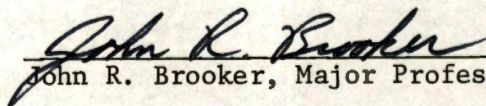
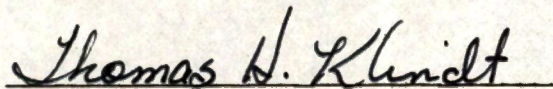


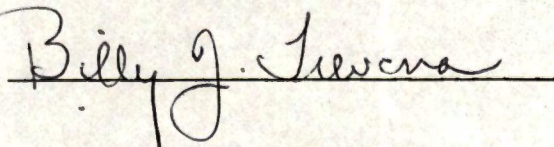
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I am submitting herewith a thesis written by Thomas H. King, Jr. entitled "An Economic Analysis of the Production, Packaging, and Marketing Potentials of Fresh Vegetables in Claiborne County, Tennessee." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

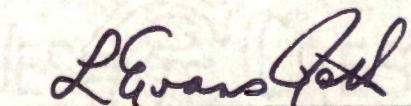

John R. Brooker, Major Professor

We have read this thesis
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AN ECONOMIC ANALYSIS OF THE PRODUCTION, PACKAGING, AND

MARKETING POTENTIALS OF FRESH VEGETABLES IN

CLAIBORNE COUNTY, TENNESSEE

A Thesis

Presented for the

Master of Science

Degree

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Thomas H. King, Jr.

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ABSTRACT

The purpose of this study was to evaluate the potential of commercial vegetable production in East Tennessee. Specific objectives were: 1) to develop input-output coefficients, potential volume and harvest dates for vegetable crops which can be grown in Claiborne County, 2) to develop investment and operating costs and to establish profitability criteria for technically feasible single product and multiproduct packinghouses for suitable vegetables outlined in objective 1, and 3) to evaluate the market potentials for the vegetables used in the packinghouse feasibility models outlined in objective 2.

Enterprise budgets and harvest dates were developed synthetically for six vegetables which 1) could be processed in a packinghouse operation, 2) were suited physically to the study area and 3) were familiar to the farmers in the area.

From these six vegetables, tomatoes, bell peppers, winter squash, and cabbage were selected because of 1) the potentially high net returns they could provide the farmer and 2) the advantageous product mix which could be channeled into a packinghouse operation.

Packinghouse budgets were developed for the final four vegetables listed above by updating budgets originally developed in 1968. Capital values were calculated and then compared to initial investments of various single product and multiproduct packinghouse combinations to determine profitability. Packinghouses found to be profitable were then evaluated with the potential vegetable production in the study area taken into consideration. The goal, here, was to find the smallest

profitable packinghouse which the vegetable production of the region could realistically support.

The smallest profitable single product tomato packinghouse examined required 32 acres of tomatoes. The smallest profitable two product--tomato and bell pepper--packinghouse required 32 acres of tomatoes and 31.3 acres of bell peppers. The smallest profitable three product--tomato, bell pepper and winter squash--packinghouse combination required 32 acres of tomatoes, 15.7 acres of bell peppers and 27.3 acres of winter squash.

Market potential for tomatoes and bell peppers was first examined to determine if the volume of vegetables handled by the smallest profitable packinghouse models would affect the price of these products in the major markets. The volume handled was found to be insignificant and it was determined that these packinghouse models face a perfectly elastic demand function.

Second, tomato and bell pepper unload data were analyzed to partially identify Tennessee's competitive position in regard to any possible transportation cost advantage held by Tennessee. The potential for increasing Tennessee's share of the tomato market is substantial and was found to be greater than the potential for marketing bell peppers.

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CHAPTER I

INTRODUCTION, OBJECTIVES, PROCEDURE, AND LIMITATIONS

I. INTRODUCTION

The trend which has occurred during the past 15-20 years of fewer and fewer farms has been well documented [6, 9, 10, 16]. One reason sighted for this exodus from farming is the direction the agricultural establishment has taken during the past 50-60 years to raise the efficiency of farmers and marketing firms [9, p. 11]. This has helped raise incomes of farmers who have been able to increase their production with the aid of new, more efficient technology or by increasing the size of their operation.

But those farmers who were not able to increase their productivity for one reason or another were not able to participate fully in the benefits available from the emphasis mentioned above [12, p. 7]. Some of the more important results attributed to these agricultural trends are 1) the number of farms with sales of less than \$10,000 decreased by 40 percent between 1959 and 1969 and 2) 1/3 of all U.S. farmers produced more than 85 percent of the total value of farm products in 1969 [17, p. 56 and 9, p. 11].

Obviously, substantial social benefits were accrued to society as a result of the increased efficiency and increased production in the agricultural sector. However, these benefits did not come about without some social costs. Large numbers of farm families and farm workers were displaced. Without the necessary job skills, these people found it

difficult to find other jobs in either the rural or urban areas. Also, even though the number of farms with sales under \$10,000 (small farms) declined, there were still 1.8 million small farms in 1969. And, according to the U.S. Department of Agriculture, farm sales of less than \$10,000 alone would not have provided a net income large enough to maintain a decent standard of living [6, p. 22].

Rural development strategies, which have been proposed to deal with the movement of people off of the farm, center around preparing the exfarm worker for a nonagricultural job [9, 10, 12]. Coupled with this emphasis have been proposals to encourage 1) the growth of nonfarm jobs in the rural areas [9, p. 13], 2) outmigration programs from rural areas to urban centers, and 3) improvements in rural public services such as the educational system, the welfare system, and rural labor legislation, to list just a few [12, p. 21 and 10, p. 209].

These programs, then, have dealt fairly exclusively with the results of the exodus off the farm rather than with the cause or causes of this exodus. Probably the most common reason given by economists for the slight attention paid to help the small farmer remain on the farm is a belief that many small farmers are not able to take advantage of economies of scale. That is, additional land suitable for expanding the farm's production either is not available or is available at prohibitively high costs so that this option is effectively closed to the small farmer [12 and 3, p. 93]. Also, new technology is frequently not within reach of the small farmer either because of its high cost or because the small size of the farm operation does not warrant its purchase. However, even if access to new

technology or additional land is closed to a small farmer, he may still have other options available to him. In fact, Roy, in his investigation of low income farmers in Louisiana, lists six alternatives available to farmers, either large or small, who want to increase their economic positions. His alternatives are:

- 1) upgrade the technology presently employed on the farm so that output per unit of input is increased;
- 2) rent, lease or purchase more land to obtain economies of size;
- 3) leave the farm and migrate to urban areas or to other areas of growth;
- 4) obtain off-farm employment in whole or in part;
- 5) shift farm enterprises from low-return to higher-return ones; and
- 6) apply for public assistance [15, p. 58].

Further, Marshall and others contend that increased agricultural production could be achieved for those small farms with underutilized land and labor by shifting to crops that are not yet subject to high degrees of mechanization [10, 17, 18]. These are crops such as vegetables and fruit which have been found not to exhibit economies of size [8, p. 51].

An increase in production alone, or this coupled with other income increasing alternatives (off-farm employment for example), could help increase a small farmer's income. As part of a rural development scheme, increases in small farmer production would also help stimulate

local economies both directly--through purchases of production inputs within a local economy--and indirectly--through additional trade generated between local economic sectors [5, p. 10].

Also, impacts of programs designed to increase the small farmer's production could be significant on local economies simply because of their numbers. The 1.8 million small farms "produced 11.3 percent of farm products sold in 1969, but accounted for 65 percent of U.S. farms" [17, p. 56]. Farms with gross sales of less than \$10,000 comprise even a larger percent of farms in the South.¹ In 1969, these farms accounted for 70 percent of total farms, controlled 35 percent of the land and produced 20 percent of farm products [18]. In addition, these farms controlled 42 percent of the value of land and buildings and 44 percent of the value of machinery and equipment [6, p. 4].

In Tennessee, the incidence and economic significance of small farms is substantial. Of the 121,406 Tennessee farms in operation in 1969, 74,989 or 61.7 percent had sales of less than \$2,500. Almost 90 percent of total number of farms had sales less than \$10,000. Those farms with sales of less than \$10,000 controlled 66.2 percent of the total land in farms and sold 37.6 percent of the total value of agriculture production in the state in 1969 [22].

The potential, then, for small farmer development appears to be present at least as one part of an overall rural development scheme.

¹South here refers to the states of Texas, Oklahoma, Arkansas, Louisiana, Mississippi, Alabama, Tennessee, Kentucky, Florida, Georgia, North Carolina, South Carolina and Virginia.

However, the same authors who built a case for increasing the production of small farms also pointed out the need for additional research into the adaptability of alternative crops to small farmer production. Specifically, they suggest further research into the production, processing and marketing of those crops identified as adaptable to the small farmer [15, p. 58, and 17, p. 58].

II. OBJECTIVES

The overall goal of this study was to evaluate the potential of commercial vegetable production in East Tennessee as one possible enterprise alternative adaptable to the small farmer in this area. Claiborne County, Tennessee is used as a focal point although it is envisioned that the results of this study would be applicable to other areas of Tennessee.

The specific objectives of this study are:

1. To develop technical input-output coefficients, potential volume and harvest dates for vegetable crops which can be grown in Claiborne County;
2. To develop investment and operating costs for technically feasible single product and multiproduct packinghouses for suitable vegetables outlines in Objective 1;
3. To evaluate the market potentials for the vegetables used in the packinghouse feasibility models outlined in Objective 2.

III. PROCEDURE

The first objective was met by initially choosing six vegetables out of a possible twelve which 1) could be processed in a packinghouse operation, 2) were suited to the area's physical characteristics, and 3) were familiar to the farmers in the area. Input-output coefficients for these six vegetables were developed synthetically by adopting vegetable budgets previously constructed by Tennessee and surrounding states to the resource condition of the Claiborne County area. Extension specialists at the University of Tennessee and in the Claiborne County area were consulted in determining those input-output coefficients, and they provided the information necessary to develop the harvest dates for the six vegetables selected. Finally, four out of the six vegetables were chosen for further consideration in a packinghouse operation because of 1) the increased income they could bring to the farms and 2) the resulting advantageous product mix which could be channeled into a packinghouse operation. Tomatoes, bell peppers, cabbage and winter squash were the four vegetables selected.

The second objective was accomplished by first updating packinghouse budgets originally developed in 1968 to 1976 figures by the use of appropriate index numbers and current prices. Profitability of both single product and multiproduct packinghouses was calculated by comparing the capital value (the present value of the net annual revenues of the packinghouse over its planning horizon plus the discounted salvage value of equipment and buildings) to the initial

cost of investment. This methodology is described more fully in Chapter III. Packinghouses found to be profitable were then evaluated with the potential vegetable production in the region taken into consideration. The goal was to find the smallest profitable packinghouse which the vegetable production of the region could realistically support.

The third objective first involved examining the volume of output of the feasible packinghouses as related to the total U.S. summer production of tomatoes and bell peppers to determine if the volume from these packinghouses was sufficient to affect price in the major markets. Second, tomato and bell pepper unload data were analyzed to partially identify Tennessee's competitive position with other producing areas. Attention was directed at identifying those states which shipped large quantities of produce to markets also supplied by Tennessee and which were also considerably farther away from those markets than Tennessee.

IV. LIMITATIONS

Because this is a feasibility analysis designed to answer fairly specific questions concerning the viability of small scale packinghouse operations, the results obtained from these investigations are valid only under the assumptions outlined in the text which follows. However, the results can and should be used as bench mark figures for any future studies, and, hopefully, sufficient information and explanations have been provided so that the assumptions can be changed to suit a future project or area as needed.

CHAPTER II

PRODUCTION CONSIDERATIONS OF FRESH MARKET VEGETABLES

An underlying assumption of this study is that in order to have any appreciable effect on improving a small farmer's well-being, any enterprise alternative must be of a sufficient size to utilize commercial channels of processing and marketing to insure a sufficient net return. This, then, is in contrast to relatively small scale endeavors--back-yard gardens--whose only aim is to eat or sell a bushel or two of fresh produce a day. For a farmer to commit himself to produce a specific crop, however, sufficient technical information must be available to him indicating whether the crop can be produced in his area, what the potential yield may be, whether the crop can be processed locally, and, finally, whether the crop can ultimately be marketed at a reasonable price to assure him a sufficient return on his investment. This chapter, then, will focus on the production possibilities, enterprise budgets, and harvest periods for selected vegetable production in the Claiborne County area.

I. PRODUCTION POSSIBILITIES OF FRESH MARKET VEGETABLES

IN THE CLAIBORNE COUNTY AREA

Historically, the Claiborne County area (Claiborne, Campbell, Union, Grainger and Hancock Counties) has contributed only a small portion to Tennessee's overall vegetable production. Since 1954, as shown in Table 1, the total acreage of vegetables grown in the region

TABLE 1. NUMBER OF ACRES OF VEGETABLES, SWEET CORN, AND MELONS
HARVESTED FOR SALE ON ALL FARMS IN CLAIBORNE AND ITS
SURROUNDING TENNESSEE COUNTIES FROM 1954 TO 1974

Counties	Acres				
	1954	1959	1964	1969	1974 ^a
Claiborne	124	276	169	70	51
Campbell	19	80	21	31	4
Union	106	44	23	20	12
Grainger	425	430	480	144	132
Hancock	47	6	14	17	14
Region Totals per year	721	836	707	282	213
Tennessee Totals per year	33,203	44,002	42,340	34,120	29,824

^aPreliminary data subject to change.

SOURCE: United States Department of Commerce, Bureau of the Census, The 1954, 1959, 1964, 1969, 1974 Census of Agriculture, Part 31, Tennessee, Washington: Government Printing Office.

reached a high of 836 acres in 1959 and has declined to a low of 213 acres in 1974. This acreage accounted for only 1.9 percent of Tennessee's total of 44,002 acres devoted to vegetable production in 1959 and only 0.7 percent of Tennessee's 1974 production of 29,824 acres [22].

Because of the small importance placed on vegetable production in this region, certain criteria had to be used to determine the vegetables to be examined in this study.

Three criteria were used to select those vegetables with the greatest promise of becoming successful commercial enterprises. The first criterion was that the vegetable must lend itself to commercial marketing techniques (a packing house operation). The second criterion, based on recommendations from production specialists, was that the vegetable had to be well suited to the area's soil and climatic characteristics. The third criterion was that the vegetable should not be totally unfamiliar to the area's farmers so as to facilitate potential widespread adoption.

Out of a preliminary list of 12 technically feasible vegetables, 6 vegetable enterprises were found to be both technically feasible for production purposes and also adaptable to commercial packing operations. These vegetables were: snap beans, green peppers, cabbage, squash, sweet corn and tomatoes.

