 1.77 | | | 4.60 |
| Disc | 1 | March | 3 | 9 | 5.25 | 1.5D | .171 | .190 | | 1.37 | .84 | | | 2.21 |
| Float | 1 | March | 3 | 10 | 5.00 | 1.2D | .180 | .200 | | 1.41 | .88 | | | 2.29 |
| Fertilize | 1 | March | 2 | 20 | 15.00 | .4D | .060 | .067 | 170 lbs. 11-48-0 | .58 | .29 | 17.42 | | 18.29 |
| Herb/disc | 1 | March | 2 | 19,9 | 5.20 | 1.0D | .173 | .192 | 1 pt. Treflan | 1.78 | .84 | 3.52 | | 6.14 |
| List | 1 | March | 3 | 12 | 5.00 | 1.5D | .180 | .200 | | 1.51 | .88 | | | 2.39 |
| Buck rows | 5 | March-Aug. | 2 | 17 | 40.00 | .8D | .112 | .125 | | .75 | .55 | | | 1.30 |
| Pre-irrigate | 1 | March | | | 2.36 | 43NG | | .42 | 6 AI | 8.25 | 1.72 | | | 9.97 |
| Plant | 1 | April | 2 | 7 | 6.0 | 1.0D | .150 | .167 | 4 lbs. seed w/5 lbs. Furadan | 1.78 | .74 | 87.00 | | 89.52 |
| Remove cap | 1 | April | 2 | 11 | 6.0 | 1.0D | .150 | .167 | | .92 | .74 | | | 1.66 |
| Thin/weed | 1 | April | | | | | | | | | 30.56 | | | 30.56 |
| Irrigate | 18 | April-Aug. | | | 7.16 | 257NG | | 2.52 | | 49.50 | 10.33 | | | 59.83 |
| Cultivate | 6 | April-June | 2 | 8 | 1.00 | 36.0D | 5.40 | 6.00 | | 37.92 | 26.52 | | | 64.44 |
| Fertilize | 1 | May | 2 | 21 | 3.75 | 1.6D | .300 | .333 | 175 lbs. Urea 46 | 2.37 | 1.47 | 15.02 | | 18.86 |
| Pesticide | 1 | Aug. | | | | | | | 2 lbs. Sevin | | | 4.58 | 2.50 | 7.08 |
| Prepare ends | 1 | Aug. | 2 | 9 | 40.0 | .2D | .023 | .025 | | .22 | .11 | | | .33 |
| Harvest | 2-3x | Aug.-Sep. | | | | | | | | | 227.50 | | | 227.50 |
| Haul | (45 miles) | | 5 | | | | | | | 10.85 | 6.15 | | | 17.00 |
| Cut stalks | 1 | Sep. | 2 | 18 | 2.0 | 3.0D | .450 | .500 | | 2.76 | 1.54 | | | 4.30 |
| Subtotal | | | | | | | | | | 126.17 | 314.27 | 127.54 | 2.50 | 570.48 |
| Pickup use (30 miles) | | | | | | 5.0G | | | | 4.18 | | | | 4.18 |
| Crop insurance | | | | | | | | | | | | | 15.00 | 15.00 |
| Subtotal | | | | | | | | | | 130.35 | | | 17.50 | 589.66 |
| Interest (production credit at 11.50% interest on 50% of total variable cost/acre) | | | | | | | | | | | | | | 33.91 |
| Total | | | | | | | | | | | | | | 623.57 |

## Table 10. Calendar and Variable Costs of Operations for Watermelons, Elfrida-McNeal Area, 1979

| (1) Operation | (2) Times | (3) Month | Machine Code (4) Power | Machine Code (5) Tool | Acres/ Hour | Per Acre Inputs (hours) (7) Energy | (8) Machinery | (9) Labor | (10) Materials | Per Acre Costs ($) (11) Machinery | (12) Labor | (13) Materials | (14) Service | (15) Total Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Disc | 1 | April | 3 | 9 | 5.25 | 1.5D | 0.171 | 0.190 | | 1.37 | 0.84 | | | 2.21 |
| Plow | 1 | April | 2 | 14 | 2.50 | 2.4D | .360 | .400 | | 2.83 | 1.77 | | | 4.60 |
| Disc | 1 | April | 3 | 9 | 5.25 | 1.5D | .171 | .190 | | 1.37 | .84 | | | 2.21 |
| Float | 1 | April | 3 | 10 | 5.00 | 1.2D | .180 | .200 | | 1.41 | .88 | | | 2.29 |
| Fertilize | 1 | April | 2 | 20 | 15.00 | .4D | .060 | .067 | 150 lbs. 11-48-0 | .58 | .29 | 15.37 | | 16.24 |
| Herb/disc | 1 | April | 2 | 19,9 | 5.20 | 1.0D | .173 | .192 | 1 pt. Treflan | 1.78 | .84 | 3.52 | | 6.14 |
| List | 1 | April | 3 | 12 | 5.00 | 1.5D | .180 | .200 | | 1.51 | .88 | | | 2.39 |
| Buck rows | 5 | April-Aug. | 2 | 17 | 40.00 | .8D | .112 | .125 | | .75 | .55 | | | 1.30 |
| Pre-irrigate | 1 | April | | | 2.36 | 43NG | | .42 | 6 AI | 8.25 | 1.72 | | | 9.97 |
| Plant | 1 | May | 2 | 7 | 6.0 | 1.0D | .150 | .167 | 2.5 lbs. seed | 1.78 | .74 | 12.74 | | 15.26 |
| Remove cap | 1 | May | 2 | 11 | 6.0 | 1.0D | .150 | .167 | | .92 | .74 | | | 1.66 |
| Irrigate | 6 | May-Oct. | | | 3.58 | 171NG | .28 | | 2 AF | 33.00 | 6.89 | | | 39.89 |
| Cultivate | 2 | May | 2 | 8 | 1.00 | 12.0D | 1.80 | 2.00 | | 12.64 | 8.84 | | | 21.48 |
| Fertilize | 1 | June | 2 | 21 | 3.75 | 1.6D | .300 | .333 | 70 lbs. Urea 46 | 2.37 | 1.47 | 6.02 | | 9.86 |
| Prepare ends | 1 | Sep. | 2 | 9 | 40.0 | .2D | .022 | .025 | | .22 | .11 | | | .33 |
| Harvest | 2-3 | Sep. | ($22/ton) | | | | | | | | 330.00 | | | 330.00 |
| Haul | (90 miles) | Sep. | 5 | | | | | | | 21.69 | 12.30 | | | 33.99 |
| Disc vines | 1 | Oct. | 2 | 9 | 5.0 | 1.2D | .180 | .200 | | 1.55 | .62 | | | 2.17 |
| Subtotal | | | | | | | | | | 94.02 | 370.32 | 37.65 | 00 | 501.99 |
| Pickup use (3D miles) | | | | | | 5.0G | | | | 4.18 | | | | 4.18 |
| Crop insurance | | | | | | | | | | | | | 15.00 | 15.00 |
| Subtotal | | | | | | | | | | 98.20 | 370.32 | 37.65 | 15.00 | 521.17 |
| Interest (production credit at 11.5% interest on 50% of total variable costs/acre) | | | | | | | | | | | | | | 29.97 |
| Total | | | | | | | | | | | | | | 552.14 |

Table 11. Input Prices and Custom Services: Supporting Data for Calendar and Variable Costs of Operations for Vegetables, 1979

| Classification | Input | Unit | Price ($) |
|---|---|---|---|
| Fuel | Gasoline | gal | 0.5750 |
| | Diesel | gal | 0.4270 |
| | Natural Gas | therm | 0.20916 |
| Herbicide | Treflan | gal | 27.00 |
| | Sutan Plus | gal | 19.95 |
| Fungicide | Benlate | lb | 10.75 |
| Pesticide | Seven | lb | 2.20 |
| | Furadan | lb | 0.73 |
| Fertilizer | 11-48-0 | ton | 197.00 |
| | Urea 46 | ton | 165.00 |
| Seed | Pumpkin | lb | 3.65 |
| | Watermelon | lb | 4.90 |
| | Bell peppers | lb | 20.00 |
| | Cucumber | lb | 5.00 |
| | Banana squash | lb | 5.50 |
| | Cantaloupe | lb | 4.65 |
| | Sweet Corn | lb | 1.88 |
| Service | Aerial Spraying[a] (5 gal mixture) | acre | 2.50 |
| Labor | Hand weeders/thinners | hour | 3.00 |
| | Harvest (watermelon) | ton | 22.00 |
| | Harvest (bell peppers) | ton | 32.50 |
| | Harvest (banana squash) | ton | 22.00 |
| | Harvest (pumpkin) | ton | 22.00 |
| | Harvest (cucumber) | ton | 35.00 |
| | Harvest (sweet corn)[b] | acre | 25.00 |
| | Harvest (cantaloupe) | ton | 27.00 |
| | Tractor operators | hour | 3.50 |
| | Other | hour | 3.00 |
| | Fringe Benefits[c] | percent | 13.00 |
| | FICA Matching[c] | percent | 6.05 |
| | Workman's Compensation[c] | percent | 7.09 |

[a]Application method for Benlate and Sevin.

[b]Mechanical harvesting.

[c]Additional costs for all hourly workers.

.00318 = millions of cubic feet of gas to lift 1 AF of water 1 foot at 100% overall efficiency,

10.68 = number of therms per 1,000 cubic foot of gas,

340 = feet of lift,

.131 = overall efficiency stated as a decimal,

.20916 = cost of natural gas per therm including sales tax, and

.009322 = cost of plant repairs, maintenance, lubrication, and attendance per foot of lift.

Irrigation labor requirements are based on estimates in Hathorn and Sullivan (1979). Average pumping rate is assumed to be 800 gallons per minute.

## CHAPTER 3

## COSTS OF FRESH VEGETABLE MARKETING

Increased water costs in the Elfrida-McNeal area have given local growers greater incentive to raise a variety of high-value vegetable crops. Market options are limited by first, the perishable nature of vegetables and second, the small volume that is generated. Small farmers have three alternatives.

First, farmers may sell as individuals. Their potential outlets include local roadside stands and small wholesalers in Tucson and Phoenix. Farmers selling alone have three main problems related to the small scale of their operations. First, the number of buyers they can contact is limited by the time they can spend away from actual production tasks. Second, they have insufficient capital to invest in grading and packing facilities. Third, they generate low volume.

The second marketing option is contract growing. In this case, farmers agree to deliver specified crops to one buyer. The crop most often contract marketed in the Elfrida-McNeal area is chili peppers. The majority of chili farmers surveyed for this report traditionally contract with a canning or dehydrating firm. There are two reasons why this option is not entirely satisfactory to local growers. First, contracting arrangements are primarily limited to the processing market, and therefore eliminate higher-value fresh market grades.

Second, many farmers believe that contractors calculate prices to cover production costs only, without adequate return to management.

The third option is cooperative marketing. Problems with the above alternatives have prompted local interest in this more organized approach. Farmers expect to realize several internal economies of scale through joint marketing. First, because a cooperative pools all member production, it allows stronger market access. Buyers are reluctant to deal in small quantities and are attracted by large volume purchases. Thus, the larger the volume, the better the sellers' bargaining power. Second, cooperatives offer economies of scale. By pooling equity capital, farmers are better able to secure the financing necessary to operate processing equipment.