Even though the Claiborne County region has accounted for only a very small percentage of the overall vegetable production in Tennessee, the area has had experience producing five of the six vegetables selected by criteria one and two.

In 1954, 1959, and 1964, snap beans and tomatoes were the two leading vegetables produced in the Claiborne County area (Table 2).

In 1969, on farms reporting sales greater than \$2500, 94 acres of tomatoes were produced along with 46 acres of sweet peppers and 18 acres of snap beans (bush/pole) which were the three leading vegetables produced in the area. However, the area has also produced sweet corn and cabbage which make these two vegetables qualify under the criterion that the vegetable must be somewhat familiar to the farmers of the area.

Although there is no written record of the quantity of squash produced in the area in the past, reports from extension leaders in the field indicate there is sufficient familiarity with squash production to warrant the crop's further consideration in this study. Therefore, enterprise budgets were generated for the six crops initially selected as having potential for commercial production in the Claiborne County area.

II. ENTERPRISE BUDGETS

Of the six vegetables selected for examination in this study, the University of Tennessee, Agricultural Extension Service has published budgets for only fresh market tomatoes and bell peppers on contract [13, pp. 68-75]. The form of the University of Tennessee budget for fresh market tomatoes was used as a guide in developing these six vegetable budgets. Net return to land and management is the final calculated figure.

The final set of budgets (Appendix Tables 18-23) was derived synthetically, that is, derived and adopted from existing published

TABLE 2. NUMBER OF ACRES OF INDIVIDUAL VEGETABLE CROPS HARVESTED FOR SALE IN CLAIBORNE COUNTY AND ITS SURROUNDING TENNESSEE COUNTIES FROM 1954 TO 1969

Year	County	Acres				
		Tomatoes	Sweet Corn ^a	Sweet Peppers ^b	Snap Beans (Bush/Pole)	Cabbage
1954 ^c	Claiborne	37			60	9
	Campbell	6			5	1
	Union	22			81	
	Grainger	351			56	1
	Hancock	1			44	z
1959	Claiborne	63	8		69	6
	Campbell	3	2		3	z
	Union	11	4		15	z
	Grainger	361	15		22	1
	Hancock	2	1		z	z
1964	Claiborne	24	6		25	7
	Campbell	1	3		3	1
	Union	4	z		5	z
	Grainger	266	66		22	1
	Hancock	2	1		2	z
1969 ^d	Claiborne	9	5	12	11	2
	Campbell	z	1	5		
	Union	1	2		1	
	Grainger	83	1	25	5	
	Hancock	1	z	4	1	

^a Sweet corn was not reported in the 1954 Census of Agriculture.

^b Sweet peppers were not reported until the 1969 Census of Agriculture.

^c For the years 1954, 1959, and 1964, county figures for the number of acres of specific vegetables are from all farms reporting.

^d The 1969 Census of Agriculture reported the acres for specific vegetables only for those farms with sales of over \$2500.

^z Fraction of an acre.

SOURCE: United States Department of Commerce, Bureau of Census, The 1954, 1959, 1969 and 1974 Census of Agriculture, Part 31, Tennessee, Washington: Government Printing Office.

budgets available from Tennessee, Kentucky, Georgia, South Carolina, and North Carolina [4, 11, 13, 14, 19, and 23]. Input and output coefficient were examined and modified by extension specialists to fit the Claiborne County area farming situation as nearly as possible. All current University of Tennessee fertilizer and chemical recommendations were followed, and prices were updated using data supplied by local commercial agricultural supply outlets in Tazewell and Knoxville, Tennessee. Finally, tentative budgets were reviewed by extension leaders in Claiborne County to assure that local farming practices were reflected in the budgets. To this extent, the budgets for tomatoes and bell peppers represent the actual farming situation in the Claiborne County area more closely than the other budgets. This is true since tomatoes and bell peppers are currently the most produced vegetable crops in the area which suggests the extension leaders in the area are in a better position to comment on these two vegetable crops than the other vegetables being considered.

All of the budgets assumed rather high managerial capabilities, but according to extension personnel, these are achievable goals for farmers who wish to participate in a commercial operation. Another assumption was that all labor would be hired. However, it probably is more likely that some or all of the labor will come from the farmer's family in which case family income would be the sum of the figure for net return to land and management plus the amount of family labor used at the listed price.

As with most enterprise budgets, these were designed to be used principally as bench mark figures. That is, each individual farmer

has to analyze each of these budgets in line with his particular farming enterprise. For example, average soil test results were used as a base for the recommended fertilization program of N, P_2O_5 and K_2O . Each farmer, however, should adjust the enterprise budget according to the amount of fertilizer recommended for his farm.

Similar adjustments need to be made with changes in yield and changes in the price received for the product. To illustrate the potential range of returns for each budget as yield and price of the product change, Appendix Tables 24-29 show the range of net return to land and management for three rates of production and five levels of price for each vegetable.

Final figures for net return to land and management for the six vegetables are shown in Table 3. The tomato enterprise budget was highest with net returns of \$1777.47 while sweet corn was lowest with net returns of only \$80.94. It should be noted that the budgets for squash, snap beans and cabbage did not include expenses for packing charges as did the other three budgets. No reliable estimate for these charges was obtained; therefore, the net return to land and management for the three vegetable budgets without packing charge expenses are higher than they would be in actual practice.

Another method of comparing these six vegetable budgets is to calculate their respective ratios of net income to gross income. The higher the ratio the greater the share of net farm income obtained from gross farm income. Table 4 shows the respective net income to gross income ratio for the six vegetable crops. Note that packing charges were removed from the budgets for tomatoes, bell peppers and sweet corn

TABLE 3. NET RETURNS TO LAND AND MANAGEMENT FOR SIX VEGETABLES PRODUCED FOR FRESH MARKET

Vegetable	Net Return to Land and Management
Tomatoes	\$1,777.47
Squash ^a	369.38
Bell Peppers	355.28
Snap Beans ^a	253.28
Cabbage ^a	234.18
Sweet Corn	80.94

^aPacking charges were not included in these budgets.

SOURCE: Appendix Tables 18-23.

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TABLE 4. RATIO OF NET FARM INCOME TO GROSS FARM INCOME OF THE SIX FRESH VEGETABLE BUDGETS

Vegetables	Gross Farm Income	Net Farm Income ^a	Ratio of Net Farm Income to Gross Farm Income
Tomatoes	\$6300.00	\$3652.47	0.58
Bell Peppers	2040.00	955.28	0.47
Squash	1125.00	369.38	0.33
Snap Beans	1050.00	253.28	0.24
Sweet Corn	800.00	160.94	0.20
Cabbage	1207.50	234.18	0.19

^aNet farm income is net returns to land and management plus packing charges for those vegetable budgets (tomatoes, bell peppers and sweet corn) where this expense was originally included.

SOURCE: Appendix Tables 18-23.

to make the comparisons with the other three vegetables more equal. Again, the tomato enterprise leads the list as the most lucrative of the six vegetable budgets compared.

Given these budgets, and looking at only the production side of the operation, a farm manager, other variables being equal, would choose to produce tomatoes before he would choose to produce bell peppers, and he would choose to produce bell peppers before he would choose to produce squash and so forth. This information is important not only to the farmer who has to make the decision of what to produce, but it is also important to promoters or investors of packing house operations since they need to deal with the crops that farmers want to produce to assure the packing house an adequate supply of the specific raw product. Further, the decision to produce a certain vegetable should not depend solely on the estimated net returns which could be obtained from the enterprise but should also depend on other factors such as the availability of marketing channels, expected prices to be received for the product, and some risk factor associated with the likelihood that the net return to land and management can be realized.

In addition to the profit position of these various vegetables, the enterprise budget also shows potential yield information on the various crops. This information can be used by investors of packing-houses to calculate an approximate figure for total expected volume in the area to determine an optimum size packinghouse.

III. HARVEST PERIODS FOR THE SIX FRESH MARKET VEGETABLES IN THE CLAIBORNE COUNTY AREA

To the potential investor or operator of a vegetable packing-house, the knowledge of the harvest period of specific vegetables is equally as important as knowing the overall potential volume of production for a specific vegetable. This importance lies in the fact that packing houses are generally not in operation year round, but rather, they are in operation only during the harvesting season of the crop or crops being processed.

Depending on the cost and revenue structures and operating levels of the packinghouse models being considered, combinations of vegetable packing lines in operation during the same time period may or may not increase profitability compared with running only a single product packing line. Likewise, adding another vegetable packing line which will be in operation in a time period different from the original single product line may or may not add to the profitability of the original single product packinghouse.

The possible combinations of vegetable packing lines can be seen in Figure 1 which illustrates the most favorable harvest seasons in the Claiborne County area for each of the six vegetables selected above. These are only estimates of the harvesting periods since specific dates for each season are determined and affected by a combination of climatic variables--frost dates, moisture, heat, etc. For all vegetables except cabbage, the earliest planting dates are principally determined by the last frost date for this region of the state. The later the last

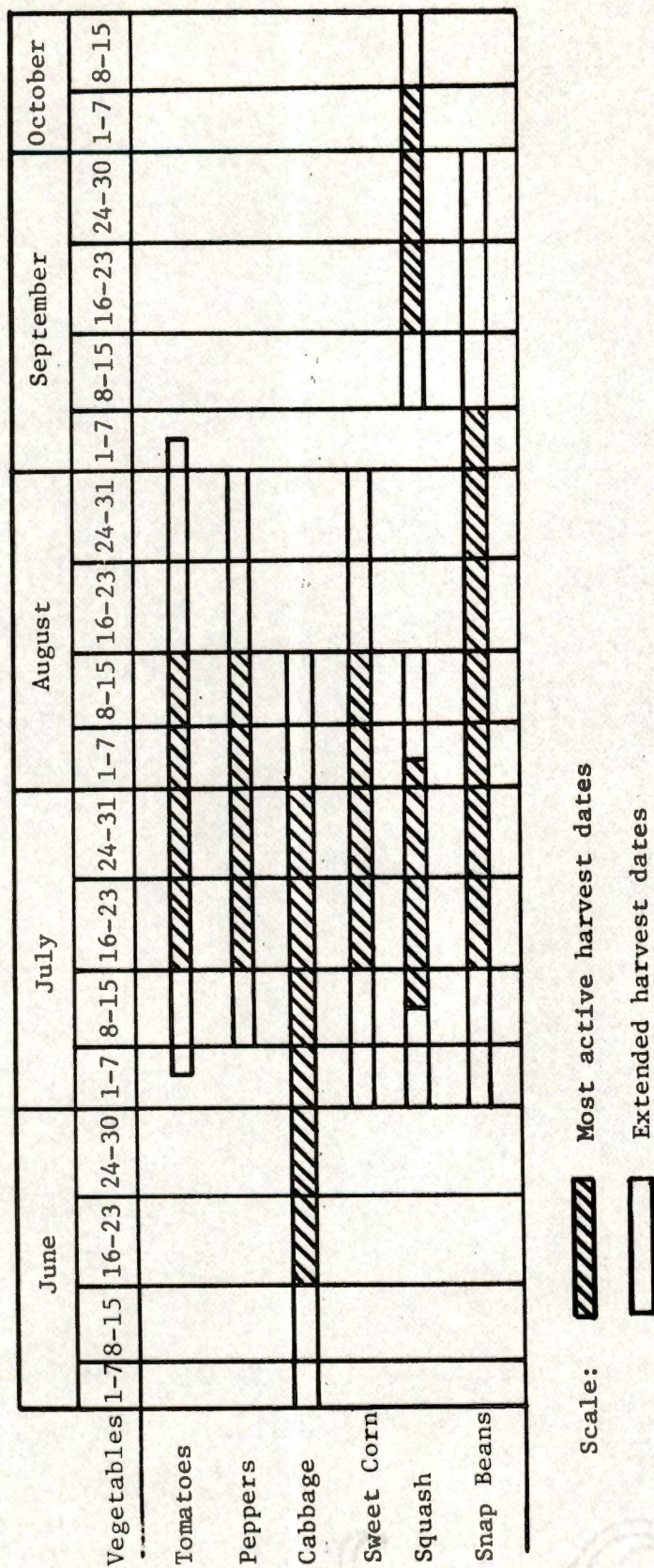


Figure 1. Approximate harvest dates for six fresh vegetables grown in upper East Tennessee.

Source: Extension specialists, University of Tennessee.

frost date, the later the planting date, and consequently, the later the harvest dates for these vegetables. Cabbage, however, is more resistant to cold temperatures and therefore can be planted and harvested earlier than the other vegetables being considered.

The latter ends of the harvest periods shown do not necessarily indicate that the particular vegetable cannot be grown for the later season, but rather, the times shown are for those periods most favorable--from a production standpoint--to the plant's growth. Grouped together, the harvest periods of all the vegetables overlap during the months of July and August. Only cabbage can be harvested during June, and only squash can be harvested beyond September. One other item in Figure 1 which should be explained is the two harvest periods for squash. There are two periods shown since two types of squash can be grown in the area. Summer squash is harvested during the months of July and August while winter squash (acorn squash) is planted in July and harvested in September and October.

IV. SELECTION OF THE VEGETABLES INCLUDED IN THE FEASIBILITY ANALYSIS

Before entering into discussions of specific packinghouse models, it is necessary to select those vegetables which seem to possess the most potential for success on the basis of the area's productive resources, anticipated producer returns, and harvest periods of the various vegetables. However, there is no one scientific method which can be applied to determine which combination, if not all, of the six vegetables is "most likely to succeed." Nevertheless, some important considerations do point to certain vegetables.

First, and perhaps foremost, is the goal of providing a profitable alternative farming enterprise to the limited resource farmers. If sufficient operating capital can be secured by producers to cover the high costs of production, tomatoes and bell peppers provide the greatest potential for increased income since their projected returns per acre are rather large compared to the other vegetables being considered. Farmers, then, could be more easily persuaded to grow these two vegetables than the other four, and this, coupled with the production history of tomatoes and bell peppers in the region, would be more likely to provide a sufficient supply of these two vegetables for a viable packing-house operation.

After a base has been established with tomatoes and bell peppers, the packer could seek to increase his product mix by encouraging the production of, for example, early cabbage and winter squash. While not producing as much profit per acre to the farmer as tomatoes or bell peppers, they would provide the farmer with additional income if there was a stable packinghouse operation already processing the basic two crops--tomatoes and bell peppers. Another factor in favor of encouraging the production of cabbage and winter squash is the fact that labor for their production that might otherwise be idle is available due to the harvest periods shown in Figure 1. Therefore, tomatoes, bell peppers, cabbage and winter squash were chosen for further consideration since they possess the most potential for success based on the production criteria presented in this chapter.

CHAPTER III

MODELS OF FRESH VEGETABLE PACKINGHOUSES

After production considerations have been set forth, the second important part of a successful commercial fresh vegetable operation is the selection of an appropriate processing facility. Important factors which have to be taken into consideration when making this selection are initial cost of the investment, profitability associated with a particular size facility, and the availability of the raw product. This chapter, then, will examine various hypothetical fresh vegetable packinghouse models. The examination will begin with single product packinghouse models for vine-ripe tomatoes since this crop was shown to have the greatest potential, among the vegetables being considered, for increasing income to the farmer and because it is the leading vegetable crop being produced in the Claiborne County region. Later, the affects on profit of adding bell peppers, cabbage, and winter squash to the packinghouse facility will be examined. In all cases, emphasis will be placed on discovering the smallest profitable packinghouse consistant with the realistic production potential of these vegetables in the area.

Basic input-output coefficients used to derive cost estimates for the various packinghouse models were obtained from Brooker and Pearson's Planning Data for Marketing Selected Fruits and Vegetables in the South, Part III, Fresh Vegetable Packing Handbook [2]. The current study implies that the technologies employed in 1968 are the same as those

in use in 1976. While this assumption is probably not 100 percent correct, the author feels that basic relationships present in 1968 technologies still hold between the cost structure of the different sized packinghouses for 1976 technologies. Also, the basic design used in this study to compare the various packinghouse models was borrowed from Brooker and Pearson's Factors Affecting the Feasibility of Investment in Tomato Packinghouses [1]. A more detailed explanation of the methodology employed in this study will be found in the text which follows.

I. SINGLE PRODUCT PACKINGHOUSE MODELS FOR VINE-RIPE TOMATOES

Initial Investment

Five different sized packinghouses were examined for vine-ripe tomatoes. The packinghouses are rated in hourly pack-out of 20-pound cartons, and their size ranged from 150, 20-pound cartons per hour to 2,400, 20-pound cartons per hour. Appendix Table 30 presents total estimated initial investment costs for the five sizes of packinghouses broken down by the amounts for equipment, buildings, and miscellaneous expense. The dollar amounts represent 1976 prices and were derived by updating budgets which used 1968 prices [1, p. 17] by the use of appropriate index numbers (see footnotes at the end of Appendix Table 30)

The important basic assumptions carried over from the original budgets outlined in 1968 are: 1) buildings were to be constructed of concrete and steel with wood offices, 2) sufficient floor space was allocated to temporarily hold approximately one carlot plus four hours of output at maximum production rates, and 3) land costs were not

included in the investment because of the wide fluctuations in location and price of parcels of land. The fact that land costs were not included should not affect the discussion on whether or not to invest in a particular size packinghouse since land costs can be assumed to appreciate enough to cover the interest on the invested capital.

As shown in Appendix Table 30, total investment costs ranged from \$111,544 for the 150 carton-per-hour capacity plant to \$259,756 for the 2,400 carton-per-hour capacity plant. The small difference in initial investment costs between the 150 carton-per-hour model and the 300 carton-per-hour model can be attributed to excess capacity inherent in the 150 carton-per-hour size [1, p. 18].

As can be expected, significant economies of size are present in both equipment and building for the various size packinghouses. Investment in equipment per 20-pound carton of rated capacity ranged from \$408 per carton for the 150 carton-per-hour model to \$52 per carton for the 2,400 carton-per-hour model. Building investment per carton of rated capacity also declined as packinghouse size increased from \$268 per carton on the 150 carton-per-hour size to \$46 per carton on the 2,400 carton-per-hour size, but this was not as pronounced as the decrease associated with equipment investment.

Outputs and Gross Returns

Even though these packinghouses have rated hourly capacities of 150, 300, 600, 1,200, and 2,400 cartons per hour, these are actual maximum rated capacities, and it is more common for packinghouses to operate at less than their maximum rated capacity. For example, poor

quality of the produce and insufficient supply of the raw product can cause a packinghouse to operate somewhere below its rated capacity. Therefore, in this as in previous studies, two different operating levels were chosen to more closely represent the cost and return structure of these model packinghouses. The operating levels used here, 50 percent and 70 percent of rated hourly capacity, were chosen principally because these rates were used in previous studies and also because they should provide informative bench mark levels and appropriate profit pictures for decision making by potential investors. The 50 and 70 percent operating levels are assumed to be average figures over the planning horizon of the packinghouse (here the planning horizon is 10 years). At the 70 percent operating level, for example, some years it will operate at 85 percent of capacity, and in other years it may operate at 60 percent of capacity. But the average assumed over the 10 years is 70 percent in this case. Also, since season length is assumed to play a significant role in determining the profitability of model packinghouses, four season lengths were used for each operating level in determining revenues and costs for the five model, single product, vine-ripe tomato packinghouses.

Annual pack-out of vine-ripe tomatoes can be determined by multiplying rated hourly capacity of each packinghouse times the number of hours in a season. This total, the maximum rated output, is then multiplied by the operating level to determine the actual estimated output. Appendix Table 31 lists the various annual outputs for the five packinghouse models at two operating levels and four season lengths.

Annual pack-out figures multiplied by a specific packing margin represent the estimated gross revenue figures for the packinghouse models detailed in this study. Appendix Table 32 lists the total estimated gross revenue for all the packinghouse models at two operating levels and four season lengths each. A packing margin of \$1.50 per 20-pound packed carton is assumed since this was the prevailing price charged by packinghouses in the East Tennessee region.

Operating Costs

Operating costs for selected packinghouse models can vary with one or all of the following: 1) rated hourly capacity of the packinghouse, 2) operating level of the packinghouse and 3) length of the packing season. Appendix Table 33 presents the estimated hourly operating costs for the five different plant capacities operating at 50 and 70 percent of capacity.

Labor costs were assumed to remain the same regardless of the operating level of the packinghouse in order to assure an adequate supply of labor. Workers probably would not remain at the packinghouse if they were not guaranteed a minimum number of hours at a particular wage rate. The wage rate assumed here ranged from the current minimum wage of \$2.30 per hour to \$3.00 per hour. Containers, wax, waste disposal, and utilities all vary directly with the level of output; therefore, hourly costs are shown at the two different levels of capacity. Repair work and supplies are also assumed to vary with the amount of hourly machine use and are calculated as a small percentage of initial equipment investment.

The remaining categories of operating costs are shown in Appendix Tables 34 and 35 along with hourly costs for two operating levels, 50 and 70 percent, and four season lengths, 100, 200, 300, and 400 hours. Salaries are those of the general manager, secretary and when necessary packinghouse foremen and salesmen. Their estimated cost was calculated on an hourly basis, and they were assumed to be paid for 50 percent more hours than the particular season length specified.

Property tax expenses and insurance payments were estimated to be 1 percent of initial investment in equipment and buildings excluding "miscellaneous." Annual repair was also estimated on the basis of initial equipment and building investment excluding "miscellaneous" but at the rate of 1.5 percent.

Interest on operating capital was assumed to be 9 percent of hourly costs for the period of six months. Office expenses--telephone, paper, etc.--and miscellaneous expenses--legal fees, audits, travel expenses, etc.--were both assumed to be a function of sales volume and were estimated at 2 and 5 percent of gross sales respectively.

An examination of the cost structure of these single product, vine-ripe tomato packinghouses reveals several factors important to potential investors or operators. Table 5 lists average operating costs for all the packinghouse models presented thus far. Average operating cost figures were derived by dividing each particular total operating cost figure from Appendix Tables 34 and 35 by each corresponding annual pack-out figure listed in Appendix Table 31. The resulting average operating costs per packed carton ranged from a high of \$2.002 per carton for the 150 carton-per-hour packinghouse model operating at

TABLE 5. AVERAGE OPERATING COSTS PER PACKED CARTON FOR VINE-RIPE TOMATO PACKINGHOUSES WITH SELECTED HOURLY PACK-OUT CAPACITIES OPERATING AT 50 and 70 PERCENT OF RATED CAPACITY

Operating Level and Season Length	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
<u>50 percent</u>					
100 hours	\$2.002 ^a	\$1.487	\$1.312	\$1.108	\$1.045
200 hours	1.758	1.362	1.235	1.061	1.011
300 hours	1.679	1.321	1.209	1.046	0.999
400 hours	1.640	1.300	1.197	1.038	0.994
<u>70 percent</u>					
100 hours	1.602	1.241	1.117	0.973	0.928
200 hours	1.433	1.152	1.062	0.939	0.904
300 hours	1.377	1.123	1.044	0.928	0.896
400 hours	1.349	1.108	1.035	0.923	0.891

^a Average operating costs were obtained by dividing the appropriate total operating cost, from Appendix Tables 34 and 35 by the corresponding annual pack-out shown in Appendix Table 31. For example:

$$\frac{\$15,013}{7,500} = \$2.002 \text{ per packed carton.}$$

50 percent of capacity with a 100-hour season to a low of \$0.891 per carton for the 2,400 per hour packinghouse model operating at 70 percent of capacity with a 400-hour season. Assuming a packing margin of \$1.50 per packed carton, none of the 150 carton-per-hour plants operating at 50 percent of capacity nor the 150 carton-per-hour plant operating at 70 percent of capacity for a 100 hour season have positive net returns.

The cost structures for these model packinghouses using 1976 prices indicate, as they did in Brooker and Pearson's study using 1968 prices [1, p. 19] that increasing season length decreased average operating costs per carton more for the smaller size capacity packinghouses than for the larger capacity ones. For example, when season length is increased from 100 hours to 400 hours for the 150 carton-per-hour capacity model operating at 50 percent of capacity, average operating costs per carton decreased from \$2.002 to \$1.640 or a decrease of 18 percent. However, as season length was increased from 100 to 400 hours on the 2,400 carton-per-hour plant operating at 50 percent capacity, average operating costs per carton decreased only 4.9 percent. The same type of relationship is present when the packinghouse models operate at 70 percent of rated capacity. Using the same two packinghouse models as above but this time operating at 70 percent of capacity, an increase from a 100-hour season length to a 400-hour season length produces a 16 percent decline in average operating costs per carton for the 150 carton-per-hour plant

and a 4 percent decline for the 2,400 carton-per-hour plant. With this relationship, investors or packinghouse operators can expect a decline in average costs per carton which would potentially increase profits if they were successful in increasing the season length of a particular packinghouse of the type and structure presented here.

Another important cost relationship between packinghouse size and season length for all the single product, vine-ripe tomato packinghouse models presented thus far, is that a decrease in average operating costs can be obtained by increasing the size of the packinghouse and shortening the length of the packing season. As just one example, notice from Appendix Table 31 that both the 300 carton-per-hour capacity plant operating at 50 percent capacity for 400 hours produces the same output as the 600 carton-per-hour capacity plant operating at 50 percent capacity for 200 hours. Looking at the average operating costs of these same two sized packinghouses (Table 5) at the operating level and season lengths mentioned above, the average cost is less for the 600 carton-per-hour capacity model operating for 200 hours than the 300 carton-per-hour model operating for 400 hours. Again, this relationship is true for all models with equal output. This relationship between hourly pack-out capacity and the length of the operating season tells the potential packinghouse investor that he could expect lower average costs per carton with the larger size packinghouse and the shorter season length than with a smaller size packinghouse and longer season length--both producing the same output. If the investor is able to secure the additional initial capital needed to build and equip the larger size packinghouse, this higher capacity packinghouse would have lower average operating costs than the

smaller sized packinghouse and would have greater potential for returning higher net returns than the smaller sized packinghouse assuming the volume of tomatoes passing through both packinghouses was the same. However, the above statement of greater net returns is valid only when making comparisons between plants with the same total output. More information is needed to determine if either or any of the packinghouse models is profitable--that is, do they return more than the initial investment. This question is covered in the next section.

II. PROFITABILITY OF SINGLE PRODUCT, VINE-RIPE TOMATO PACKINGHOUSES

Choice of Methodology

A potential investor in packinghouses as well as any durable good investment (an investment where returns to the capital outlay are spread out over more than one production period) needs to determine whether he will recover his initial investment, and, if he does recover his initial investment, whether the returns over his initial investment are enough to earn him a satisfactory rate of return. Several methods are available to determine an investments' profitability; the two most common techniques used are: 1) estimating the "internal rate of return" of the investment, and 2) estimating the capital value of the investment. Both methods employ the concept of the time value of money, that is, that a dollar received today is worth more than a dollar received in the future. In addition, these methods focus in on the stream of revenue over the life of a project plus ending salvage

value rather than focusing on each particular production period.

The equations for the two methods are shown below:

1. capital value (solve for CV):

$$CV = \frac{QR_1}{(1+i)^1} + \frac{QR_2}{(1+i)^2} + \dots + \frac{QR_n}{(1+i)^n} + \frac{SV}{(1+i)^n}$$

where CV = capital value

QR_n = quasi rent in period n (total revenue in period n
minus total operating costs in period n)

i = discount rate (market rate of interest)

SV = salvage value of initial investment at the end of
the planning horizon

2. internal rate of return (solve for r):

$$II = \frac{QR_1}{(1+r)^1} + \frac{QR_2}{(1+r)^2} + \dots + \frac{QR_n}{(1+r)^n} + \frac{SV}{(1+r)^n}$$

where II = initial investment

QR_n = quasi rent in period n (total revenue in period n
minus total operating costs in period n)

r = internal rate of return

SV = salvage value of initial investment at end of planning
horizon

The criteria for evaluating the profitability of a capital investment using the capital value method is to compare the results of CV with that of the initial investment (II). Then, if CV is less than II, assuming QR is greater than zero, the investment is not profitable. If CV = II then the operation is just returning the initial cost of investment. If CV is greater than II, however, the operation is assumed to be returning a profit. This last case would indicate a favorable environment for the investment.

The criteria used to evaluate the internal rate of return method is to compare the computed values of "r" with the market rate of interest. If r is greater than the specified market rate of interest, then the investment is considered profitable.

With both methods of determining profitability, the theoretical approach in choosing the most profitable investment between mutually exclusive operations would be to choose the investment with the highest capital value in the profitable range or to choose the one with highest internal rate of return above the market interest rate. Assuming, for the moment, that there are no other constraints on choosing the most profitable investment (no limit to capital, etc.), which method-- capital value or internal rate of return-- should be used to determine the profitability of an investment for the tomato packinghouses being considered in this study?