In 1977, several growers in the Elfrida-McNeal area concluded that a marketing cooperative would be the most effective means of entering the fresh vegetable market. Toward this end, they organized the Cochise Vegetable Growers' Association (CVGA), which began operations in 1978.

Because there seem to be substantial economies of scale in vegetable marketing, we can expect the CVGA cooperative approach to be the most profitable of the three alternatives. This study examines the cost of co-op marketing.

To assess what marketing costs the co-op members incur, a detailed description and analysis of the organization is necessary. Therefore, this chapter is concerned with how the CVGA operation works and what its services will cost its growers.

In Chapter 2, budgets for seven vegetables were developed. Of these seven, cucumbers and cantaloupes were eliminated from further consideration because of typically low yields. Sweet corn was also eliminated because the majority of farmers surveyed agreed that the frequency of severe insect infestations made the crop too risky. Marketing costs for the four remaining crops as well as for chili peppers are analyzed in this chapter.

## History and Operations of the Cochise Vegetable Growers' Association

Original CVGA equity capital at the beginning of the 1978 growing season was $61,000. The 21 original members each contributed a $400 membership assessment fee. In addition, those members who wanted to grow vegetables for the co-op contributed $200 per acre pledged. Approximately 260 acres were pledged and paid for.

The cooperative invested $10,000 in 10 acres of land in Elfrida. The property includes an office complex, which is now the headquarters for all co-op operations. Since the purchase date, the co-op has installed a packing line and hydrocooler, both of which were operated in 1978.

The co-op's gross revenue in 1978 was approximately $160,000. Vegetables sold were chili peppers, bell peppers, watermelons, cantaloupes, cucumbers, banana squash, and white sweet corn. Most of the produce was sold through commission houses in Phoenix, Los Angeles, and San Francisco. The rest went directly to grocery store chains in these same areas or was sold to retail customers at the co-op headquarters.

Vegetable cooperatives differ in the way they keep individual grower accounts. The pooling arrangement adopted by CVGA for the 1979 season is well accepted (U.S. Department of Agriculture [USDA], 1977). Under this plan each member's produce is kept separate until graded. After grading, all produce is pooled and packed for marketing. Although the individual identity of the farmer's particular produce is lost, this practice simplifies handling operations.

The method adopted by the CVGA to calculate grower payments is also common among fresh vegetable cooperatives. Every 2 weeks, the bookkeeper computes the average market price received for each grade of each type of produce. Three deductions are made from this price. First, a per unit charge is deducted to cover packing expenses. This figure approximates the cost of operating the packing line on a per unit basis. It is adjusted to reflect changes in overhead if necessary.

A second per unit deduction is made to cover freight costs. Again, the pooling method is used. The bookkeeper averages all freight charges incurred in each 2-week period. This practice avoids the complications involved in keeping track of each member's produce. Whatever commission fees are incurred are also deducted at this time.

Lastly, a 20 percent retain is withheld for capital and operating expenses. (The CVGA by-laws state that there need be no segregation of funds between investment and operating purposes.) The dollar amount of these retains will be credited to each member's account according to patronage.

## Harvest Schedule and Price Analysis

In this section, four of the remaining five crops under consideration are analyzed for the purpose of projecting their prices over the next two years. These four are bell peppers, chili peppers, watermelons, and banana squash. For the fifth crop (pumpkins) price data were inadequate for analysis.

CVGA marketing records from its first year of operation indicate that vegetables were processed between July 14 and October 21 (Figure 1). The most volume was processed during the four-week period between August 26 and September 23.

Time series data (USDA, 1968-1970, 1972-1978) for four crops were analyzed for the purpose of projecting prices from 1979 to 1980 (Figures 2-5). Prices during the appropriate harvest period were recorded for each of the four crops over the period of 1968 through 1978. (No data were available for 1971.)

The 1978 bell pepper harvest period lasted 14 weeks. It began in the third week of July and ended in the second week of October (Figure 1). Eighty-five percent of member yield was sold in the 6-week period between July 26 and October 7.

Ten-year time series data presented in Figure 2 indicate that bell pepper prices vary substantially within each season. Typically, the prices decrease rapidly from the beginning of harvest period, hit a low point between the eighth and tenth week, and rise slightly in the last four weeks of harvest. There seems to be an upward trend in average seasonal prices.

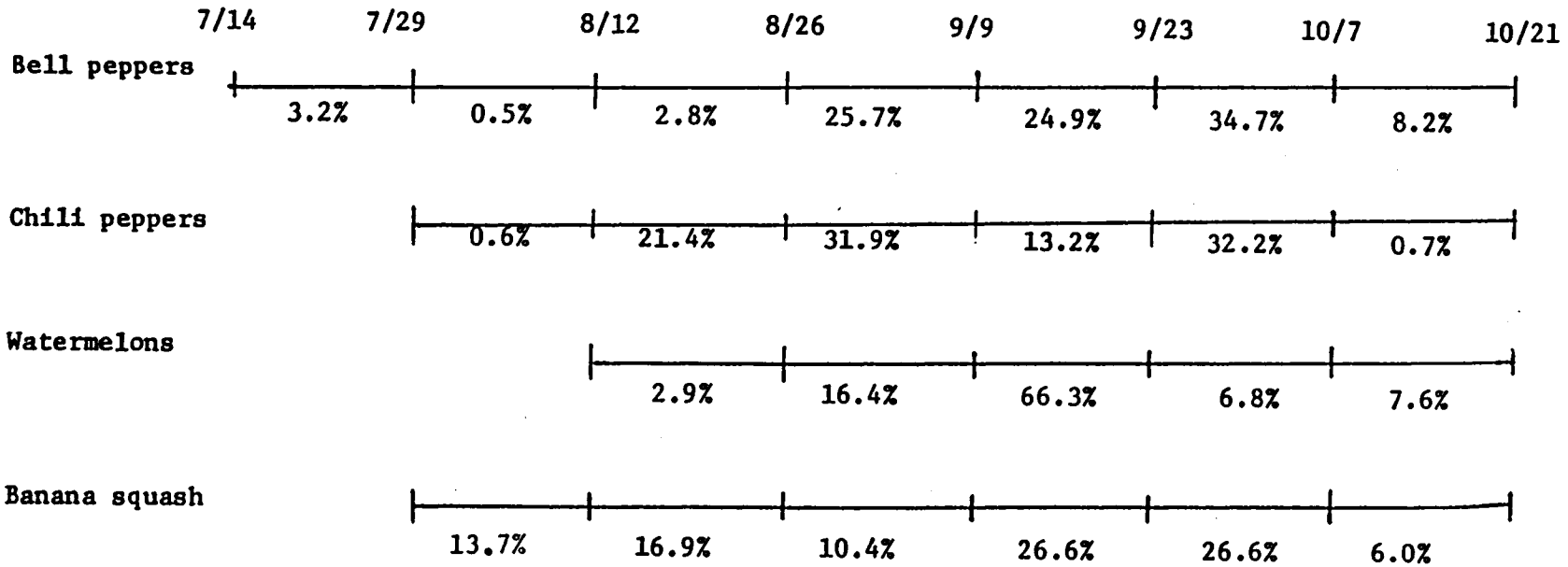


Figure 1. Market Schedule, Four Major Crops, Cochise Vegetable Growers' Association, 1978

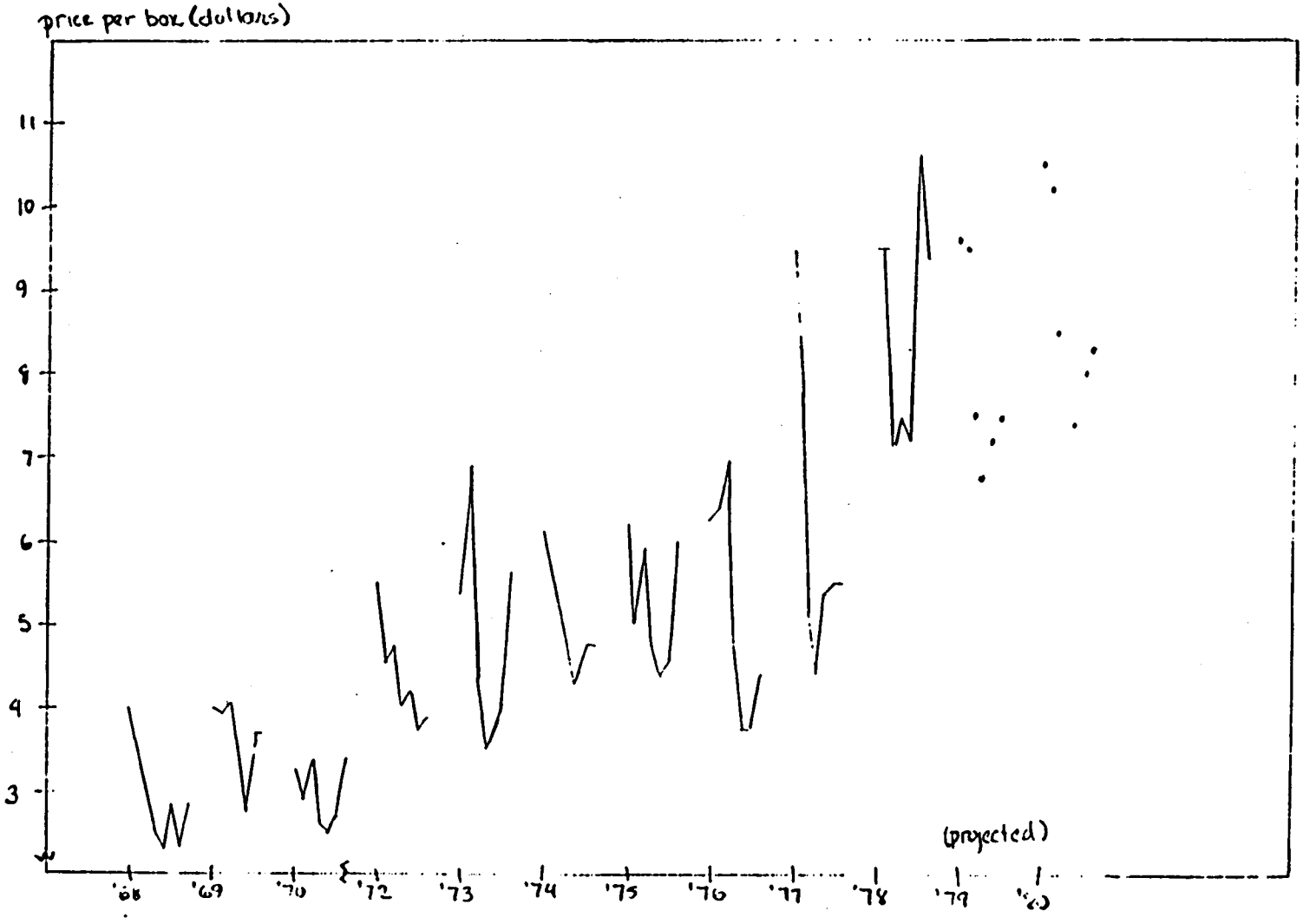


Figure 2. Los Angeles Wholesale Market Prices, Bell Peppers, Third Week of July–Second Week of October, 1968-1978