Fortunately, because of the cost and revenue structures of the packinghouse projects defined in this study, the same relative measure of profitability of the investment will be determined by either method presented here. This is true principally because of the assumptions attached to the enterprises which include: 1) an equal planning horizon for all investment possibilities and 2) annual net income streams (quasi rents) remain the same throughout the planning horizon. With these two assumptions, both measures of profitability of investment would yield the same results as to which, if any, of the packinghouses were profitable [7, pp. 11-43]. Further, notice that the two equations shown above are almost identical. In fact, at the point where $CV = II$, $r = i$ which is the break-even point for profitability

where the operation is just returning the initial cost of the investment, and any value above CV would mean the internal rate of return would be greater than the market rate of interest and therefore the investment would be profitable.

The choice as to which method to use, then, can be based on other, more functional criteria such as computational ease, units of measurement, flexibility to change initial assumptions concerning revenue and cost coefficients and so forth. Calculating the capital value is generally easier than calculating the internal rate of return, especially when computer access is not available. This is important to potential investors who need to change some of the assumptions made here to their own specifications or to introduce site costs or other expenses not covered by these models. Further, the capital value method expresses the decision points in actual dollar figures instead of percentage rates as in the internal rate of return method. The use of dollar figures is especially helpful if changes in the initial investment need to be made since the potential investor can immediately see the changes in the profit picture which result from a change in the initial investment. For these reasons, the capital value method was chosen over the internal rate of return method as the criteria for judging the profitability of investments in vegetable packinghouses.

Determining Capital Values

From the capital value equation shown above, and from the criteria used to determine profitability of investment, five pieces of information are needed to evaluate the profitability of the various

investments. Total annual revenue and total annual operating costs (excluding depreciation and interest on long term investment) are needed to determine the first piece of information--quasi rents--for each production period. Even though in actual practice a new packing-house may take several years to reach the annual net revenue figures estimated here, for the sake of simplicity, annual net revenues (quasi rents) are assumed to be the same for each period over the life of the project.

A second piece of information needed to derive the capital value formula is the number of years to be used in the planning horizon. In this study, 10 years was assumed to be a reasonable length of time for an investor to recover his initial capital expenditure. Any time period less than ten years, five years for example, would place too much pressure on the packinghouse operation to earn satisfactory returns above the initial investment. This would be especially true in regions which did not have the history of vegetable production on a commercial scale.

Even though the planning horizon was assumed to be ten years, this does not necessarily mean the values of the building and equipment would be reduced to zero. On the contrary, the building would probably have at least 50 percent of its useful life remaining; it was therefore assumed to be valued at 50 percent of the initial building investment. Also, the value of the equipment was assumed to be worth 20 percent of the initial investment in equipment at the end of the ten year planning horizon. Thus, the salvage value is the third piece of information needed for the capital value equation.

The discount rate, i , or cost of capital as it is sometimes called, is the fourth part needed to determine the capital value of a particular packinghouse. In general practice, this figure is difficult to estimate exactly since it is dependent on the current market interest rate which may vary among regions, lending institutions, and the financial position of the investor to list just a few. Therefore, two discount rates were chosen for this study--8 percent and 10 percent--to give a representative sample of rates from which a potential investor may choose to approximate his particular situation.

Initial investment in equipment and buildings is the fifth and final part needed to determine the profitability of an investment in a packinghouse using the capital value criteria. This information is obtained directly from Appendix Table 30 for each single product packinghouse model used in this study. Substituting values for the first four pieces listed above into the capital value equation will yield the capital value of a specific packinghouse. Comparing this quantity with the fifth piece of information, the initial investment, produces the criteria for determining profitability of the investment. Again, if the value derived for the capital value is greater than the initial investment, then the project is considered profitable under the various sets of conditions previously mentioned.

Estimated Capital Values and Profitability of Single Product, Vine-Ripe Tomato Packinghouses

Table 6 lists the capital values derived for the five sizes of single product, vine-ripe tomato packinghouses which had positive annual net returns for two operating levels, four season lengths, and at two

TABLE 6. ESTIMATED CAPITAL VALUE FOR FIVE SIZES OF SINGLE PRODUCT, VINE-RIPE TOMATO PACKINGHOUSES, TWO OPERATING LEVELS, FOUR SEASON LENGTHS, TWO DISCOUNT RATES AND PACKING MARGIN OF \$1.50^a

Operating Level and Season Length	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
	-----dollars-----				
<u>Discount Rate--8 Percent</u>					
<u>50 Percent</u>					
100 hours	x	17,352	58,088	182,837 ^b	403,434 ^b
200 hours	x	43,716	126,880	378,255 ^b	824,961 ^b
300 hours	x	70,080	195,672 ^b	573,666 ^b	1,246,489 ^b
400 hours	x	96,464	264,424 ^b	769,084 ^b	1,668,010 ^b
<u>70 Percent</u>					
100 hours	x	52,486	128,108	322,199 ^b	681,835 ^b
200 hours	24,408	113,984	266,933 ^b	656,979 ^b	1,381,764 ^b
300 hours	41,042	175,482 ^b	405,751 ^b	991,758 ^b	2,081,700 ^b
400 hours	57,663	236,987 ^b	544,570 ^b	1,326,531 ^b	2,781,622 ^b
<u>Discount Rate--10 Percent</u>					
<u>50 Percent</u>					
100 hours	x	14,556	51,506	165,334	366,318 ^b
200 hours	x	38,698	114,500	344,282 ^b	752,319 ^b
300 hours	x	62,840	177,494 ^b	523,224 ^b	1,138,321 ^b
400 hours	x	87,001	240,452 ^b	702,173 ^b	1,524,317 ^b
<u>70 Percent</u>					
100 hours	x	46,729	115,625	292,951 ^b	621,256 ^b
200 hours	20,047	103,044	242,750 ^b	599,515 ^b	1,262,195 ^b
300 hours	36,335	159,359 ^b	369,869 ^b	906,080 ^b	1,903,141 ^b
400 hours	51,555	215,680 ^b	496,987 ^b	1,212,639 ^b	2,544,075 ^b

^aEstimated capital value is the present value of the net annual revenues for ten years plus the discounted salvage value of buildings and equipment (not including the "miscellaneous" from Appendix Table 30) in the tenth year. Discount rates used were 8 and 10 percent per annum. The equation used for capital value is the following:

$$CV = \frac{QR_1}{(1+i)^1} + \frac{QR_2}{(1+i)^2} + \dots + \frac{QR_n}{(1+i)^n} + \frac{SV}{(1+i)^n}$$

TABLE 6 (Continued)

where CV = capital value of the investment

QR = quasi rents for each period (total revenue minus total operating costs per period)

i = discount rate

n = number of years in planning horizon

^b Estimated capital values greater than the cost of the total initial investment including "miscellaneous" from Appendix Table 30.

^x Annual net revenues (quasi rents) were negative.

discount rates. Notice that at the 50 percent operating level and at the 8 percent discount rate, neither the 150 nor the 300 carton-per-hour packinghouses had capital values greater than the corresponding initial investments. Only the 600 carton-per-hour packinghouse with the two longest season lengths and the 1200 and 2400 carton-per-hour packinghouses were considered profitable. At the 70 percent operating level and 8 percent discount rate, two of the 300 carton-per-hour size packinghouses operating 300 and 400 hour seasons were added to the list of profitable investments along with the 200 hour season of the 600 carton-per-hour packinghouse.

Except for the 1200 carton-per-hour packinghouse with a 100 hour season, the same packinghouses which were considered profitable at the 8 percent discount rate were also found to be profitable at the 10 percent discount rate at both the 50 and 70 percent operating levels. This would indicate that the cost of capital has little affect on the profitability of the various size packinghouses with these particular cost structures at discount rates between 8 and 10 percent. The variables which do affect the profitability of these packinghouses are length of season and especially the level of capacity at which the packinghouse is operating. Packinghouse investors and operators must be aware of the effect operating levels have on profitability of these packinghouses since, as shown here, a drop from the 70 to 50 percent operating level can greatly influence the profitability of a particular size packinghouse.

Raw Product Requirements

Along with the initial cost of investment and the potential profitability of a vegetable packinghouse, availability of the raw product must enter into the final decision whether or not to invest in a particular size packinghouse. Therefore, Table 7 was prepared to indicate the minimum number of acres of tomatoes needed to supply the five size packinghouses running at two operating levels and four season lengths. The number of acres needed for a packinghouse was derived assuming the average yield per acre would be 35,000 pounds of tomatoes (see Appendix Table 18), and that a reasonable hourly packout rate would be 75 percent of raw product [2, p. 120]. The packinghouse with the smallest initial investment which also passed the criteria for profitability was the 300 carton-per-hour plant operating at 70 percent of capacity with a 300 hour season length. This particular packinghouse would need a minimum of 48 acres of raw product to support the operating level of this packinghouse. Fewer number of acres are needed to supply the 1200 carton-per-hour packinghouse operating at 50 percent of capacity and with a 100 hour season, but this packinghouse requires considerably more initial investment in building and equipment.

For an indication of how the raw product needs of the smallest profitable packinghouse compare with the number of acres of tomatoes grown in Claiborne and its surrounding counties, return to Table 2, page 12. In 1959, Claiborne County recorded 63 acres of tomatoes harvested for sale, but the number of acres dropped to only 9 acres in 1969, and indications are that the number of acres recorded for the 1974 Census of Agriculture may be the same or even less. In order to supply

TABLE 7. ESTIMATED NUMBER OF ACRES OF VINE-RIPE TOMATOES NEEDED TO SUPPLY A SINGLE PRODUCT PACKINGHOUSE FOR TWO OPERATING LEVELS AND FOUR SEASON LENGTHS^a

Operating Level and Season Length	Hourly pack-out capacity in 20-pound cartons ^b				
	150	300	600	1200	2400
	-----Acres-----				
50 Percent					
100 hours	5.7 ^c	11.4	22.9	45.7 ^d	91.4 ^e
200 hours	11.4	22.9	45.7	91.4 ^e	182.9 ^e
300 hours	17.1	34.3	68.6 ^e	137.1 ^e	274.3 ^e
400 hours	22.9	45.7	91.4 ^e	182.9 ^e	365.7 ^e
70 Percent					
100 hours	8.0	16.0	32.0	64.0 ^e	128.0 ^e
200 hours	16.0	32.0	64.0 ^e	128.0 ^e	256.0 ^e
300 hours	24.0	48.0 ^e	96.0 ^e	192.0 ^e	384.0 ^e
400 hours	32.0	64.0 ^e	128.0 ^e	256.0 ^e	512.0 ^e

^a Average yield per acre of vine-ripe tomatoes assumed to be 35,000 pounds (see Appendix Table 18).

^b Hourly pack-out rate assumed to be 75 percent of raw product.

^c Calculated as follows:

1. From Appendix Table 31 calculated the total number of pounds of finished product. $7500 \times 20 \text{ pounds} = 150,000 \text{ pounds}$.
2. Divide 150,000 pounds by .75 = 200,000 pounds of raw product.
3. Divide this number by the assumed yield per acre, $200,000 \div 35,000 = 5.7 \text{ acres}$.

^d This packing house was estimated to be profitable at the 8 percent discount rate from Table 6.

^e These packinghouses were estimated to be profitable at the 8 and 10 percent discount rate from Table 6.

the 48 acres needed to support the 300 carton-per-hour packinghouse, other areas must supplement the Claiborne County production possibly coming from Grainger County for example. However, if other sources of supply are not available, none of the smaller size packinghouses which could handle the smaller number of acres of raw supply are considered profitable at the existing initial investment and annual net revenue structure. In other words, some other cost-revenue structure or product combination must be present if a smaller sized packinghouse is to be considered profitable.

Effects on Packinghouse Profitability Assuming a 10 Percent Increase in the Packing Margin

As mentioned earlier, the packing margin originally selected for the packinghouses currently being examined was chosen because it was the price being charged by other packinghouses in the East Tennessee area. Under normal marketing circumstances, a packinghouse operator would find it difficult to charge a higher price to the producer than the price being charged by other packinghouses in the area. However, for purposes of examining the results of a change in the revenue structure on the profitability of the smaller size packinghouses, the \$1.50 per carton packing margin was increased 10 percent to \$1.65 per carton.

Appendix Table 36 shows the new total revenue figures for the two smaller capacity packinghouses at two operating levels and four season lengths with the packing margin assumed to be \$1.65. Along with the changes in gross revenue from an increase in the packing margin, some categories of total operating costs will also be increased--

specifically, those categories which are calculated as a percentage of gross sales. In this case, office expenses and miscellaneous expenses which form part of total operating costs shown in Appendix Tables 34 and 35 were increased accordingly.

Combining the revised total revenue and revised total operating costs for the 150 and 300 carton-per-hour packinghouses produced new quasi rents which were then used to calculate revised capital value estimates. Table 8 presents estimated capital values for the smaller rated capacity packinghouses assuming a \$1.65 per carton packing margin at those operating levels, season lengths and discount rates which were found to be unprofitable using the \$1.50 per carton packing margin.

Only two additional packinghouse models at each discount rate passed the criteria of profitability when the packing margin was increased 10 percent--the 300 carton-per-hour packinghouse operating at 50 percent of capacity and season length of 400 hours and the 300 carton-per-hour packinghouse operating at 70 percent of capacity and season length of 200 hours. Again, none of the 150 carton-per-hour packinghouses were included in the profitable range.

Of the two additional packinghouse models found to be profitable with a 10 percent increase in revenues, the 300 carton-per-hour model operating at 70 percent of capacity and season length of 200 hours requires the least amount of raw product (32 acres as shown in Table 7). Therefore, if the packinghouse was located in a region where there were no other packinghouses competing for the same raw product, the smallest profitable packinghouse size, assuming the packing margin could be set at \$1.65 per carton, would require at least 32 acres of tomatoes

TABLE 8. ESTIMATED CAPITAL VALUE FOR TWO SIZES OF SINGLE PRODUCT, VINE-RIPE TOMATO PACKINGHOUSES AT TWO OPERATING LEVELS, FOUR SEASON LENGTHS, TWO DISCOUNT RATES, AND PACKING MARGIN OF \$1.65^a

Operating Level and Season Length	Hourly Capacity in 20-Pound Cartons	
	150	300
	-----dollars-----	
<u>Discount Rate--8 Percent</u>		
<u>50 Percent</u>		
100 hours	x	30,336
200 hours	x	69,691
300 hours	x	109,045
400 hours	x	148,407 ^b
<u>70 Percent</u>		
100 hours	17,624	72,147
200 hours	44,069	153,298 ^b
300 hours	70,520	c
400 hours	96,978	c
<u>Discount Rate--10 Percent</u>		
<u>50 Percent</u>		
100 hours	x	26,446
200 hours	x	62,484
300 hours	x	98,522
400 hours	x	134,566 ^b
<u>70 Percent</u>		
100 hours	14,890	64,733
200 hours	39,106	139,045 ^b
300 hours	63,328	c
400 hours	87,556	c

^aEstimated capital value is the present value of the net annual revenues for ten years plus the discounted salvage value of buildings and equipment (not including the "miscellaneous" from Appendix Table 30) in the tenth year. Because of the change in packing margin from \$1.50 to \$1.65 per carton, changes in total operating costs (Appendix Tables 34 and 35) occurred in the categories of office expenses and miscellaneous. These changes combined with new gross revenue figures (Appendix Table 36) created new quasi rent figures (net annual revenue) which were used to calculate the capital value figures in this table.