Source: U.S. Department of Agriculture (1968-1970, 1972-1978)

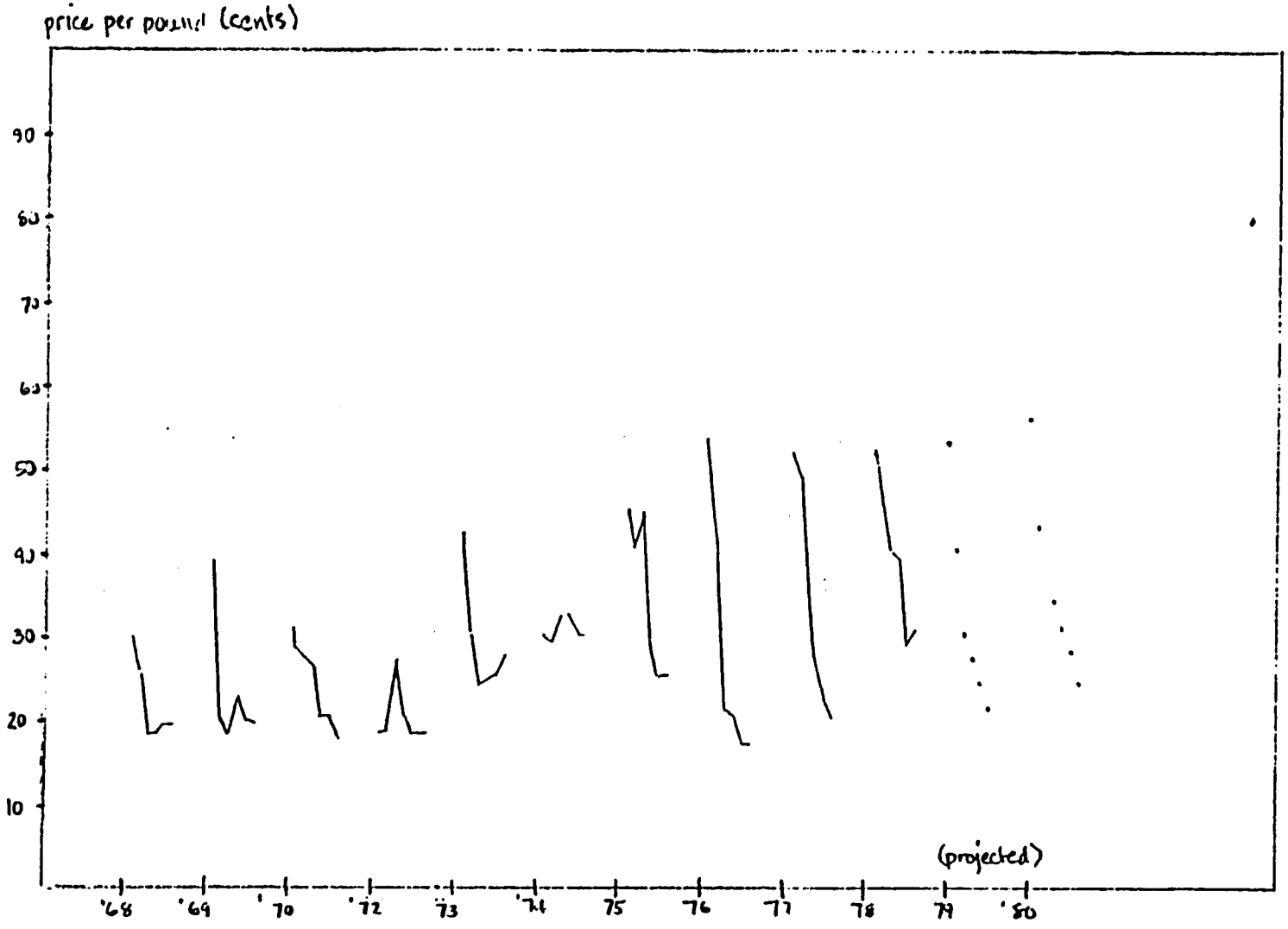


Figure 3. Los Angeles Wholesale Prices, Anaheim Chilis, Last Week of July-Second Week of October, 1968-1978

Source: U.S. Department of Agriculture (1968-1970, 1972-1978)

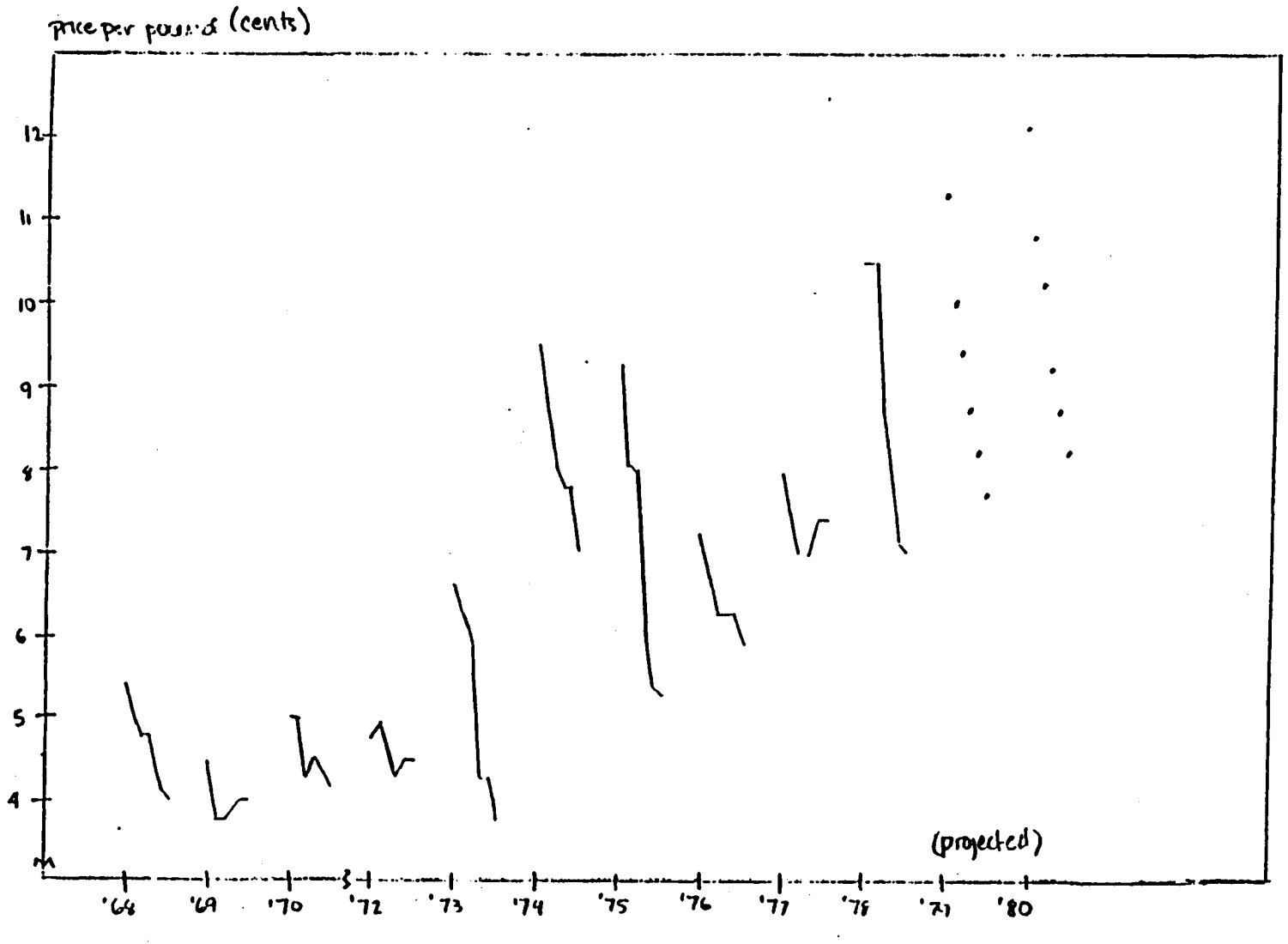


Figure 4. Los Angeles Wholesale Market Prices, Banana Squash, Last Week of July-Second Week of October, 1968-1978

Source: U.S. Department of Agriculture (1968-1970, 1972-1978)

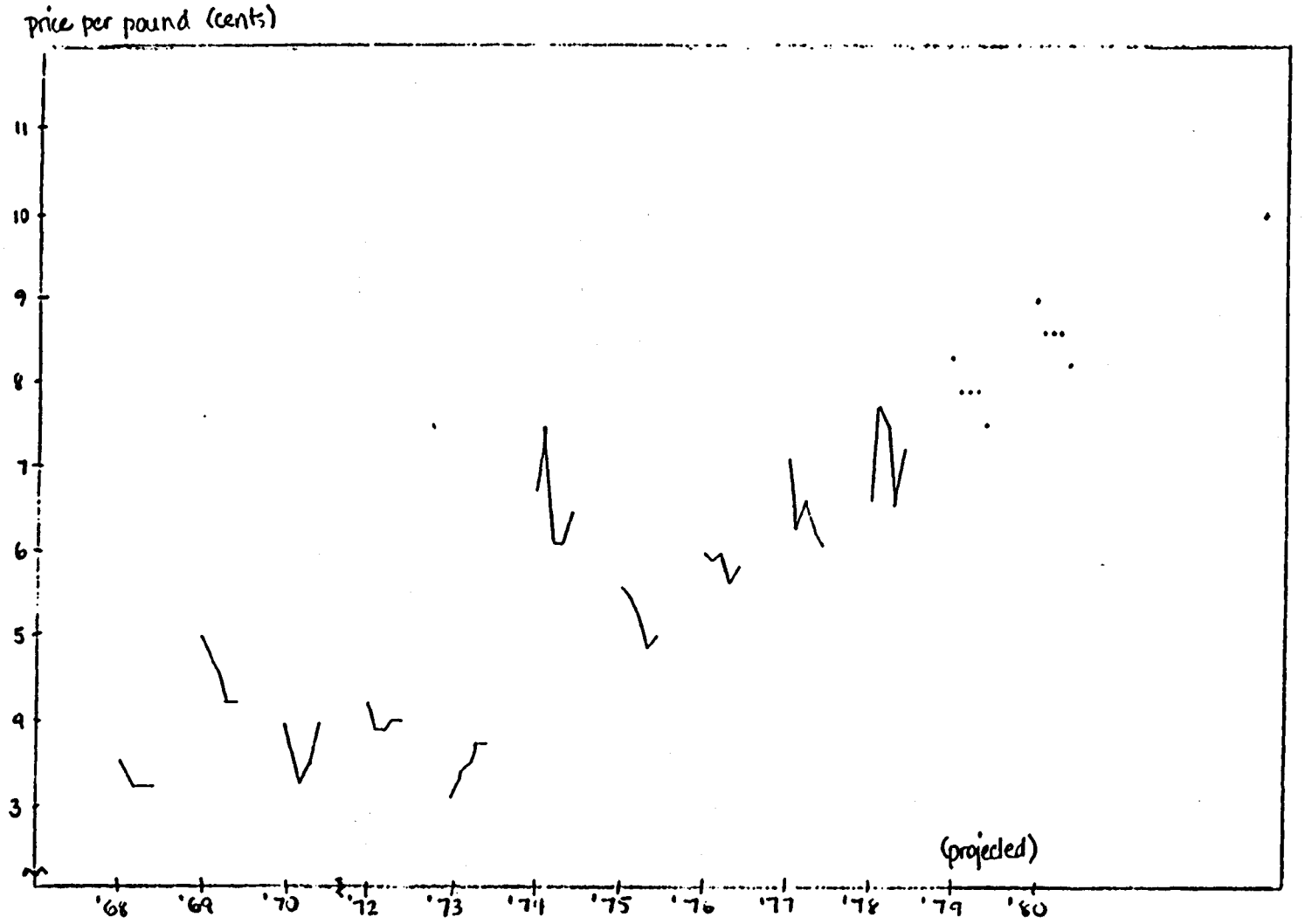


Figure 5. Los Angeles Wholesale Market Prices, Watermelons, Third Week of August-Second Week of October, 1968-1978

Source: U.S. Department of Agriculture (1968-1970, 1972-1978)

The 1978 chili pepper harvest period lasted 12 weeks. It began in the last week of July and ended in the second week of October (Figure 1). The harvest was concentrated during the middle 8 weeks.

Ten-year time series data presented in Figure 3 indicate that there may be increasing price fluctuations within each season. As in the bell pepper market, prices start out high in the beginning of the season and fall steadily. In the case of chili peppers, however, this decline is not usually reversed. By the middle of October, the market may be expected to be at its low point. The typical seasonal low end of the range shows no upward trend, though the high point seems to be increasing slowly over time.

Banana squash was harvested during a 12-week period between July 29 and October 21 (Figure 1). The harvest was well distributed through this period with slightly heavier volume between September 9 and October 7.

Ten-year time series data presented in Figure 4 indicate that prices are typically high at the beginning of the harvest, and low at the end. There has been an increasing trend in both the high and low price of each period.

The 1978 watermelon harvest lasted 10 weeks, beginning August 12 and ending October 21. Approximately 80 percent of the volume was marketed between the third and sixth week of harvest.

Ten-year time series data presented in Figure 5 indicate a steady increasing trend in average seasonal prices. As in the markets for the other three crops, high prices occur during the beginning of

the harvest, low prices usually during the seventh and eighth weeks, with slightly improved prices in the final 2 weeks.

In all four cases, prices at the beginning of the harvest period are higher than at the end. Analysis of competitive areas of production indicates that the Elfrida-McNeal vegetable harvest coincides with harvest in much of California. By mid-September and early October, producers in southern California are harvesting the end of their summer vegetable crop, while producers in the northern part of the state are harvesting early fall vegetables. Thus the greatest supply and the lowest prices of the season occur during this period of overlapping harvests.

Figures 2-5 provide a basis for future price projections used in estimating gross revenue to the cooperative. It is assumed that harvest timing in 1979 and 1980 will be approximately the same as it was in 1978. Therefore, based on price levels and trends over the relevant harvest periods in the past 10 years, average season prices are projected for five vegetable crops (Table 12). These season

Table 12. Projected Average Season Prices Received by Cochise Vegetable Growers' Association, 1979 and 1980

| Crop | Average Season Prices ($/lb) 1979 | 1980 |
|---|---|---|
| Bell peppers | 0.2305 | 0.2435 |
| Chili peppers (G) | .2875 | .3100 |
| Chili peppers (R) | .7500 | .7500 |
| Watermelons | .0600 | .0650 |
| Pumpkins | .0500 | .0600 |
| Banana squash | .0685 | .0740 |

prices have been weighted by the projected volume marketed in each 2-week operating period during each harvest season.

Figure 6 presents the projected harvest schedule for 1979 and 1980. The projected schedule shows the harvest more evenly distributed than the actual 1978 schedule.

## Projected Performance: Cochise Vegetable Growers' Association

Co-op members expect to increase their sales volume in 1979. By planting time they had approximately 170 acres pledged to vegetable production (Table 13). Though this acreage is less than that committed in 1978, the co-op is likely to increase its sales volume. Members have decided to limit the number of vegetables produced to those five with the highest marketable yields in 1978: watermelon, banana squash, pumpkin, and chili and bell peppers. The decision to concentrate on fewer crops is a logical one. In 1978, several crops grown for the first time were failures. As members gain more experience in the production of these five vegetables, they can be expected to be more selective about marketable varieties and cultural practices and thus to increase volume.

Table 14 presents projected personnel requirements for the 1979 co-op operating season. The cooperative has hired one general manager and one secretary-bookkeeper for the 1979 operating season. Both will work full-time through the season and as necessary after operations stop in October. In addition, one line supervisor and an 18-person crew will be hired for the packing shed. A double operating

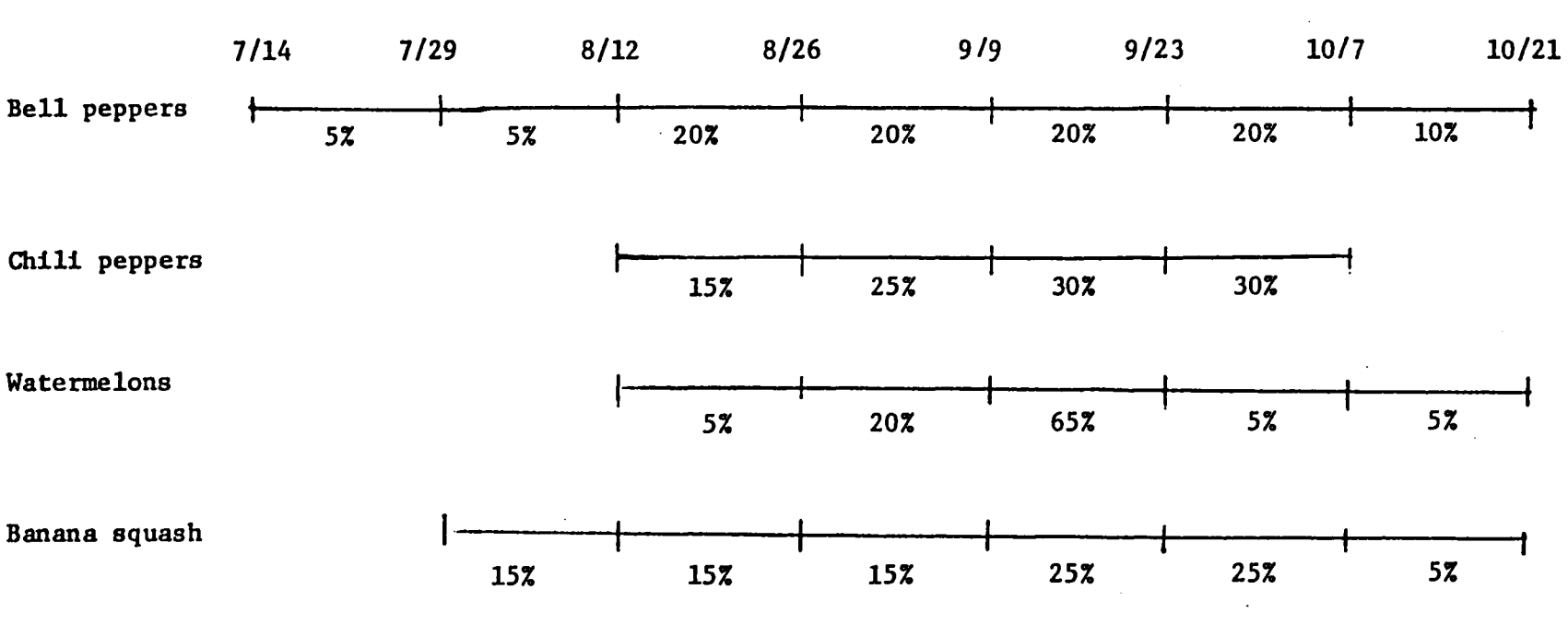


Figure 6. Projected Market Schedule, Five Crops, Cochise Vegetable Growers' Association, 1979-1980

Table 13. Projected Acreage and Marketable Yields, Cochise County Vegetable Growers' Association, 1979-1980

| Crop | Projected 1979 Acreage | Projected 1980 Acreage | Projected Marketable Yield (tons) |
|---|---|---|---|
| Bell peppers | 62 | 85 | 7 |
| Chili peppers | 35 | 50 | 7 |
| Watermelons | 35 | 35 | 15 |
| Pumpkins | 26 | 10 | 12 |
| Banana squash[a] | 10 | 20 | 12.5 |
| Total | 168 | 200 | |

[a]Approximate acreage planned by co-op members.

Table 14. Projected Personnel Requirements for 1979 Operating Season, Cochise Vegetable Growers' Association

| Position | Rate | Annual Cost (1979)[a] |
|---|---|---|
| Manager (1) | $800.00/month | $ 3,335 |
| Secretary-bookkeeper (1) | 4.25/hour | 3,306 |
| Line supervisor (1) | 4.00/hour | 2,944 |
| Line labor (18) | 2.90/hour | 19,207 |

[a]Includes 15 percent FICA taxes and benefits.

shift during periods 4 and 5 will necessitate hiring additional labor. See Tables 14 and 15 for personnel scheduling and wage rates.

Table 15. Projected Personnel Hours for 1979 Operating Season, Cochise Vegetable Growers' Association

| Position | Personnel Hours per 2-week Intervals | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 |
| Manager (1) | 80 | 80 | 80 | 90 | 90 | 80 | 80 |
| Secretary-bookkeeper (1)[a] | 80 | 80 | 80 | 90 | 90 | 80 | 80 |
| Line supervisor (1)[b] | 40 | 80 | 80 | 160 | 160 | 80 | 40 |
| Line labor (18)[b] | 720 | 1,440 | 1,440 | 2,880 | 2,880 | 1,440 | 720 |

[a]Additional help hired in weeks 7-8 and 9-10.

[b]Double shift in weeks 7-8 and 9-10. Extra labor hired.

The CVGA has received a seven-year operating loan from a commercial bank. This loan has been 90 percent guaranteed by the Farmers' Home Administration, U.S. Department of Agriculture (FmHA). Under authority granted by the Rural Development Act of 1972, FmHA may guarantee up to 90 percent of commercial loans made to private businesses and industry, including co-ops. A debt servicing schedule is presented in Table 16.

Table 17 shows a projected depreciation schedule for all co-op assets. A straight line depreciation method is used.

Table 16. Debt Service, Cochise Vegetable Growers' Association

| Loan purpose | Length of loan | Interest Rate | Loan Amount | Principal and interest (annual) |
|---|---|---|---|---|
| Operating capital[a] | 7 years | 12% | $150,000[b] | $31,188 |

[a]Payment on debt begins first period, 1979.

[b]90 percent FmHA guarantee.