TABLE 8 (Continued)

^bEstimated capital values greater than the cost of the total initial investment including the "miscellaneous" category from Appendix Table 30.

^cEstimated capital values were not calculated for these packing-houses since they were already found to be profitable using the \$1.50 packing margin (see Table 6, page 37).

^xAnnual net revenues (quasi rents) were negative.

compared to 48 acres with a packing margin of \$1.50 per carton.

Single Product Packinghouse Profitability Assuming Free Use of A Building

Another method of changing the cost-revenue structure to potentially increase packinghouse profitability would be to decrease the initial cost of investment. A lower initial investment means the estimated capital value need not be as high as previously calculated to pass the criteria for profitability.

One method of reducing initial costs sometimes used by local development agencies is for the city, county, or other similar group to purchase a suitable site and construct a building which would then be loaned to an organization, in this case a packinghouse operation, for a number of years usually rent free. The building would remain the property of the development authority which means that the initial investment in buildings for the model packinghouses, presented in Appendix Table 30, along with the ending salvage value of the building would be removed from profitability considerations. The important question to answer now is would this change in cost structures push some or all of the smaller packinghouses into the region of profitability?

Table 9 shows the capital values of the two smaller packinghouses operating at 50 and 70 percent capacity and four season lengths eliminating the initial investment costs of the buildings. (The salvage value for buildings was also removed when calculating the capital values.) At both the 8 and 10 percent discount rates, two additional packinghouses were considered profitable. With this assumption, the smallest size packinghouse requiring the least amount

TABLE 9. ESTIMATED CAPITAL VALUE FOR TWO SIZES OF SINGLE PRODUCT, VINE-RIPE TOMATO PACKINGHOUSES AT TWO OPERATING LEVELS, FOUR SEASON LENGTHS, TWO DISCOUNT RATES, A PACKING MARGIN OF \$1.50 PER CARTON AND ASSUMING BUILDINGS WERE DONATED TO THE ENTERPRISE^a

Operating Level and Season Length	Hourly pack-out capacity in 20-pound cartons	
	150	300
	-----dollars-----	
<u>Discount Rate--8 Percent</u>		
<u>50 Percent</u>		
100 hours	x	10,097
200 hours	x	36,461
300 hours	x	62,825
400 hours	x	89,209 ^b
<u>70 Percent</u>		
100 hours	x	45,231
200 hours	17,795	106,729 ^b
300 hours	34,429	c
400 hours	51,050	c
<u>Discount Rate--10 Percent</u>		
<u>50 Percent</u>		
100 hours	x	8,764
200 hours	x	32,906
300 hours	x	57,048
400 hours	x	81,208 ^b
<u>70 Percent</u>		
100 hours	x	40,937
200 hours	15,822	97,252 ^b
300 hours	31,055	c
400 hours	46,275	c

^a Estimated capital value is the present value of the net annual revenues for ten years plus the discounted salvage value of equipment (not including the "miscellaneous" from Appendix Table 30) in the tenth year. Since the building was donated to the enterprise, property taxes which are included in the total operating cost figures (Appendix Tables 34 and 35) were calculated as 1 percent of the value of equipment only. Discount rates used were 8 and 10 percent per annum.

TABLE 9 (Continued)

^b Estimated capital values greater than the cost of the initial investment (equipment only) including a miscellaneous charge calculated at 10 percent of equipment investment (see Appendix Table 30). The new initial investments used to compare with the capital values are:

\$67,332 for the 150 carton-per-hour model, and
\$68,660 for the 300 carton-per-hour model.

^c Estimated capital values were not calculated for these packing-houses since they were previously found to be profitable using the \$1.50 packing margin including the cost of the building (see Table 6, page 37).



of raw product is the 300 carton-per-hour packinghouse operation at 70 percent capacity with a 200 hour season length requiring only 32 acres of raw product--the same size packinghouse requiring the least amount of raw product with the previous assumption of a packing margin of \$1.65 per carton.

Profitability of Single Product, Vine-Ripe Tomato Packinghouses

Assuming Free Use of a Building and Packing Margin of \$1.65 Per Carton

What would be the effect on packinghouse profitability if both of these previous assumptions were combined? Table 10 shows the estimated capital values of the two smallest rated packinghouses assuming a packing margin of \$1.65 per carton and assuming the building was donated to the enterprise. Even though two additional packinghouses moved into the profitable range at both the 8 and 10 percent discount level, the cost and revenue structures are such that the least amount of raw product required to supply the smallest size packinghouse is still 32 acres of tomatoes. The two profitable packinghouses which utilize the 32 acres of raw product are the 150 carton-per-hour model operating at 70 percent of capacity with season length of 400 hours and the 300 carton-per-hour model operating at 70 percent of capacity with a 200 hour season length. Notice that in the first case, with the discount rate at 8 percent, the capital value is \$90,364 while in the second case, the capital value is estimated at \$146,245. If the assumptions mentioned above were in fact true, and an investor was able to purchase either the 150 or the 300 carton-per-hour packinghouse, he should choose the 300 carton-per-hour packinghouse over the 150

TABLE 10. ESTIMATED CAPITAL VALUES FOR TWO SIZES OF SINGLE PRODUCT, VINE-RIPE TOMATO PACKINGHOUSES AT TWO OPERATING LEVELS, FOUR SEASON LENGTHS, TWO DISCOUNT RATES, A PACKING MARGIN OF \$1.65 PER CARTON AND ASSUMING BUILDINGS WERE DONATED TO THE ENTERPRISE^a

Operating Level and Season Length	Hourly pack-out capacity in 20-pound cartons	
	150	300
	-----dollars-----	
<u>Discount Rate--8 Percent</u>		
<u>50 Percent</u>		
100 hours	x	23,081
200 hours	x	62,436
300 hours	x	101,790 ^b
400 hours	6,884	141,152 ^b
<u>70 Percent</u>		
100 hours	11,011	64,891
200 hours	37,455	146,245 ^b
300 hours	63,907	c
400 hours	90,364 ^b	c
<u>Discount Rate--10 Percent</u>		
<u>50 Percent</u>		
100 hours	x	20,654
200 hours	x	56,692
300 hours	x	92,729 ^b
400 hours	5,831	128,773 ^b
<u>70 Percent</u>		
100 hours	9,610	58,940
200 hours	33,826	133,437 ^b
300 hours	58,048	c
400 hours	82,276 ^b	c

^aEstimated capital value is the present value of the net annual revenues for ten years plus the discounted salvage value of equipment (not including "miscellaneous" from Appendix Table 30) in the tenth year. Since the building was donated to the enterprise, property taxes which are included in the total operating cost figures (Appendix Tables 34 and 35) were calculated as 1 percent of the value of equipment only. Also, since the packing margin is assumed to be \$1.65 per carton, office

TABLE 10 (Continued)

expenses and miscellaneous expense from Appendix Tables 34 and 35 were revised to reflect the increased packing margin. These changes combined with new gross revenue figures (Appendix Table 36) created the new quasi rent figures which were used to calculate the capital value figures in this table.

^b Estimated capital values greater than the cost of the initial investment (equipment only) including the miscellaneous charge calculated at 10 percent of equipment investment (see Appendix Table 30). The new initial investments used to compare with the capital values are:

\$67,332 for the 150 carton-per-hour model, and
\$68,660 for the 300 carton-per-hour model.

^c Estimated capital values were not calculated for these packing-houses since they were previously found to be profitable using the \$1.50 packing margin including the cost of the building (see Table 6, page 37).

^x Annual net revenues (quasi rents) were negative.



carton-per-hour packinghouse since his potential profits would be greater with the 300 carton-per-hour model rather than with the 150 carton-per-hour model.

The analysis of single product, vine-ripe tomato packinghouses with the costs and revenue structures presented here indicates that, under normal conditions, profitability begins with some levels of the 300 carton-per-hour model. Assuming potential investors have constraints on both initial capital investment and amounts of the raw product being produced in the region, other types of packinghouses--multiproduct--need to be investigated to determine whether any smaller sized facility would become profitable.

III. MULTIPRODUCT PACKINGHOUSE MODELS

Cabbage, winter squash, and bell peppers were also selected in Chapter II, in addition to tomatoes, for further investigation as to their feasibility in a commercial packing operation. None of these other vegetables are compatible with a tomato packing line, but bell peppers and squash (hereafter, squash refers to winter squash which is harvested in September and October) can both be packed on the same line after only minor adjustments [2, p. 92]. Therefore, a multiproduct packinghouse constructed with a tomato packing line as its base could consist of a tomato line combined with either a cabbage line, and/or a line for both squash and bell peppers. Since this study is seeking to discover the smallest profitable packinghouse combination consistent with the potential vegetable production of the Claiborne County region, the smallest packinghouse sizes for cabbage, squash, and bell peppers

will be examined in combination with the smaller tomato packinghouse models presented in the previous section. In other words, this section will seek to discover which combination of packinghouse models, if any, can be combined with a tomato packing line to decrease the raw product requirement of tomatoes below 32 acres while still remaining profitable.

Annual pack-out and raw product requirements for prospective packing lines of cabbage, squash, and bell peppers are shown in Appendix Table 37. These represent the lowest rated capacity lines for each of the three vegetables as described in Brooker and Pearson [2]. Even though these are the smallest packing lines for each vegetable, raw product requirements are substantial when compared to the Claiborne County region's harvested acres of these vegetables shown in Table 2, page 12. The number of acres of cabbage required to supply the 200 crate-per-hour line ranges from 22.9 acres to 128.1 acres depending on the level of operating capacity and the season length. The largest number of acres of cabbage harvested in the area between 1954 and 1969 was 11 acres in 1954 as shown in Table 2. In 1969, only 2 acres of cabbage were harvested as recorded in the 1969 Census of Agriculture. Therefore, it would be extremely difficult to assume the Claiborne County region could supply the required amount of cabbage needed even for the smallest line assumed to operate at 50 percent of capacity with a 100 hour season. Cabbage, then, was eliminated from further consideration.

The number of acres of squash required to supply the 75 crate-per-hour packing line is also large compared with estimates of current production levels in the area. The number of acres required to supply

the 75 crate-per-hour bell pepper line, however, appears to lie well within the obtainable yields in the area. In 1969, 46 acres of bell peppers were reported harvested in the Claiborne County area (see Table 2, page 12), and the number of acres of raw products needed to supply the bell pepper packing line ranges from 11.2 acres for the line operating at 50 percent of capacity with a 100 hour season to 62.6 acres for the line operating at 70 percent of capacity with a 400 hour season. With this in mind, the bell pepper line will be combined with the tomato line to form the first example of a multiproduct packing-house operation. Further, even though the Claiborne County area probably would not be able to supply sufficient raw product, and even though the production of squash would return relatively little to the farmer,¹ the squash packinghouse model will be combined with the single product, tomato packinghouse model and then with the tomato and bell pepper multiproduct packinghouse model. This will be done to illustrate the effects of these additions on the raw product requirements of tomatoes for the packinghouse models estimated to be profitable. The addition of the squash component is facilitated because squash can be graded and packed using the same packing line as bell peppers. Therefore, the addition of squash will demonstrate the effects on packinghouse profitability with an extension of the length of the operating season from summer into the fall.

¹Net return to land and management would be estimated to be only \$65.33 per acre when packing charges are added to the squash production budget (Appendix Table 22). Packing charges are assumed to be \$1.50 per crate. Each crate holds approximately 1.11 bushels which means the producer would be charged \$304.05 assuming his yield is 225 bushels per acre [$(225 \div 1.11) \times \$1.50 = \304.05].

The multiproduct packinghouses which are outlined below share one factor in common. That is, in order to provide adequate space for either a 150 carton-per-hour or a 300 carton-per-hour tomato packing line plus a packing line for squash and/or bell peppers, the building must be of sufficient size to allow for the two lines. The necessary square feet required for additional squash or bell pepper packing line equipment would be only 770 square feet [2, p.96]. The building associated with the 300 carton-per-hour tomato packinghouse has sufficient unassigned floor space to accommodate this additional packing line equipment assuming sufficient supervisory personnel is available to manage the increased volume of produce which would result from operating the two lines simultaneously. The other requirements of the bell pepper/squash packing line (office space, receiving, temporary storage, etc.) can be absorbed by the existing building designed for the 300 carton-per-hour tomato packinghouse.

Assuming the multiproduct packinghouse models utilize the building designed for the 300 carton-per-hour single product, tomato packinghouse, operating costs for the 150 carton-per-hour tomato packing line need to be recalculated to account for the increase in initial investment relating to the larger building. Specifically, Appendix Table 38 shows the revised total cost figures for the 150 carton-per-hour tomato packinghouse which reflect the increases in property taxes, insurance, and annual repair corresponding to the increased initial cost. These costs will be combined with the appropriate operating costs of the other packinghouse models in determining the corresponding capital value. The other tomato packing line which will be used in the multiproduct packinghouse models is the 300 carton-per-hour line. Its

cost structure will remain the same as that shown in Appendix Tables 34 and 35.

The equipment line chosen to grade and package both bell peppers and squash is rated at a maximum output of 75 crates-per-hour. The investment required over and above the initial cost of the tomato packinghouses is shown in Appendix Table 39 and totals \$12,170. These additional costs relate directly to the extra equipment and machinery required to process bell peppers and squash. Hourly operating costs will be the same no matter which vegetable--bell peppers or squash--is being packaged on the line. These costs are found in Appendix Table 40 where they are calculated for the packing line operating at both 50 and 70 percent of capacity.