Table 17. Proposed Straight Line Depreciation Schedule, Cochise Vegetable Growers' Association

| Asset | Cost ($) | Life Life (years) | Percent Depreciation Annually (%) | Annual Depreciation Allowance ($) |
|---|---|---|---|---|
| Land office complex[a] | 10,000 | 20 | 5 | 500 |
| Packing line[b] and improvements | 5,000 | 5 | 20 | 1,000 |
| Refrigeration | 31,000 | 10 | 10 | 3,100 |
| Forklift[b] | 7,000 | 5 | 20 | 1,400 |
| Total | 53,000 | | | 6,000 |

[a]Depreciation on office complex only.

[b]Reconditioned.

Table 18 presents the projected net price per pound received by co-op members for each of the five crops. This price represents the residual that remains after all marketing costs are deducted.

Table 18. Projected Net Prices, Cochise Vegetable Growers' Association, 1979

| Crop | Projected Net Prices ($/lb) (1) Average Season Price | (2) Marketing Cost | (3) Freight[a] Cost[a] | (4) Net Price | (5) Less 20% Retain |
|---|---|---|---|---|---|
| Bell peppers | 0.2305 | 0.015 | 0.0250 | 0.1905 | 0.1524 |
| Chili peppers (G)[b] | .2875 | .015 | .0250 | .2475 | .1980 |
| Chili peppers (R) | .7500 | .015 | - | .7350 | .5880 |
| Watermelons | .0600 | .015 | .0125 | .0325 | .0260 |
| Pumpkins | .0500 | .015 | .0125 | .0225 | .0180 |
| Banana squash | .0685 | .015 | .0125 | .0410 | .0328 |

[a]Assumed that bell peppers and chili peppers are marketed in California and Arizona. Pumpkins, banana squash, and watermelons marketed in Arizona only.

[b]Co-op members have agreed to sell green chilis until market price falls below $0.28 per pound. Approximately 40 percent of the crop should be harvested before this time.

Because of the extreme variability in vegetable production and marketing it is very important to understand what major assumptions

were used in the development of both the pro forma cash flow and projected net prices (Table 18) that are presented here. These assumptions are as follows:

1. Members harvest all acreage pledged to production with marketable yields at least as high as average yields achieved in 1978 (Table 13).
2. Harvest timing is approximately the same as in 1978, that is, between August 1 and mid-October. In addition, it is assumed that the harvest is better coordinated. Members may, of course, stagger plantings so as to spread the harvest more evenly through the season. A staggered system of planting will reduce the likelihood of having too much produce arrive at the co-op at one time, as well as possible labor shortages. A comparison of Figure 1 (1978 harvest) and Figure 6 (projected 1979-1980 harvest) reflects a more coordinated schedule.
3. Produce prices in 1979 and 1980 follow seasonal patterns typical of the last 10 years (Figures 2-5).
4. Prices received by the co-op are approximately 75 percent of Los Angeles wholesale prices less freight charges. This assumption is based on a comparison of 1978 co-op records and Market News Service data. A summary of projected prices received by the co-op appears in Table 12.
5. Buyers procure transportation and deduct freight charges from co-op receipts.
6. Ten percent of the total volume of peppers is shipped to San Francisco at $1.00 per box. Sixty percent is shipped to Los

Angeles at $0.75 per box. Thirty percent is shipped to Tucson and Phoenix at $0.25 per box. Simple weighted average freight cost is $0.625 per box or $0.025 per pound of fresh peppers. (This assumption is based on size of wholesale markets in each of the three cities. While Phoenix is growing in importance as a market, it is still not a major distribution center for most buyers. Therefore, the co-op cannot expect to sell the majority of its product at the closer market.) The other three crops are marketed in Tucson and Phoenix at an appropriate cost of $0.0125 per pound.

7. The cooperative deducts $0.015 per pound from sales receipts to cover operating expenses. If funds in excess of expenses are generated by this deduction, they can be refunded according to member patronage after the close of operations in 1979.

A summary of deductions consistent with these assumptions was presented earlier in Table 18. The net price per pound in column (4) is used in Chapter 4 to calculate returns over variable costs for vegetables.

Several additional assumptions were made in the development of the pro forma cash flow for 1980. A new method of calculating operating deductions and per unit retains is introduced. Per pound expenses incurred by the operation of the packing line are now charged against the two vegetables that require packing (bell peppers and fresh chilis). These expenses include all line labor and packing boses. The remaining expenses are prorated on a per pound basis among

all the vegetables. Whereas in 1979 the heavier and lower-value crops subsidized peppers, in 1980 operating deductions are made according to the actual marketing costs incurred. This results in a $0.065 deduction on fresh peppers and a $0.016 deduction on the remaining crops.

If this policy is adopted, a smaller per unit retain can be deducted and set aside for equity expansion. Only retains and not operating deductions are considered as taxable income to the farmer. Thus it is to the members' advantage to make sure that retains are withheld only for purposes of capital expansion or for covering future operating losses.

Together, these assumptions and policy recommendations lay the groundwork for the development of the pro forma financial statements presented here (Tables 19-22). To the extent these assumptions are correct and the policy changes are adopted, we may conclude that the co-op is likely to be in sound financial condition by the end of the 1980 season. The projected cash flow indicates that at no time is the co-op likely to have a negative cash balance. The projected operating statement indicates that both 1979 and 1980 should show a net increase of revenues over costs.

In addition, it appears that the equity position of co-op members should improve over time. Capital retains will continue to favorably affect the ratio of long-term debt to equity. However, if the deduction policy proposed here is adopted in 1980, it will result in smaller net increase of funds (Table 22). If, at some future date, the membership decides that further investment is desirable, they may vote to increase their retains.

Table 19. Explanatory Notes: Pro Forma Cash Flow, Cochise Vegetable Growers' Association, 1979-1980

| Row Heading | Explanation |
|---|---|
| Salaries and wages | See Tables 14 and 15. Approximately 9 percent cost of living increase and extra period of double shift, third year of operation. |
| Producer payment | Total value of produce sales, less $0.015 per pound operating deduction, less 20 percent retain. Producers are paid when co-op receives payment from buyers, approximately 28 days after sale. |
| Packing boxes | 42,560 boxes required for 1979 operating season at $0.67 per box. Build inventory on hand to 15 percent and purchase one-half required stock during start-up. Purchase remainder in Period 4; $0.75 per box in 1980. |
| Utilities | Electricity, water, natural gas; 15 percent increase, 1980. Pump is electric. Water is required to wash produce on line and to run hydrocooler. |
| Telephone | See Tables 20 and 21; 15 percent increase, 1980. |
| Licenses and permits | Federal, state, and local. Annual renewal. |
| Advertising | Trade journals, etc.; 15 percent increase, 1980. |
| Insurance | Truck plus property insurance. |
| Legal-professional | Semi-annual audit at $600/audit and miscellaneous legal assistance. |
| Dues and subscriptions | Blue Book plus trade journals. |
| Office expenses | Supplies and postage; 15 percent increase, 1980. |
| Maintenance | Labor and materials required for upkeep of packing equipment, office, and vehicle; 15 percent increase, 1980. |

Table 19. Explanatory Notes--Continued

| Row Heading | Explanation |
|---|---|
| Travel | Mileage and expenses to personnel for business use of personal vehicles; 15 percent increase, 1980. |
| Forklift lease | Monthly lease rate for one forklift. |
| Capital goods | |
| Forklift | One reconditioned forklift. |
| Improvements | Concrete slab, 30 square yards at $35 per square yard. |
| Principal | See Table 16. |
| Interest | See Table 16. |
| | Cash Received |
| Sales, net retain | See Tables 20 and 21. Assume 28-day accounts receivable. Prices are based on Los Angeles wholesale discounted by 25 percent and by appropriate freight charges. |
| Retain | (Twenty percent) x (sales less per pound operating charge) in 1979. Rate of retain decreased to 10 percent in 1980. |
| Loan | See Table 16. |
| Total cash received | See Tables 20 and 21. |
| | Flow |
| Cash flow | Total cash received minus total cash disbursed per period. |
| Accumulated cash flow | Cumulative cash flow total; second year of operations begins in start-up period, ends June 30, 1980; third year begins July 1, 1980, ends June 30, 1981. |

Table 20. Pro Forma Cash Flow, Second Year of Operation, July 1, 1979-June 30, 1980, Cochise Cochise Vegetable Growers' Association

| Crop | Pro Forma Cash Flow by Two-week Operating Periods ($) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (start-up) 7/1-7/14 | (1) 7/15-7/28 | (2) 7/29-8/11 | (3) 8/12-8/25 | (4) 8/26-9/8 | (5) 9/9-9/22 | (6) 9/23-10/6 | (7) 10/7-10/20 | (close) 10/21-11/4 | 11/5-6/30 |
| Cash disbursed | | | | | | | | | | |
| Salaries and wages | | | | | | | | | | |
| Manager | 115 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | --- | --- |
| Secretary-bookkeeper | 98 | 388 | 388 | 388 | 440 | 440 | 388 | 388 | 388 | 350 |
| Line supervisor(s) | --- | 184 | 368 | 368 | 736 | 736 | 368 | 184 | --- | --- |
| Line labor | --- | 1,200 | 2,401 | 2,401 | 4,802 | 4,802 | 2,401 | 1,200 | --- | --- |
| Producer payment | --- | --- | --- | 8,680 | 25,823 | 56,636 | 27,789 | 34,391 | 29,330 | 15,848 |
| Packing boxes | 14,867 | --- | --- | -- | 14,264 | --- | --- | --- | --- | --- |
| Utilities | 50 | 100 | 350 | 350 | 700 | 700 | 350 | 100 | 50 | --- |
| Telephone | 25 | 200 | 200 | 200 | 325 | 325 | 200 | 100 | 50 | --- |
| Licences/permits | 175 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Advertising | --- | 50 | 50 | 50 | 75 | 75 | 50 | 50 | --- | --- |
| Insurance | 500 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Legal/professional | 100 | --- | --- | 600 | --- | --- | --- | --- | 800 | --- |
| Dues and subscriptions | 450 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Office expenses | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | --- | --- |
| Maintenance | 250 | 75 | 75 | 150 | 150 | 150 | 150 | 75 | --- | --- |
| Travel expenses | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | --- | --- |
| Forklift lease | --- | 175 | --- | 175 | --- | 175 | --- | 88 | --- | --- |
| Capital goods | | | | | | | | | | |
| Forklift | 7,000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Improvements | 1,200 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Principal | --- | 1,667 | --- | 1,667 | --- | 1,667 | --- | 1,667 | --- | 14,761 |
| Interest | --- | 759 | --- | 759 | --- | 759 | --- | 759 | --- | 6,723 |
| Total cash out | 24,955 | 5,383 | 4,417 | 16,373 | 47,900 | 67,050 | 32,281 | 39,587 | 30,618 | 37,682 |
| Cash received | | | | | | | | | | |
| Sales net retain | --- | --- | --- | 9,331 | 27,411 | 62,588 | 38,417 | 57,220 | 42,614 | 50,755 |
| Retain | --- | --- | --- | 2,170 | 6,550 | 14,384 | 7,566 | 10,860 | 8,401 | 10,724 |
| Loan | 150,000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total cash | 150,000 | --- | --- | 11,501 | 33,961 | 76,977 | 45,983 | 68,080 | 51,015 | 61,479 |
| Cash flow | 125,045 | (5,383) | (4,417) | (4,872) | (13,939) | 9,922 | 13,702 | 28,493 | 20,397 | 23,797 |
| Accumulated cash flow | 125,043 | 119,662 | 115,245 | 110,373 | 96,434 | 106,356 | 120,058 | 148,551 | 168,948 | 192,745 |