Tomato and Bell Pepper Multiproduct Packinghouse Model

The first multiproduct packinghouse which will be discussed is the combination of fresh market tomatoes and fresh market bell peppers. For this packinghouse design and for the other two combinations which follow, profitability will again be determined by comparing capital value with initial investment costs. Initial investment costs will comprise those costs in the original tomato packinghouse models for the 300 carton-per-hour building plus the costs of either the 150 or 300 carton-per-hour equipment. These costs will then be added to the additional equipment costs shown in Appendix Table 39 to form the total initial cost of the investment. Capital values, as explained in a previous section, are derived after determining the net annual revenue, which is the difference between total revenue and total operating cost, plus the discounted salvage value after 10 years. In the

multiproduct packinghouse case, the total operating cost component will be the sum of the operating costs for the specific tomato packinghouse model plus the additional costs associated with extra vegetable(s) being packaged. In this first case, the tomato and bell pepper multiproduct plant, total operating costs are derived by summing the respective operating costs of either the 150 carton-per-hour plant shown in Appendix Table 38 or the 300 carton-per-hour plant shown in Appendix Tables 34 and 35 and the corresponding operating cost² of the bell pepper component shown in Appendix Table 41. The costs shown in this last table reflect only those costs which relate to the bell pepper component of the multiproduct packinghouse. For example, "salaries" is one component of total operating costs for bell peppers. In this case, the amount shown consists solely of the expenses for a packinghouse foreman who was assumed to be needed to insure an adequate supply of supervisory personnel since both vegetables are harvested during the same weeks of the summer (see Figure 1, page 19). This cost is in addition to the salaries of the manager and secretary already accounted for in the tomato portion of total operating costs shown in Appendix Table 38 for the 150 carton-per-hour tomato packinghouse or in Appendix Table 34 or 35 for the 300 carton-per-hour tomato packinghouse.

²To facilitate computation by reducing the number of packinghouse combinations, the various vegetable lines--tomato, bell pepper, or squash--were assumed to be at the same operating level simultaneously. That is, all lines were at the 50 percent operating level at the same time or at the 70 percent operating level at the same time.

Total revenue, the other part needed to determine net annual revenue, is found in a similar fashion as the method used to calculate total operating costs. Sales of tomatoes are added to sales of bell peppers or squash to determine total revenue. The tomato portion of total revenue is found in Appendix Table 32, and the bell pepper and squash components are found in Appendix Table 42. A packing margin of \$1.50 per crate of bell peppers and squash was used since the price charged in the Claiborne County region was found to be \$1.50 per crate of bell peppers. The packing margin for squash was assumed to be the same since these crates are the same size as the crates for bell peppers. Capital values were then calculated for various combinations of rated capacity and season lengths and compared to the corresponding initial investment costs to determine which, if any, of the tomato-bell pepper multiproduct packinghouses are profitable.³ Table 11 shows that the multiproduct packinghouse combination enters the profitable range at the 8 percent discount level, with the 300 carton-per-hour tomato component operating at 70 percent of capacity with a 200 hour season combined with the 70 percent operating capacity of the bell pepper component with a 200 hour season length. The number of acres of raw products needed to supply this combination is 32.0 acres of tomatoes and 31.3 acres of bell peppers (from Table 7, page 41).

³The salvage values used in calculating capital values assumed: 1) the building (the building used for the original 300 carton-per-hour single product tomato packinghouse model) had a value of 50 percent of its original cost, 2) the equipment used for either the 150 or 300 carton-per-hour tomato line had a value of 20 percent of its original cost, and 3) the value of the equipment line for bell pepper/squash had a value of 20 percent of its original cost. This added up to a total (before discounting) of \$36,726.40 for the 150 carton-per-hour

TABLE 11. ESTIMATED CAPITAL VALUE FOR VARIOUS SIZE COMBINATIONS OF MULTIPRODUCT--TOMATO AND BELL PEPPER--PACKINGHOUSES AT TWO OPERATING LEVELS, FOUR SEASON LENGTHS, DISCOUNT RATE OF 8 PERCENT AND PACKING MARGINS OF \$1.50 PER CARTON AND \$1.50 PER CRATE^a

Tomato Packinghouse Models: Rated Capacity, Operating Level ^b , and Season Length	75 Crate-Per-Hour Bell Pepper Packinghouse			
	100 hours	200 hours	300 hours	400 hours
	-----dollars-----			
<u>150 Carton-Per-Hour</u>				
<u>50 Percent Operating Level</u>				
100 hours	c	c	c	d
200 hours	c	c	c	d
300 hours	c	c	c	c
400 hours	c	c	c	c
<u>70 Percent Operating Level</u>				
100 hours	d	d	d	d
200 hours	d	d	d	d
300 hours	d	d	d	d
400 hours	d	d	d	d
<u>300 Carton-Per-Hour</u>				
<u>50 Percent Operating Level</u>				
100 hours	d	d	d	d
200 hours	d	d	d	d
300 hours	d	d	d	d
400 hours	d	d	d	d
<u>70 Percent Operating Level</u>				
100 hours	d	d	d	d
200 hours	d	138,718 ^e	151,963	165,196
300 hours	186,970	200,216	213,461	226,694
400 hours	248,474	261,720	274,966	288,198

^aEstimated capital value is the present value of the net annual revenues for ten years plus the discounted salvage value of buildings and equipment in the tenth year. For this multiproduct packinghouse operation, the building used to calculate salvage values was the one shown in Appendix Table 30 for the 300 carton-per-hour capacity plant. The equipment used was the respective values of equipment for the 150 and 300 carton-per-hour tomato packinghouses listed in Appendix Table 30 and the 75 crate-per-hour plant equipment shown in Appendix Table 39.

The actual values for the estimated capital values are shown only for those combinations of packinghouse size, operating level and

TABLE 11 (Continued)

season lengths where the capital value is greater than the initial investment (\$129,224 is initial investment for the 150 carton-per-hour tomato packinghouse and the 75 crate-per-hour bell pepper packinghouse and \$130,561 is the initial investment for the 300 carton-per-hour and 75 crate-per-hour combination.)

^bThe operating levels listed below indicate that all of the packing lines were operating at the same level simultaneously. That is, when the tomato packing line is shown at the 50 percent operating level, the other line was assumed to operate at the 50 percent operating level also. No attempt was made to calculate capital values for packinghouse combinations involving different operating levels for the same size combinations.

^cAnnual net revenues (quasi rents) were negative.

^dAnnual net revenues were positive, but the capital values were less than the corresponding initial investments.

^eCapital value less than the corresponding initial investment at the 10 percent discount level.

and Appendix Table 37 respectively). This compares to 48 acres of tomatoes for the original single product, tomato packinghouse which included the construction of a building and assumed a packing margin of \$1.50 per carton (see Table 6, page 37). Therefore, fewer acres of tomatoes are needed to supply this multiproduct--tomato, bell pepper--packinghouse at its lowest profitable level than the single product tomato packinghouse at its lowest profitable level. Also, the raw product requirement for bell peppers, just over 31 acres, is less than the 46 acres harvested in the Claiborne County area in 1969. This packinghouse, then, is within the range of raw product requirements which realistically can be provided by the Claiborne region.

Tomato and Squash Multiproduct Packinghouse Model

The second multiproduct vegetable packinghouse model combines tomatoes with squash. A procedure similar to the one described above was used to determine the net annual revenues (quasi rents) used to calculate the capital values corresponding to the various operating levels and season lengths. Appendix Table 43 lists the total operating costs for the squash component of a tomato and squash multiproduct packinghouse. Since squash is harvested after the tomato harvest is completed (Figure 1, page 19), a general manager and a secretary must be included in the "salaries" component of the total operating cost figure. The remaining cost categories reflect only additions to the

tomato line with the bell pepper/squash line and \$36,969.60 for the 300 carton-per-hour tomato line with the bell pepper/squash line.

operating cost of a tomato packinghouse because of the addition of the squash packing line.

Capital values were calculated for combinations of tomato and squash season lengths at two operating levels. Table 12 shows the results of these calculations, and, again, the smallest size tomato packinghouse combination found to be profitable was the 300 carton-per-hour packing line operating at 70 percent of capacity with a 200 hour season length. This is coupled with the 75 crate-per-hour squash packing line operating at 70 percent of capacity with a 300 hour season length. This multiproduct packinghouse combination translates into raw product needs of 32.0 acres of tomatoes and 81.8 acres of squash. Again, it is highly unlikely that the Claiborne County area could produce the squash component of this packinghouse at this time. A more realistic combination of tomatoes and squash which the Claiborne County area could strive for is the multiproduct packinghouse utilizing the 300 carton-per-hour tomato line operating at 70 percent of capacity and with a 300 hour season length combined with the 75 crate-per-hour squash line operating at 70 percent of capacity with only a 100 hour season length. Raw product requirements here equal 48.0 acres of tomatoes and 27.3 acres of squash.

Tomato, Squash and Bell Pepper Multiproduct Packinghouse Model

The final multiproduct vegetable packinghouse model to be examined is the tomato, bell pepper and squash packinghouse combination. In this instance, the tomato and bell pepper packing would occur during the same time period and the squash packing would occur

TABLE 12. ESTIMATED CAPITAL VALUE FOR TWO SIZE COMBINATIONS OF MULTIPRODUCT-TOMATO AND SQUASH-PACKINGHOUSES EACH AT TWO OPERATING LEVELS, FOUR SEASON LENGTHS, DISCOUNT RATE OF 8 PERCENT AND PACKING MARGINS OF \$1.50 PER CARTON AND \$1.50 PER CRATE^a

Tomato Packinghouse Models: Rated Capacity, Operating Level ^b and Season Length	.75 Crate-Per-Hour Squash Packinghouse			
	100 hours	200 hours	300 hours	400 hours
	-----dollars-----			
<u>150 Carton-Per-Hour</u>				
<u>50 Percent Operating Level</u>				
100 hours	c	c	c	c
200 hours	c	c	c	c
300 hours	c	c	c	c
400 hours	c	c	c	c
<u>70 Percent Operating Level</u>				
100 hours	c	d	d	d
200 hours	d	d	d	d
300 hours	d	d	d	d
400 hours	d	d	d	d
<u>300 Carton-Per-Hour</u>				
<u>50 Percent Operating Level</u>				
100 hours	d	d	d	d
200 hours	d	d	d	d
300 hours	d	d	d	d
400 hours	d	d	d	d
<u>70 Percent Operating Level</u>				
100 hours	d	d	d	d
200 hours	d	d	137,966 ^e	146,535
300 hours	182,306	190,882	199,464	208,033
400 hours	243,811	252,386	260,969	269,537

^aEstimated capital value is the present value of the net annual revenues for ten years plus the discounted salvage value of buildings and equipment in the tenth year. For this multiproduct packinghouse operation, the building used to calculate salvage values was the one shown in Appendix Table 30 for the 300 carton-per-hour capacity plant. The equipment used was the respective values of equipment for the

TABLE 12 (Continued)

150 and 300 carton-per-hour tomato packinghouses listed in Appendix Table 30 and the 75 crate-per-hour plant equipment shown in Appendix Table 39.

The actual values for the estimated capital values are shown only for those combinations of packinghouse size, operating level and season lengths where the capital value is greater than the initial investment (\$129,224 is the initial investment for the 150 carton-per-hour tomato packinghouse and the 75 crate-per-hour squash packinghouse and \$130,561 is the initial investment for the 300 carton-per-hour and 75 crate-per-hour combination).

^bThe operating levels listed below indicate that all of the packing lines were operating at the same level simultaneously. That is, when the tomato packing line is shown at the 50 percent operating level, the other line was assumed to operate at the 50 percent operating level also. No attempt was made to calculate capital values for packinghouse combinations involving different operating levels for the same size combinations.

^cAnnual net revenues (quasi rents) were negative.

^dAnnual net revenues were positive, but the capital values were less than the corresponding initial investments.

^eCapital value less than the corresponding initial investment at the 10 percent discount level.

after the tomato and bell pepper harvest was concluded. The same process used above for determining quasi rents was used in this example except that one of either the bell pepper or squash total operating cost schedules must be revised so that costs are not duplicated, but rather, only additional costs are recorded for each component of the packinghouse. The bell pepper component was arbitrarily chosen for this revision, and Appendix Table 44 lists the revised total operating costs for the bell pepper component of a tomato, bell pepper, and squash multiproduct packinghouse. Actually, the only total cost category that was changed was the property tax category. It was eliminated because property taxes were already accounted for in the total cost schedule of the squash component.

Capital values were calculated for various combinations of operating levels and season lengths for the three components of a tomato, bell pepper, and squash multiproduct packinghouse. The results are shown in Table 13. At the 8 percent discount rate, five previously unprofitable tomato lines combined with bell peppers and squash to move into the profitable range. These are: 1 and 2) the 150 carton-per-hour tomato line operating at 70 percent of capacity and season length of 400 hours combined with the 400 hour season bell pepper line and the 300 and 400 hour season squash packing lines, 3 and 4) the 300 carton-per-hour tomato packing line operating at 50 percent of capacity and season length of 400 hours combined with the 400 hour season bell pepper line and the 300 and 400 hour season squash lines, and 5) the 300 carton-per-hour tomato line operating at 70 percent of capacity and season length of 100 hours combined with

the 400 hour season bell pepper line and the 400 season squash line. The fifth combination requires the least amount of tomatoes as raw product--16.0 acres, but requires the maximum amount of bell peppers and squash--62.6 acres and 109.0 acres respectively at the 70 percent operating level. Since more tomatoes are produced than bell peppers and squash in the Claiborne County area, this combination appears to be an extremely unlikely alternative packinghouse scheme compared with the single product tomato packinghouse model or the two product--tomato and bell pepper--packinghouse combination analyzed above.

However, the 300 carton-per-hour tomato packing line operating at 70 percent of capacity and with a 200 hour season length combines with all other combinations of season lengths of the bell pepper and squash lines to produce capital values large enough to exceed their respective initial costs of investment. As in previous profitable multiproduct packinghouse models, the 300 carton-per-hour tomato line operating at 70 percent of capacity and a 200 hour season length requires 32.0 acres of raw product. This packing line combined with both the bell pepper line operating with a 100 hour season length and the squash line operating with a 100 hour season ~~is~~ potentially the most realistic, profitable, three product packinghouse model available for the Claiborne County area since it requires only 15.7 acres of bell peppers and only 27.3 acres of squash in addition to the 32 acres of tomatoes.