Table 21. Pro Forma Cash Flow, Third Year of Operation, July 1, 1980-June 30, 1981, Cochise Vegetable Growers' Association

| Item | Pro Forma Cash Flow by Two-week Operating Periods ($) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (start-up) 7/1- 7/14 | (1) 7/15- 7/28 | (2) 7/29- 8/11 | (3) 8/12- 8/25 | (4) 8/26- 9/8 | (5) 9/9- 9/22 | (6) 9/23- 10/6 | (7) 10/7- 10/20 | (close) 10/21- 11/4 | 11/5- 6/30 |
| Cash disbursed | | | | | | | | | | |
| Salaries and wages | | | | | | | | | | |
| Manager | 125 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | --- | --- |
| Secretary-bookeeper | 107 | 423 | 423 | 423 | 480 | 480 | 480 | 423 | 423 | 380 |
| Line supervisor(s) | --- | 200 | 401 | 401 | 802 | 802 | 802 | 200 | --- | --- |
| Line labor | --- | 1,308 | 2,617 | 2,617 | 5,234 | 5,234 | 5,234 | 2,617 | --- | --- |
| Producer payment | --- | --- | --- | 11,513 | 15,295 | 69,250 | 72,508 | 51,628 | 38,528 | 61,532 |
| Packing boxes | 22,125 | --- | --- | --- | 22,125 | --- | --- | --- | --- | --- |
| Utilities | 58 | 115 | 403 | 403 | 806 | 806 | 806 | 115 | 58 | --- |
| Telephone | 29 | 230 | 230 | 230 | 374 | 374 | 374 | 115 | 58 | --- |
| Licenses/permits | 175 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Advertising | 55 | 55 | 55 | 83 | 83 | 83 | 83 | 55 | --- | --- |
| Insurance | 600 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Legal/professional | 100 | --- | --- | 600 | --- | --- | --- | --- | 800 | --- |
| Dues and subscriptions | 450 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Office expenses | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | --- |
| Maintenance | 275 | 83 | 83 | 165 | 165 | 165 | 165 | 83 | --- | --- |
| Travel expenses | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | --- | --- |
| Forklift lease | --- | 200 | --- | 200 | --- | 200 | --- | 100 | --- | --- |
| Capital goods | | | | | | | | | | |
| Forklift | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Improvements | 1,500 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Principal | --- | 1,667 | --- | 1,667 | --- | 1,667 | --- | 1,667 | --- | 14,761 |
| Interest | --- | 759 | --- | 759 | --- | 759 | --- | 759 | --- | 6,723 |
| Total cash out | 25,743 | 5,684 | 4,856 | 19,705 | 46,008 | 80,464 | 81,096 | 58,406 | 39,925 | 83,396 |
| Cash received | | | | | | | | | | |
| Sales net retain | --- | --- | --- | 15,381 | 20,363 | 93,535 | 103,913 | 80,018 | 58,758 | 73,387 |
| Retain | --- | --- | --- | 1,279 | 1,700 | 7,694 | 8,056 | 5,736 | 4,281 | 6,837 |
| Loan | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total cash in | --- | --- | --- | 16,660 | 22,063 | 101,279 | 111,969 | 85,754 | 63,039 | 80,224 |
| Cash flow | (25,743) | (5,684) | (4,856) | (3,045) | (23,945) | 20,815 | 30,873 | 27,348 | 23,114 | (3,172) |
| Accumulated cash flow | 167,002 | 161,318 | 156,462 | 153,417 | 129,472 | 150,287 | 181,160 | 208,508 | 231,622 | 228,450 |

Table 22. Pro Forma Statement of Operations, Second and Third Years of Operation, Cochise Vegetable Growers' Association

| Item | 7/1/79-6/30/80 | 7/1/80-6/30/81 |
|---|---|---|
| Income: | | |
| Bell peppers | $178,374 | $252,221 |
| Chili peppers (G) | 51,451 | 91,526 |
| Chili peppers (R) | 30,000 | 45,000 |
| Watermelon | 51,771 | 52,025 |
| Banana squash | 14,000 | 29,413 |
| Pumpkins | 23,400 | 10,800 |
| Gross income | 348,996 | 480,988 |
| Less: Per unit retains[a] | 60,655 | 35,583 |
| Gross margin | 288,341 | 445,405 |
| Expenses: | | |
| Salaries | 28,792 | 36,136 |
| Producer payment | 198,497 | 320,254 |
| Packing boxes | 29,131 | 44,250 |
| Operating expenses | 9,475 | 11,255 |
| Lease (forklift) | 613 | 700 |
| Interest | 9,759 | 9,759 |
| Depreciation | 6,000 | 6,000 |
| Total expenses | 282,267 | 428,354 |
| Net earnings | 6,074 | 17,051 |
| Repayment ability: | | |
| Capital retain[a] | 60,655 | 35,583 |
| Net earnings | 6,074 | 17,051 |
| Total | 66,729 | 52,634 |
| Application of funds | | |
| Principal | 21,429 | 21,429 |
| Total | 21,429 | 21,429 |
| Net increase | 45,300 | 31,205 |

[a]In 1979, retains are 20% and in 1980, 10%, or sales less operating deduct.

Equity redemption is not likely in the immediate future. It is assumed here that co-op members will make some provision for operating expansion, if their initial years are successful. Retains should be set aside for such purposes until future facility needs are established and met.

# CHAPTER 4

## RETURN OVER VARIABLE COSTS: FIELD CROPS AND VEGETABLES

In Chapter 3 attention was concentrated on the variable costs of marketing vegetables. In five cases, it was found that sales revenue can at least cover marketing costs. In addition, it was found that a well-managed vegetable cooperative appears viable.

In this chapter an examination of both field crops and vegetables is made. Since all variable costs have been estimated, price and yield data can be combined with expense information to generate total net returns over variable costs.

### Gross Returns

Typical Elfrida-McNeal yields are combined with 1979 price projections to calculate gross returns (Table 23). Field crop prices are those quoted in Hathorn and Sullivan (1979). Vegetable prices are those estimated in the preceding chapter.

### Net Returns

Projected net returns over variable costs for all crops are presented in Tables 24 and 25. On the basis of these data, it can be concluded that four selected vegetables generate relatively high net returns. They are bell peppers, chili peppers, watermelons, and banana squash. Together with selected field crops and a fifth

Table 23. Projected Gross Returns per Acre, Elfrida-McNeal Area, 1979

| Crop | Marketable Yield/Acre | Price/ Unit ($) | Gross Return/ Acre ($) |
|---|---|---|---|
| Vegetables | | | |
| Bell peppers | 7 tons | 0.2305/lb | 3,227 |
| Chili peppers[a] | 5,600 lb | .2875/lb | 2,820 |
| (R after G) | 1,680 lb | .7500/lb | |
| Watermelon | 15 tons | .0600/lb | 1,800 |
| Banana squash | 12 1/2 tons | .0685/lb | 1,713 |
| Pumpkins | 12 tons | .0500/lb | 1,200 |
| Field Crops | | | |
| Cotton: | | | |
| Lint | 700 lb | .61/lb | 485 |
| Seed | 1,155 lb | 100.00/ton | |
| Alfalfa | 5.5 tons | 70.00/ton | 385 |
| Corn | 6,000 lb | 4.50/cwt | 270 |
| Pinto beans | 1,300 lb | 20.00/cwt | 260 |
| Sorghum | 5,400 lb | 4.35/cwt | 235 |

[a]"G" refers to fresh green chilis for processing. "R" refers to dried red chilis. "R after G" refers to red chilis left in the field after green harvest.

Table 24. Projected Net Returns per Acre, Five Vegetables, Elfrida-McNeal Area, 1979

| Crop | Projected Net Returns per Acre ($) | | | | | |
|---|---|---|---|---|---|---|
| | Gross Revenue | Production Cost | Marketing Cost | Freight Cost | Net Return | Return Less 20% Retain |
| Bell pepper | 3,227 | 624 | 210 | 350 | 2,043 | 1,634 |
| Chili peppers | 2,870 | 1,008 | 109 | 140 | 1,613 | 1,290 |
| Watermelon | 1,800 | 552 | 450 | 375 | 423 | 338 |
| Banana squash | 1,713 | 514 | 375 | 313 | 511 | 409 |
| Pumpkins | 1,200 | 495 | 360 | 300 | 45 | 36 |

Table 25. Projected Net Returns per Acre, Five Field Crops, Elfrida-McNeal Area, 1979

| Crop | Projected Net Returns per Acre ($) | | |
|---|---|---|---|
| | Gross Revenue | Total Variable Cost | Net Return |
| Cotton | 485 | 296 | 189 |
| Sorghum | 235 | 207 | 28 |
| Corn | 270 | 245 | 25 |
| Pinto beans | 260 | 186 | 74 |
| Alfalfa | 385 | 203 | 182 |

vegetable (pumpkins) these vegetables are evaluated for their contribution to total income on a 200-acre representative farm in Chapter 6.

# CHAPTER 5

# FIXED COST ANALYSIS

## Concepts

Before evaluating returns to management on a representative farm, there must first be a calculation of what fixed costs are incurred by the fact of farm ownership. Fixed costs consist of depreciation on capital investment, opportunity cost or interest on average investment, taxes, and insurance. Unlike total variable costs, total fixed costs remain constant regardless of the number of acres on the farm that are actually cultivated. Returns over variable costs must be adequate to cover all fixed costs if a farm is to be profitable in the long run. A summary of fixed costs for the representative farm is presented in Table 26.

## Calculation of Fixed Costs

The four major types of fixed costs are calculated as follows.

### Depreciation

Physical assets are assumed to decline in value due to both physical deterioration and technological obsolescence. This assumption implies that at least some loss in value is a function of time rather than hours of actual use. For this reason depreciation is classified here as a fixed cost.

Table 26. Summary of Fixed Costs for 200-acre Representative Farm, Elfrida-McNeal Area, 1979

| Item | Costs ($) | |
|---|---|---|
| Depreciation | | |
| Machines | 10,847 | |
| Wells | 15,279 | |
| Buildings | 60 | |
| Total | | 26,186 |
| Interest on Average Investment | | |
| Land | 10,200 | |
| Machines | 7,130 | |
| Wells | 4,755 | |
| Buildings | 51 | |
| Total | | 22,136 |
| Taxes | | |
| Land and improvements (including wells) | 1,076 | |
| Machinery | 1,736 | |
| Total | | 2,812 |
| Insurance | | |
| Pumping equipment | 102 | |
| Machinery (off-road) | 524 | |
| Machinery (on-road | 469 | |
| Total | | 1,095 |
| Total Fixed Costs | | 52,229 |

Straight-line depreciation is used. The annual depreciation of physical assets is:

$$\text{depreciation} = \frac{\text{purchase price - salvage value}}{\text{lifetime in years}}$$

Purchase prices for all machinery are quoted in Hathorn (1979). The salvage or remaining farm value(RFVr) for machinery is calculated according to the method presented in that report.

Well depreciation estimates for the Elfrida-McNeal area are obtained from Hathorn and Sullivan (1979).

Building depreciation is based on a current replacement price of $0.98 per square foot, a lifetime of 20 years, and zero salvage value.

Interest on Average Investment

The opportunity cost of capital ownership must be included in fixed costs. This cost is a non-cash expense that represents an interest payment on borrowed money or the potential return generated by capital in its best alternative use. If net returns over variable costs fail to cover the grower's interest on investment, then more profitable use should be made of his capital. Average investment for machinery and wells is equal to:

$$\frac{\text{current replacement price + salvage value}}{2}$$

This cost is calculated for all machinery, wells, and buildings at a rate of 8.5% of average investment.

Interest on land investment is computed as a straight percentage of the current market value. Agricultural land with adequate underground water is currently selling for $600 per acre in the Elfrida-McNeal area.

Taxes

Eighteen percent of the Arizona Department of Revenue guideline value of land, improvements, and wells is taxed at a rate of $11.50 per $100 of assessed valuation. This guideline value in Cochise County is $260 per acre and is used for tax purposes only (Hathorn and Sullivan, 1979). Eighteen percent of the average investment in machinery is taxed at a rate of $11.50 per $100 value (Hathorn, 1979).

Insurance

The average investment in the pumping power assembly is insured at $0.94 per $100 value. The average investment in off-road farm machinery is insured at an annual rate of $0.70 per $100 value, while road vehicles are insured at a rate of $5.20 per $100 value.

# CHAPTER 6

# REPRESENTATIVE FARM BUDGETS

## Production Mix

The next stage in estimating returns to management is the development of a crop pattern or production mix for the representative farm. This task presents some difficulties. The small sample size made interview data collected for this report inadequate. Additional data and considerations were necessary.

There are two basic criteria that could be used to select a typical production mix. The first is that the plan should reflect actual crop combinations chosen by farmers in the area under study. It is certainly not unrealistic to assume that the farmers themselves have evaluated production costs, risks, marketing returns, and resource constraints and that they have chosen a "reasonable" crop combination.

The second criterion upon which to base the design of a represemtative farm concerns the return over total variable cost (TVC), as calculated in each individual crop budget. Theoretically, the crops that will be grown are those with the highest return over variable cost given the production and marketing constraints of each particular farmer as well as his willingness and ability to bear risk.

In practice, the use of both these criteria to develop a crop pattern poses several problems. Actual patterns in the Elfrida area

are not those that seem to earn the highest net return. For this reason it is valuable to make a step-by-step examination of why two alternative crop patterns are used in this study and how they are developed.

Analysis of what field crops are grown in the Elfrida-McNeal area is not difficult. The two sources of information regarding the allocation of field crop acreage, as presented in Table 27, are consistent.

Table 27. Field Crop Acreage, Cochise County and Elfrida-McNeal Area, 1977

| | Acreage Planted (%) | |
|---|---|---|
| Crop | Cochise County[a] | Elfrida-McNeal[b] |
| Cotton (all) | 31.7 | 47.6 |
| Corn | 30.1 | 37.2 |
| Sorghum | 15.9 | 11.5 |
| Alfalfa hay | 8.8 | .6 |
| Wheat | 4.5 | 0.0 |
| Sugarbeets | 1.9 | 0.0 |
| Barley | .7 | 0.0 |
| Pinto beans | 0.0 | 3.1 |
| Other | 6.4 | 0.0 |
| Total | 100.0 | 100.0 |

[a]Arizona Crop and Livestock Reporting Service (1978).

[b]Data based on personal interviews with 14 farmers, 1979.

On the basis of these data, it is apparent that a representative farm would consist of 30-50 percent cotton acreage, 30-40 percent field corn acreage, and/or 10-20 percent sorghum acreage. The data suggest that Elfrida-McNeal farmers are more specialized in cotton and corn.

Because vegetable production has been introduced so recently to the Elfrida-McNeal area, there are no published acreage figures. Therefore, despite the small sample size, the interviews conducted for this report are very important. All 14 growers interviewed raised vegetables. Average acreage planted in vegetables was 68. Table 28 shows which vegetables were produced.

Table 28. Vegetable Acreage, Elfrida-McNeal Area, 1978, Fourteen Growers Surveyed

| Crop | Total Acres | Percent of Total Vegetables | Number of Growers | Average Acres per Grower |
|---|---|---|---|---|
| Chili peppers | 554.0 | 61.1 | 11 | 50.4 |
| Sweet corn | 163.0 | 18.0 | 4 | 40.8 |
| Pumpkins | 67.0 | 7.4 | 4 | 16.8 |
| Watermelon | 66.5 | 7.3 | 7 | 9.5 |
| Bell peppers | 35.5 | 3.9 | 8 | 4.4 |
| Cucumbers | 12.0 | 1.3 | 3 | 4.0 |
| Cantaloupes | 5.0 | .6 | 2 | 2.5 |
| Squash (winter and summer) | 4.0 | .4 | 2 | 2.0 |

Twenty-two percent of the acreage farmed by the growers surveyed was planted in vegetables, with the remaining 78 percent in field crops. If the crop pattern for a representative farm were to be chosen on the basis of what farmers actually planted in recent years, it would consist of the following:

| Crop | Percentage of Farmed Acres |
|---|---|
| Cotton | 45 |
| Field corn | 35 |
| Chilis | 13 |
| Sweet corn | 5 |
| Others | 2 |

However, there is a second criterion upon which to base a representative crop pattern for farm budget analysis. An optimal combination of crops is that which will maximize net return over variable costs, given resource constraints and risk preference. In other words, a farmer will plant the crops that give him the most return over production costs, subject to the resources at his disposal and consistent with his financial and psychological ability to face risk. (Over the long run, return over variable costs generated by the whole enterprise must be adequate to cover fixed costs. Because these costs are incurred regardless of what is produced, they do not affect the selection of a crop pattern.)

Individual budgets for all crops to be considered were presented in Chapter 2. For all crops other than field corn, yields projected by Hathorn and Sullivan (1979) are relatively close to

actual figures obtained both by interviewing and from published data. For corn, however, the 1979 Hathorn and Sullivan yield projection is significantly higher than what past trends would indicate. This projection, of course, causes inflated returns over variable costs and also doubt as to whether field corn should be included in the production mix of a representative farm. Because of the recent expansion of corn production and conflicting evidence as to its profitability, a careful examination of the corn question is warranted.

Only in the last few years has field corn become a significant crop in Cochise County. From 1970-1975, an average of 660 acres were planted annually. In 1976 and 1977, total annual acreage averaged 26,400 (Arizona Crop and Livestock Reporting Service, 1970-1978).

Six of the farmers interviewed for this report planted field corn in 1978. Insect problems caused a low average yield of 3,950 lb per acre, well below that required to cover variable costs. Only the three with the largest 1978 corn acreages expected to plant corn in 1979. Two of these farms were larger than the modal size. These results may indicate that smaller farmers, or those who plant a smaller percentage of their land in corn, do not have the expertise to make money by producing this crop.

For a representative farm of 200 acres, then, we may expect that corn is not a profitable crop. Despite the fact that corn amounted to approximately 30 percent of field acreage planted by the 14 farmers, its future production is extremely questionable. For this reason, two alternative crop patterns or farm plans are proposed for analysis, one with and one without corn.

Data regarding cotton are not as contradictory. Given current average yields and prices, production of upland cotton generates adequate return over variable cost. These data are consistent with decisions made by farmers regarding cotton acreage. Therefore, 50 percent of both representative farm plans is planted in cotton. (Arizona farmers have typically planted no more than 50 percent of their acreage in cotton. This allocation is presumably consistent with their risk preference.)

Vegetable budgets (Chapter 2) and marketing costs (Chapter 3) provide the data necessary for using the net return over total variable cost criterion to select vegetables for a representative crop pattern. Tentative conclusions regarding the return over TVC can be drawn, despite a relative lack of familiarity with production techniques on the part of the farmers. Bell peppers, chili peppers, watermelons, and banana squash appear to generate the safest margin over variable production and marketing costs (Table 24).

## Alternate Farm Plans

To get a clear understanding of what contribution vegetable production can make to net farm income it is necessary to formulate alternative farm plans with and without vegetables, and then to compare the returns to land and management generated by each. The two logical farm plans to examine are (A) the traditional cotton-chili-corn rota- (Table 29) and (B) the proposed cotton-chili-vegetable rotation (Table 30).

Table 29. Projected Farm Budget, Representative 200-acre General Crop Farm, Elfrida-McNeal Area, 1979, Alternative A

| | | | |
|---|---|---|---|
| Returns over Variable Cost | | | |
| Cotton (100 acres) | $18,900 | | |
| Corn (80 acres | 2,000 | | |
| Chilis (20 acres)[a] | 25,800 | | |
| Total | | $ 46,700 | |
| Fixed Costs | | | |
| Depreciation | 26,186 | | |
| Interest on investment | 22,136 | | |
| Taxes | 2,812 | | |
| Insurance | 1,095 | | |
| Total fixed costs | | 52,229 | |
| Return to Management | | - $ 5,529 | |
| Percent Return on Investment (Management) | | | -2.1% |
| Interest on Land Investment | | 10,200 | |
| Return to Land and Management | | $ 4,671 | |
| Percent Return on Investment (Land and Management) | | | 1.8% |

[a]Retains of $6,460, or $323 per acre, have been subtracted from these returns. It is not likely that the cooperative will revolve retains during initial operating years. However, retains are considered taxable income.

Table 30. Projected Farm Budget, Representative 200-acre General Crop Farm with 50 Acres Fallow, Elfrida-McNeal Area, 1979, Alternative B

| | | | |
|---|---|---|---|
| Returns over Variable Cost | | | |
| Cotton (100 acres) | $18,900 | | |
| Chilis (20 acres)[a] | 25,800 | | |
| Bell peppers (10 acres)[a] | 16,340 | | |
| Banana squash (5 acres)[a] | 2,045 | | |
| Watermelons (15 acres)[a] | 5,070 | | |
| Fallow (50 acres) | 0 | | |
| Total returns over variable costs | | $68,155 | |
| Fixed Costs | | | |
| Depreciation | 26,186 | | |
| Interest on investment | 22,136 | | |
| Taxes | 2,812 | | |
| Insurance | 1,095 | | |
| Total fixed costs | | 52,229 | |
| Return to Management | | $15,926 | |
| Percent on Land Investment (Management) | | | 6.1% |
| Interest on Land Investment | | 10,200 | |
| Return to Land and Management | | $26,126 | |
| Percent Return on Investment (Land and Management) | | | 10.1% |

[a]Retains have been subtracted from these returns. The total dollar amounts of these retains are as follows: chilis--$6,460, bell peppers--$4,090, banana squash--$510, watermelons--$1,275.

The total vegetable acreage in each farm plan is limited by the marketing capacity of Elfrida-McNeal farmers. The number of vegetable acres one farmer cultivates cannot exceed the local cooperative's capacity to market produce from an individual member. Both farm plans are constrained by this important factor.