IV. CHAPTER CONCLUSION

Various models of fresh vegetable packinghouses were analyzed in this chapter with respect to their initial cost of investment, their

profitability over a planning horizon of ten years, and their raw product requirements. Emphasis was placed on discovering the smallest profitable packinghouse size for the various vegetable combinations since this study focuses on the feasibility of a new packinghouse enterprise in the Claiborne County area. Assuming the cost and revenue structures presented in this chapter, and assuming a yield per acre of 35,000 pounds of tomatoes, the minimum number of acres of tomatoes required to supply the smallest size single product packinghouse facility ranges from 32 to 48 acres depending on the packing margin and initial cost combination assumed. For the two product packinghouse model, 32 acres of tomatoes and 31.3 acres of bell peppers are required to supply the smallest size profitable packinghouse. These two packinghouse models appear to be the most feasible alternatives keeping in mind the raw product limitations expressed in the second chapter. When constraints such as limited investment capital and/or raw product supplies can be relaxed, as may be the case in other producing regions, choices between alternative enterprise combinations shown here can and should be made by choosing the enterprise with the highest capital value when all other assumptions are equal.



CHAPTER IV

POTENTIAL FOR MARKETING FRESH TOMATOES AND BELL PEPPERS

Up to this point, only production and processing considerations have been examined in determining the feasibility of commercial fresh vegetable production in the Claiborne County area. However, it would be an unrealistic assumption to presuppose that all the production of the packinghouses examined in Chapter III could be easily marketed with no effect on the price received for the product without first examining the potential markets for these vegetables. That is, will the volume of tomatoes or bell peppers handled by the model packinghouses be sufficient to alter the price received by the packinghouse or will the volume handled have no effect on the price structure? The hypothesis is that the study area's volume of tomatoes and bell peppers is so minor relative to the total supply that no alteration in price will take place (a perfectly elastic demand function). This chapter, then, examines the total supply of tomatoes and bell peppers as related to the specified outputs of the various packinghouse models. Also, potential markets for these two products are considered by examining the volumes received at various consumption centers and the origin of these shipments.

I. MARKETING CONSIDERATIONS FOR TOMATOES

From 1971 through 1975 during the summer production periods of which Tennessee is a part (July, August and September) U.S.

production of tomatoes for fresh market remained between 820 and 840 million pounds [20].

Tennessee's portion of this total during this five year period varied from a high of 3.7 percent to a low of 3.0 percent. The number of acres of tomatoes harvested in the U.S. for fresh market during the summer seasons from 1971 to 1975 dropped from a high of 66.6 thousand acres in 1971 to a low of 59.0 thousand acres in 1975 (see Figure 2). Tennessee's portion of the total number of acres remained fairly steady at between 1.9 and 2.3 thousand acres, which is 3.2 and 3.6 percent of the total U.S. acreage harvested. Further, the other producing areas shown in Figure 2 also contributed approximately the same proportion each year to the total number of acres harvested during this five year period. Obviously, Tennessee's share of acres harvested is small compared to other producing regions. An additional point to note is the fact that for these five years, California's harvested acreage was almost one fourth of all the acres of tomatoes harvested for the fresh market and this occurred during the same months as Tennessee's harvest. If California is shipping the tomatoes harvested during this summer period to the same markets as Tennessee, Tennessee producers may have an opportunity to increase their sales to these markets because of the relative effect of increasing transportation costs. Transportation costs are discussed later in this chapter, but first, how does the number of acres of tomatoes required to supply the tomato packing lines compare with Tennessee's total harvested tomato acreage?

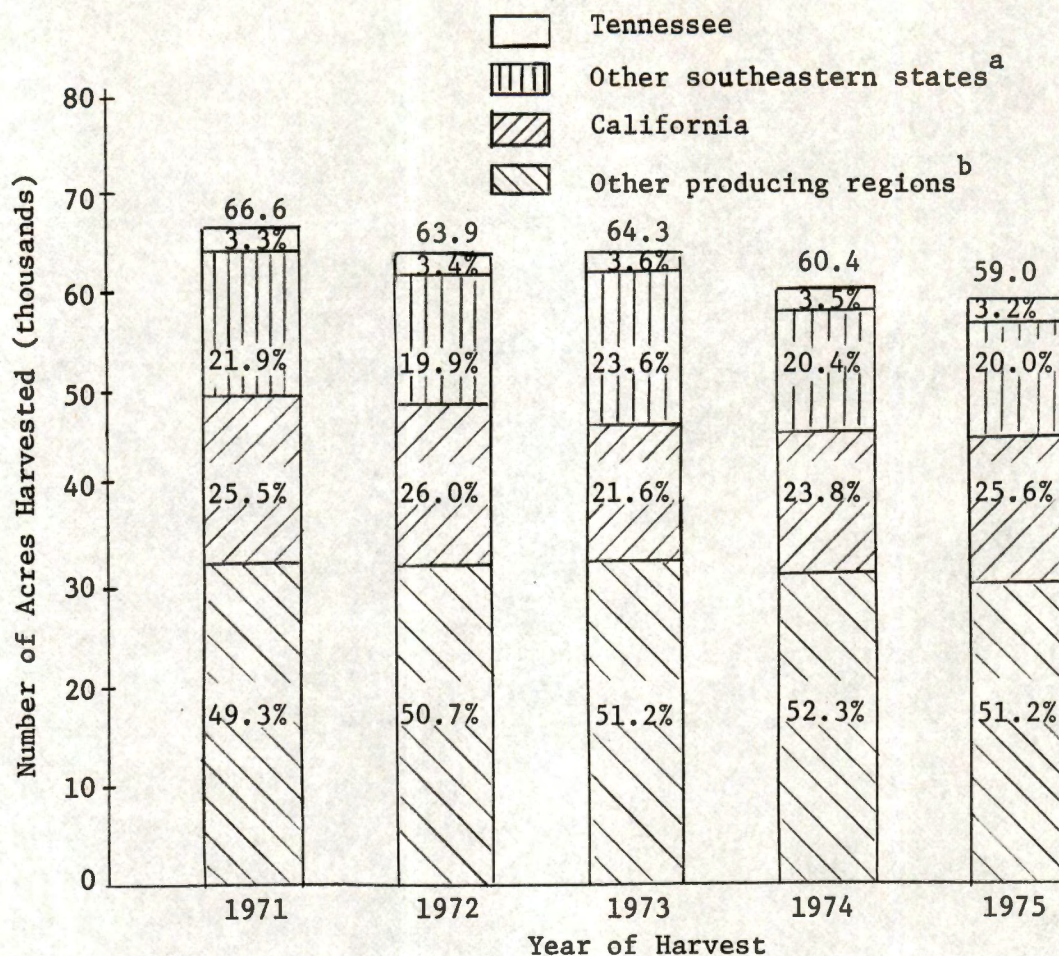


Figure 2. Total number of acres of tomatoes harvested in Tennessee, other southeastern states, California, and other producing regions during the summer months of July, August and September for the years 1971 through 1975.

^aIncludes Alabama, Arkansas, Georgia, North Carolina and South Carolina.

^bIncludes states in the eastern, northwestern, midwestern and western United States (excluding California) and Florida and Mexico.

Source: U.S. Department of Agriculture, Agricultural Statistics, 1976. Government Printing Office, Washington, D.C., 1976.

Table 14 shows the percent of Tennessee's harvested tomato acreage in 1975 which would be needed to supply various tomato packinghouse lines identified as profitable in the preceding chapter. The 300 carton-per-hour line operating at 70 percent of capacity with a 200 hour season length required 32 acres of tomatoes, assuming a yield of 35,000 pounds per acre (see Table 7, page 41). Tennessee harvested 1900 acres of tomatoes for fresh market in 1975, which means that this particular packinghouse would have required only 1.7 percent of the total acreage produced in 1975. The 300 carton-per-hour line operating at 70 percent of capacity with a 100 hour season length, which corresponds to the smallest profitable tomato component of the multiproduct packinghouse combination, would have required only 0.8 percent of Tennessee's 1975 harvested acres. These requirements are indeed small compared to the total number of acres harvested during the summer of 1975 since the 1900 acres Tennessee harvested that year accounted for only 3.2 percent of the overall total U.S. acres harvested. These small percentages support the contention that the volume of tomatoes passing through these packinghouses would not be large enough to affect the price of tomatoes. In other words, it seems fairly realistic to assume the demand function confronting the study area is perfectly elastic.

Assuming, then, that the output of tomatoes from these model packinghouses would not affect the pricing structure of the overall market, what factors are available to Tennessee tomato producers which would give them a competitive advantage over other producing areas, and in which market areas are Tennessee producers most likely to have

TABLE 14. PERCENTAGES OF TOTAL 1975 TENNESSEE HARVESTED TOMATO ACREAGES^a NEEDED TO SUPPLY TWO SINGLE PRODUCT TOMATO PACKINGHOUSES AT TWO OPERATING LEVELS AND FOUR SEASON LENGTHS

Operating Level and Season Length	Hourly Pack-Out Capacity in 20-Pound Cartons	
	300	600
	-----percent-----	
<u>50 Percent</u>		
100 hours	b	b
200 hours	b	b
300 hours	1.8	3.6
400 hours	2.4	4.8
<u>70 Percent</u>		
100 hours	0.8	1.7
200 hours	1.7	3.4
300 hours	2.5	5.1
400 hours	3.4	6.7

^aIn 1975 Tennessee harvested 1900 acres of fresh market tomatoes. See Table 7, page 41 for the number of acres needed to supply these single product tomato packinghouses. Recall that the number of acres listed in Table 7 was derived with the assumption that the yield per acre of tomatoes was 35,000 pounds. If this yield is not reached, more acres of tomatoes will be needed to supply these tomato packinghouses.

^bThese packinghouse combinations were not found to be profitable under the conditions explained in Chapter III (see Tables 6, 8, 9, and 10, pages 37, 44, 47, and 50, respectively).

SOURCE: U.S. Department of Agriculture, Agricultural Statistics, 1976. Government Printing Office, Washington, D.C., 1976.

the greatest potential market for their tomatoes? To answer the first part of the question, the framework of a competitive position must be delineated. Two important factors which affect competitive position are: 1) product quality and 2) product cost. The quality of the tomato product is partly determined by how early the tomato is harvested. That is, the farther away the production center is from the final market destination, the earlier the tomato must be harvested. This could be to the advantage of Tennessee producers who ship to the Eastern or Midwestern markets, since these markets are closer to Tennessee than they are to California. Of course, this assumes the other quality characteristics are equal between Tennessee and California.

The cost of placing the product in the final market area, however, is probably the most important component of any competitive position analysis. This cost includes production, packaging, and transportation to the final market. Comparisons of production costs between producing areas are somewhat difficult because of the differences in cultivation practices, chemical requirements, and harvesting techniques between the different producing areas. The tomato production budget presented in Chapter II represents a synthesis of budgets from surrounding states. Therefore, production costs for Tennessee and its surrounding states can reasonably be assumed to be equivalent.

This same assumption is not as easily applied when comparing Tennessee production costs with those of California. Differences in California's climate, topography, and the larger size of farms compared

with Tennessee suggest that production costs would not necessarily be equivalent to those of Tennessee. The fact that tomato production is so widespread and intensive in California suggests further that cost advantages could be realized by California producers beyond those of Tennessee producers in the procurement of many of the inputs of production. However, these potential differences in production costs between California and Tennessee may not be substantial in regard to size of farms between Tennessee and California. That is, Madden suggests that studies examining economies of size of vegetable production in California indicate that "the long run average costs for vegetable production are essentially constant throughout the size range" of the smaller vegetable farms (up to 640 acres) [8, p. 51]. Therefore, although production costs for California producers may be lower than those of Tennessee producers, for the purposes of this study, these differences are assumed to be small.

Because of the large volume of tomatoes handled by California packinghouses, some savings in packing costs over those of Tennessee could be expected also. But, these possible savings over Tennessee packing costs are probably small, and these savings combined with the possible savings in production costs in California over those of Tennessee are assumed to be not as significant as Tennessee's advantage over California's transportation costs to markets east of the Mississippi River.

Without going into great detail as to transportation rates from each producing area to each major market, some general statements can be made concerning Tennessee's relative position compared

to California regarding the cost of shipping tomatoes to selected markets. Distances from Tennessee to most Eastern, Southern, and Midwestern markets are substantially less than the distance from California to those same markets. Therefore, if it can be shown that California is shipping substantial quantities of tomatoes to markets in the Midwest, Southeast, or East where Tennessee is also a supplier, then there should be potential for Tennessee--specifically, the proposed packinghouses in the Claiborne County area--to increase its share of the market because of the advantage Tennessee has over California in transportation costs to these major markets.

The U.S. Department of Agriculture's Fresh Fruit and Vegetable Unload summary was used to determine California's strength in the markets supplied by Tennessee tomato producers [21]. This data should not be viewed as representing all movements of tomatoes from California, Tennessee, or other regions to the destinations shown. Not all vegetables marketed are accounted for through this system. But, these reports do represent a substantial share of the fresh produce movement from sources of supply to the major distribution centers. Table 15 lists the number of carlot shipments of fresh market tomatoes from Tennessee, California and all production areas to those cities where a shipment from Tennessee was received during the months of July and August, 1976. The months of July and August were chosen to reflect the major harvesting season in the Claiborne County area (see Figure 1, page 19). In cities such as Detroit, New York, Atlanta, and New Orleans where Tennessee recorded its larger total shipments, California's share of the market ranged from 40.6 percent in Atlanta

TABLE 15. QUANTITY OF CARLOT SHIPMENTS OF FRESH MARKET TOMATOES FROM TENNESSEE, CALIFORNIA, AND FROM ALL PRODUCTION POINTS TO SELECTED DISTRIBUTION CENTERS DURING THE MONTHS OF JULY AND AUGUST, 1976^a

Destination	Tennessee	California	Total From All Production Points
	-----carlots-----		
<u>EASTERN</u>			
Baltimore	6 (2.7)	21 (9.6)	219
Boston	5 (1.0)	228 (47.7)	478
New York	11 (1.5)	355 (49.9)	712
Philadelphia	2 (0.6)	62 (17.5)	355
Pittsburgh	9 (4.1)	6 (2.8)	217
Montreal, Ont.	4 (0.8)	101 (20.8)	485
<u>MIDWESTERN</u>			
Chicago	9 (2.1)	243 (55.7)	436
Cincinnati	6 (2.5)	72 (30.4)	237
Cleveland	9 (4.9)	48 (26.2)	183
Detroit	17 (8.4)	115 (56.9)	202
Indianapolis	10 (4.7)	78 (36.6)	213
Louisville	10 (10.1)	3 (3.0)	99
Milwaukee	1 (3.4)	10 (34.5)	29
St. Louis	4 (2.7)	27 (18.1)	149
<u>SOUTHERN</u>			
Atlanta	11 (6.5)	69 (40.6)	170
Columbia	11 (8.0)	19 (13.8)	138
Dallas	3 (1.4)	115 (52.2)	220
Houston	1 (1.0)	94 (94.0)	100
Memphis	2 (22.2)	4 (44.4)	9
Miami	4 (3.9)	34 (33.0)	103
Nashville	10 (13.3)	2 (2.7)	75
New Orleans	12 (11.1)	67 (62.0)	108

^aOne carlot unit is equivalent to 40,000 pounds of fresh tomatoes.