Note that Farm Plan B includes 50 acres of fallow land. To minimize risk on cotton and at the same time not exceed vegetable marketing capacity, only 145 acres are planted under this alternative. An increase in either cotton or vegetable acreage may increase farm income but will also involve higher risk.

In keeping with cost theory, identical fixed costs are subtracted from returns over variable costs in both cases. Each farm plan includes 200 acres. Returns to land and management are minimal for Farm Plan A and acceptable for Farm Plan B. Given the assumptions upon which the individual crop budgets have been formulated, we may conclude that vegetable production can increase return on investment by 8.3 percent.

## Risk

All long-range crop planning activity must allow for variation in net income. Usually, high-value crops are associated with a high degree of risk. Profitable years may be followed by years in which farmers cannot cover their costs. The fresh vegetable market in particular may be extremely volatile, subject to the industry structure, harvest timing, etc. Therefore, a realistic estimate of how feasible vegetable production is should include an analysis of its

inherent risks. The net income variability of field crops should also be examined, in addition to the overall risks involved in the two alternative farm plans under consideration.

The procedure for analyzing net income variability for a particular crop involves four steps (Wildermuth, Shane, and Gum, 1971a, -b, and 1972). First, time series data regarding net income per acre are collected. Costs are subtracted from gross income (or yield x price price per unit) to find net income for each year in the series.

Second, a regression analysis of the data is used to relate net income per acre to time. This method eliminates the trend effect on variability. For example, if net income is rising over time, the predictable rising trend must be eliminated in order to examine unpredictable or random variation in isolation.

Third, a variability coefficient for each crop is calculated as follows:

$$VC = \frac{\sigma}{\bar{X}} \times 100$$

where

VC = variability coefficient

$\sigma$ = standard deviation of net income over data range

$\bar{X}$ = mean net income over data range.

Lastly, the net income variability coefficient is estimated. Assuming that net income is distributed normally, one may predict how often net income will be greater (or less) than a specified figure.

Before analyzing the results of this procedure, factors that influence variability should be noted. Gross income (price x yield) minus costs equals net income. Gross income is affected by fluctuations in market prices and in the yields obtained by growers in a given area. Supply from Cochise County has been small enough that it has not influenced market price. Local farmers are price takers. When their yields are low, the total market supply is not affected enough to force prices up. It follows, then, that if their yields are extremely variable, their net income will be variable as well.

Results presented in Table 31 indicate that there is substantial net income fluctuation in field crop production. The variability coefficients for Cochise County field crops are very high.[1] Net income has varied dramatically in response to changing yields. For purposes of comparison, coefficients calculated for Arizona-wide production are presented in column (8).

The relative degree of risk associated with each different crop is best illustrated by results in columns (4) through (6). These numbers represent the net income level that can be expected with varying degrees of certainty. For example, cotton production may be expected to earn a net income greater than $15 per acre only 70 percent of the time. In other words, in 7 years out of 10, net income can be expected to be at least $15 per acre, or alternatively, in 3 years out of 10,

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[1]Sources of data for field crop variability analysis are Arizona Crop and Livestock Reporting Service (1966-1976) and Hathorn and Sullivan (1979). Variable costs per acre estimates (Hathorn and Sullivan, 1979) are deflated according to a "prices paid by farmers" index (USDA, 1978) in order to arrive at cost estimates for 1966-1976.

Table 31. Net Income Variability for Field Crops

| Crop | Cochise County, Arizona[a] (1) Variability Coefficient | (2) Standard Deviation | (3) Average Net Income[b] | (4) Percentage of Time Net Income Greater than 60 | (5) 70 | (6) 80 | (7) 90 | (8) Variability Coefficient |
|---|---|---|---|---|---|---|---|---|
| Alfalfa | 54 | 47 | 87 | 75 | 62 | 48 | 27 | 43 |
| Milo | 124 | 43 | 35 | 24 | 12 | - 2 | -21 | 34 |
| Cotton | 135 | 64 | 48 | 32 | 15 | - 6 | -34 | 16 |
| | | | | Percentage of Time Net Income Greater than 40 | 30 | 20 | 10 | |
| Corn | 317 | 52 | -16 | - 3 | 11 | 27 | 50 | NA |

[a]Wildermuth, Shane, and Gum (1971a, -b, 1972). Data range is 1960-1970.

[b]Average net income. Data range is 1966-1976.

net income will be less than $15 per acre. Corn, on the other hand, can be expected to earn positive returns slightly less than 40 percent of the time, or less than 4 years out of 10.

Historical data on vegetable production in Cochise County are not available. Therefore, the data sources and procedure used in predicting net income variability are slightly different than that used for field crops.

Gross income figures are calculated from Los Angeles wholesale price and California-wide yield data for bell peppers, from Los Angeles wholesale price and Cochise County 1978 yield data for chili peppers and banana squash, and from Cochise County yield and price data for watermelons. (No data are available for pumpkins.)

Cost estimates for vegetables are indexed in the same manner as are field crop costs, and are taken from budgets prepared for this study.

In order to make estimates of variability useful to the Elfrida-McNeal growers, their own 1978 net income per acre figures are substituted for the mean net income derived from the California and Arizona time series data. Thus, it is assumed that given the costs and revenues specific to Cochise County, the relative variance in net income experienced by California and Arizona state-wide growers will be the same as that experienced by Elfrida-McNeal growers. This assumption may tend to underestimate variance in net income if future vegetable yields in Cochise County are as changeable as field crop yields have been in the past. Results of the net income variability analysis for vegetables are presented in Table 32.

Table 32. Net Income Variability for Vegetables

| Crop | Variability Coefficient | Standard Deviation | Net Income Elfrida-McNeal 1978 | Percentage of Time Net Income Greater than 60 | 70 | 80 | 90 |
|---|---|---|---|---|---|---|---|
| | | dollars per acre | | | | | |
| Bell peppers | 15 | 363 | 2043 | 1955 | 1859 | 1746 | 1591 |
| Chili peppers | 17 | 530 | 1421 | 1289 | 1145 | 976 | 743 |
| Banana squash | 25 | 216 | 199 | 145 | 86 | 18 | - 77 |
| Watermelons | 81 | 196 | 527 | 478 | 425 | 362 | 276 |

A comparison of Tables 31 and 32 indicates that vegetables may be less risky than certain field crops, given the qualifications made earlier. This finding is supported by evidence that there is increasing interest in vegetables and declining interest in field corn on the part of some farmers. Several of the farmers surveyed for this report indicated that they had not achieved the field corn yields they had expected and would not plant the crop again. At the same time, they expected better returns from their high-value vegetables. If these expectations are confirmed, area-wide production patterns may change over the next few years.

The final step in this risk analysis is to estimate net income variability for the two farm plans presented earlier. A simple weighted average of the individual crop coefficients is presented in Table 33. It must be remembered that in the case of vegetables, a bias may have been introduced by looking at variation around 1978 net income instead of around mean net income (as in the case of field crops). To the extent there is such a bias, Farm Plan B with its emphasis on vegetables appears less risky than it actually is.

The bottom-line riskiness of a traditional production mix is now apparent. In only 6 years out of 10 can this crop combination be expected to earn positive returns to land and management. In contrast, greater emphasis on vegetable production is likely to earn positive returns 9 years out of 10.

Table 33. Net Income Variability of Alternative Farm Plants, Returns to Land and Management

| Plan | Crop | Percentage of Acreage | VC | Weighted Coefficient | Percent of the Time Net Income Greater than 60 | 70 | 80 | 90 |
|---|---|---|---|---|---|---|---|---|
| | | | | | ----------dollars---------- | | | |
| A | Cotton | 50.0 | 135 | | | | | |
| | Corn | 40.0 | 317 | | | | | |
| | Chilis | 10.0 | 15 | | | | | |
| | (Weighted average) | | | 196 | 2,355 | -88 | -2,984 | -6,966 |
| B | Cotton | 50.0 | 135 | | | | | |
| | Chilis | 10.0 | 15 | | | | | |
| | Bell peppers | 5.0 | 14 | | | | | |
| | Banana squash | 2.5 | 75 | | | | | |
| | Watermelons | 2.5 | 81 | | | | | |
| | (Weighted average) | | | 74 | 21,293 | 16,073 | 9,886 | 1,380 |

# CHAPTER 7

## CONCLUSION

The general outlook for vegetable production in the Elfrida-McNeal area appears favorable. Partial substitution of high-value vegetables for traditional field crops should increase net farm income, given the assumptions made in this study. Five major points are made in closing.

First, in the case of all four vegetables analyzed in Chapter 3, the Elfrida-McNeal harvest coincides with harvests in much of California. The Arizona crops may be coming off in glutted markets. If Phoenix ever becomes a major distribution center, as long-run trends indicate it will, Elfrida-McNeal farmers will have lower transport costs to that market. In the meantime, however, a thorough study should be made of whether the crops could come off any <u>earlier</u>, and if so, what are the costs of such a proposal. Specifically, if the cooperative is able to provide its members with adequate returns and increase its equity position in the next two years, it should investigate a greenhouse/transplant operation that would hasten harvest by at least two weeks, thereby increasing the likelihood of higher returns.

The second point regards the risk analysis in Chapter 6. Contrary to what one might expect, vegetable crops may improve the risk position of Elfrida-McNeal farmers. This has to be a <u>tentative</u> conclusion in 1979. There are not enough historical yield data to show

conclusively that vegetables in this area are any less risky than field crops. Regardless, there is still relatively high variability in the returns to land and management in the cotton/vegetable farm plan presented in Chapter 6. Any means of reducing this risk should be investigated. Specifically, if the Elfrida-McNeal farmers continue to produce vegetables, they should study buffer measures to insulate them against the risk inherent in the fresh produce market. The most obvious project is a pepper dehydrator. Clearly a careful market analysis should precede a large investment of this nature.

A third point concerns the co-op operations. In Chapter 3, it was proposed that a new deduction/retain policy be adopted by Cochise the Cochise Vegetable Growers' Association. Operating deductions should be graduated to reflect relative costs of marketing the five different vegetables. As long as the same per-pound deduction is made on all crops, some producers will subsidize others.

In addition, deductions should be set high enough to cover all operating expenses. Retains, on the other hand, should be maintained in a separate fund for equity purposes. If not, retains (which constitute taxable income to the members) may be consumed in the normal course of business.

Fourth, successful operation of the co-op is contingent on good management. The current leadership understands clearly that their manager plays a crucial role. He must be able to delegate authority effectively, supervise day-to-day marketing operations, and carry out policy decisions set by the board. It is essential that the co-op be willing and able to offer a competitive salary to this key employee.

Lastly, the most severe limitation on vegetable production in the Elfrida-McNeal area is the marketing capacity of local farmers. Yields and prices on at least five crops are, on the average, high enough to cover all variable costs. However, the current physical capacity to pack and market these crops is limited. The Cochise Vegetable Growers' Association is not organized to handle a significantly larger volume at this time. Any expansion of the operation, if and when it occurs, may be hampered by shortages of management, labor, and possibly capital.

The financial analysis presented in this report suggests that potential for growth in marketing capacity exists. The cooperative seems to have adequate operating capital to get through the next two seasons. During this time, members should improve their cultural practices, increase their marketing expertise, and establish a reputation for quality. If these goals are accomplished, the future for vegetable production looks bright.

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