NOTE: The numbers in parentheses represent the percent of the total carlot shipments received by each destination from the corresponding source of supply.

SOURCE: U.S. Department of Agriculture, Agricultural Marketing Service, Fresh Fruit and Vegetable Unloads, No's 1, 2, and 3, (1976), Government Printing Office, Washington, D.C. May 1977.

to 62 percent in New Orleans. Cities such as Detroit and New York, which are considerably farther away from California than from Tennessee, appear to represent those locations where Tennessee has the most potential to increase its share of the market because of Tennessee's advantage in transportation costs over California. Not only Detroit and New York, but many of the other cities Tennessee shipped to in 1976 should be considered potential markets for additional Tennessee shipments since California tomatoes represent such a large portion of the total amount of tomatoes shipped to these cities (Chicago, Cincinnati, and Indianapolis for example). In other words, potential markets for increased tomato sales from established or new Tennessee producers appear to be reasonably attractive, assuming the product meets the needed quality, price, and quantity requirements of wholesale buyers.

Table 16 presents in carlot units the annual pack-out of tomatoes and bell peppers from the various packinghouse combinations specified in Appendix Tables 31 and 37. Notice that the 300 carton-per-hour tomato packinghouse model operating at 70 percent of capacity with a 200 hour season handles 21 carlot units, which is only 2.4 percent of the quantity California shipped to New York, Chicago, Cincinnati, Detroit, and Indianapolis.

Although this method of analysis cannot guarantee that tomatoes packaged by the Tennessee packinghouses can be successfully marketed, it does show that, given reasonably similar costs of production, there does exist potential for expanded sales in regions where Tennessee has a transportation cost advantage over California.

TABLE 16. ANNUAL PACK-OUT IN CARLOT UNITS OF TWO SINGLE PRODUCT, VINE-RIPE TOMATO PACKING LINES AND ONE BELL PEPPER PACKING LINE AT TWO OPERATING LEVELS AND FOUR SEASON LENGTHS^a

Operating Level and Season Length	Hourly Tomato Pack-Out Capacity in 20-Pound Cartons		Hourly Bell Pepper Pack-Out Capacity in 34-Pound Crates	
	300	600	75	carlots
50 Percent				
100 hours	b	b	b	
200 hours	b	b	b	
300 hours	22.5 ^c	45.0	b	
400 hours	30.0	60.0	b	
70 Percent				
100 hours	10.5	21.0	6.2 ^d	
200 hours	21.0	42.0	12.4	
300 hours	31.5	63.0	18.5	
400 hours	42.0	84.0	24.7	

^aA carlot unit is equivalent to 40,000 pounds of fresh tomatoes or 28,900 pounds of bell peppers.

^bThese packinghouse combinations were not found to be profitable under the conditions listed in Chapter III (see Tables 6, 8, 9, and 10, pages 37, 44, 47, and 50, respectively).

^cCalculated by multiplying the annual pack-out in 20-pound cartons from Appendix Table 31 by 20 pounds and then dividing this total by 40,000 pounds to find the number of carlot units.

^dCalculated by multiplying the annual pack-out in 34-pound crates from Appendix Table 37 by 34 pounds and then dividing this total by 28,900 pounds to find the number of carlot units.

II. MARKETING CONSIDERATIONS FOR BELL PEPPERS

The examination of potential markets for bell peppers is hampered because local and national statistical reporting services do not report the quantity produced in Tennessee. In the 1969 Census of Agriculture, however, the total number of acres of bell peppers harvested for both processing and fresh market, by farms with sales over \$2500 was estimated to have been 732 acres [22]. That same year, 1969, the U.S. Department of Agriculture reported that the total number of acres of bell peppers harvested mostly for fresh market during the summer period (July, August and September) was approximately 28,750 acres [20]. Even assuming a margin of error for statistical inconsistencies between these two references, Tennessee's proportion of this total was small--only 2.5 percent of the total number of acres harvested.

The amount of acres required to supply the bell pepper component of the multiproduct packinghouse models would also be small compared to the estimated number of acres harvested in Tennessee in 1969. For example, from Appendix Table 37, the number of acres needed to supply the bell pepper packing line operating at 70 percent of capacity range from 15.7 to 62.6 acres, assuming a yield per acre of 6 tons. For the 100 and 200 hour season lengths 15.7 and 31.3 acres would be needed to supply these lines which are only 2.1 and 4.3 percent respectively of the 732 acres of bell peppers harvested in Tennessee in 1969.

The same method of analysis used to examine tomato markets does not produce as clear a picture of the market potential for bell peppers. The number of carlot units (850 crates each) which would be processed annually by the bell pepper packing line operating at 70 percent of capacity would range from 6.2 to 24.7 carlot units with seasons ranging from 100 to 400 hours (see Table 16). Table 17 presents the carlot shipments of bell peppers from Tennessee, North Carolina, Texas, California and from all the production points combined to those cities which received shipments from Tennessee during the months of July and August, 1976. These two months were selected since this is the major bell pepper harvesting season for the Claiborne County area (see Figure 1, page 19). No Eastern markets are listed since no shipments were recorded from Tennessee to any of these markets during the months of July and August, 1976.

Of the two regions Tennessee producers did ship to, the Midwestern region seems to be dominated by North Carolina and the Southern region by North Carolina, Texas and California. Assuming again that production costs are approximately the same for all producing regions, Tennessee producers would likely have no transportation advantage over North Carolina producers since both regions are nearly the same distance to the distribution centers. And the competitive advantage Tennessee would have over California with respect to transportation costs does not represent as much of an advantage as that found for tomatoes, since California's market share in those cities where Tennessee ships most of its bell peppers is not as great as it was in the tomato analysis. Cities such as Chicago, Miami and

TABLE 17. QUANTITY OF CARLOT SHIPMENTS OF FRESH MARKET BELL PEPPERS FROM TENNESSEE, NORTH CAROLINA, TEXAS, CALIFORNIA AND FROM ALL PRODUCTION POINTS TO SELECTED DISTRIBUTION CENTERS DURING THE MONTHS OF JULY AND AUGUST, 1976^a

Destination ^b	Source of Supply				Total from All Production Points
	Tennessee	North Carolina	Texas	California	
			carlots		
<u>MIDWESTERN</u>					
Chicago	11 (6.5)	15 (8.9)	-	35 (20.7)	169
Cincinnati	2 (2.8)	18 (25.4)	-	3 (4.2)	71
Cleveland	5 (5.9)	47 (55.3)	-	2 (2.4)	85
Detroit	1 (1.3)	34 (43.0)	-	3 (3.8)	79
Milwaukee	4 (57.1)	2 (28.6)	-	11 (14.3)	7
St. Louis	2 (4.8)	16 (38.1)	-	5 (11.9)	42
Winnipeg	1 (11.1)	-	-	5 (55.5)	9
<u>SOUTHERN</u>					
Columbia	2 (7.4)	5 (18.5)	1 (3.7)	-	27
Dallas	3 (4.4)	4 (5.9)	27 (39.7)	25 (36.8)	68
Houston	1 (6.7)	3 (20.0)	-	8 (53.3)	15
Memphis	2 (66.7)	-	-	1 (33.3)	3
Miami	8 (18.6)	14 (32.6)	5 (11.6)	7 (16.3)	43
Nashville	3 (60.0)	1 (20.0)	1 (20.0)	-	5
New Orleans	2 (5.3)	4 (10.5)	3 (7.9)	14 (36.8)	38
San Antonio	1 (1.0)	-	65 (63.7)	18 (17.6)	102

^aOne carlot unit is equal to approximately 28,900 pounds (850 crates).

^bOut of the Eastern, Midwestern and Southern distribution centers, Tennessee has recorded shipments to only those cities shown.

TABLE 17 (Continued)

NOTE: The numbers in parentheses represent the percent of the total carlot shipments received by each destination from the corresponding source of supply.

SOURCE: U.S. Department of Agriculture, Agricultural Marketing Service, Fresh Fruit and Vegetable Unloads, No's 1, 2 and 3 (1976). Government Printing Office, Washington, D.C., May 1977.

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possibly New Orlen^as, where California's share of the market is sizeable, would be the most likely distribution centers having potential for handling additional quantities of Tennessee bell peppers. In the other cities where the market is dominated already by North Carolina or Tennessee producers, the likelihood of increasing sales to these areas would seem to be less optimistic.

III. CHAPTER CONCLUSION

The major objective of this chapter was to investigate the marketing potential of the tomatoes and bell peppers which would be processed by the proposed packinghouse modes^l discussed in Chapter III. Included in this analysis was a consideration of the potential effect on the prices of these products if the output from these packinghouses was introduced into the present market system. In both cases, the additional volume of produce from these packinghouses was determined to have a negligible effect on the prices of these products in their respective overall markets.

The actual potential for marketing either tomatoes or bell peppers was evaluated by examining their respective transportation advantages over other leading producing areas in terms of Tennessee's proximity to various distribution centers. More so than bell peppers, marketing of the tomato output from the proposed packinghouse models appeared to be favorable in cities such as Detroit and New York where California's share of the market is substantial and where Tennessee's advantage in terms of transportation costs to these markets is superior to that of California. Bell peppers, on the other

hand, appear to have fewer potential locations to which the output from these packinghouses could be successfully marketed. The principal reason for this fact is that North Carolina is Tennessee's major competitor in most of Tennessee's current market outlets. Since North Carolina is located approximately the same distance from Tennessee's market outlets, little, if any transportation advantage is present for Tennessee producers.



CHAPTER V

CONCLUDING STATEMENTS

The goal of this study has been to evaluate the potential of vegetable production on a commercial scale as one possible enterprise alternative available to the small farmer in East Tennessee. Emphasis was first placed on finding those vegetables which could be successfully produced in the region and which could be expected to give the highest returns to the farmer. . . Tomatoes, bell peppers, cabbage, and winter squash were determined to be those vegetables which possessed the most potential for success in terms of production possibilities. Tomatoes and bell peppers were chosen especially because of their high expected rate of return and because the farmers in the area have had experience growing these vegetables in the past. Cabbage and winter squash were chosen especially because of the potentially advantageous product mix which would result combining them with tomatoes and bell peppers and because their production periods coincided with periods of idle labor in the region. The most intensive harvest periods for tomatoes and bell peppers occur during the months of July and August. The harvest period for cabbage begins in mid-June and runs through the end of July, and the harvest period for winter squash begins in mid-September and continues through the first week of October.

The second phase of the study examined various packinghouse models from the standpoint of initial investment and profitability

coupled with realistic raw product supply potentials of these vegetables in the Claiborne County region. The goal was to find the smallest profitable packinghouse consistent with the production potential of the region. Profitability was determined by comparing the estimated capital values of each packinghouse model, where capital value was defined as the present value of the net annual revenue stream for ten years plus the discounted salvage value of the buildings and equipment in the tenth year, with the initial investment for the packinghouse. If the estimated capital value was found to be greater than the initial cost of investment, the packinghouse was considered profitable. Discount rates used were 8 percent and 10 percent per annum.

Assuming a packing margin of \$1.50 per carton, the single product tomato packinghouse which required the least amount of raw product and which was also profitable by the criteria listed above was the 300 carton-per-hour model operating at 70 percent of capacity with a 300 hour season. This packinghouse would require at least 48 acres of tomatoes assuming a yield per acre of 35,000 pounds. To determine the effects on profitability when alternative investment possibilities face a potential investor, several of the original assumptions affecting the single product packinghouse models were modified.

First, the packing margin was increased 10 percent to \$1.65 per carton. Capital values calculated with this change in the revenue structure permitted two additional packinghouses to pass the criteria for profitability. One model, the 300 carton-per-hour

packinghouse operating at 70 percent of capacity and season length of 200 hours, requires only 32 acres of tomatoes to satisfy its raw product requirements. Second, with the original packing margin remaining at \$1.50 per carton, the initial investment in the building was assumed to be zero (donated to a packinghouse investor by a community development authority, for example). This example, in affect, lowers the initial cost of investment of the packinghouse which means the estimated capital values need not be as high as previously calculated to pass the criteria for profitability. With this assumption, then, two additional packinghouses entered the range of profitability. As with the previous assumption which increased the packing margin, the smallest size profitable packinghouse was the 300 carton-per-hour model operating at 70 percent of capacity with a season length of 200 hours requiring 32 acres of tomatoes for its raw product requirement.

Finally, these two assumptions were combined to determine, which, if any, of the smaller packinghouse models would enter the profitable range. Two additional packinghouse models did, indeed, enter the profitable range, but the structure of these packinghouse models is such that raw product requirements for the smallest of these two additional packinghouse models remained at 32 acres. Therefore, with the cost and revenue structures of these single product packinghouse models, the least amount of raw product needed to realistically supply the basic requirement of the smallest, profitable, single product tomato packinghouse was determined to be 32 acres.



In addition to single product, tomato packinghouse models, multi-product packinghouse combinations were examined using the tomato line as a base. It was combined first with a bell pepper line, then with a squash line and finally with both a bell pepper and squash packing line. These multiproduct packinghouse models were examined to discover which packing line, if any, could be combined with a tomato packing line to decrease the raw product requirements of tomatoes below the 32 acres needed for single product models while keeping the packinghouses in the profitable range. A cabbage packing line was excluded since raw product supplies needed for even the smallest packing line greatly exceeded realistic production potentials for the study area.

Bell peppers and squash can both be packaged on the same packing line. Therefore, only two packing lines were needed--one for tomatoes and one for bell peppers and squash. The building designed for the 300 carton-per-hour tomato packing line was assumed to be sufficient to house the additional squash/bell pepper line assuming sufficient supervisory personnel was available to handle the increased volume. The smallest, profitable two product tomato and bell pepper packinghouse model required 32 acres of tomatoes and 31.3 acres of bell peppers. This combination appears to be the most realistic multiproduct packinghouse model for the study area. The smallest, profitable tomato and squash packinghouse combination requires 32 acres of tomatoes and 81.8 acres of squash. This latter

figure for squash greatly exceeds the production capabilities of the study area so this packinghouse combination was considered highly unrealistic.

The final multiproduct packinghouse to be examined was the combination of tomatoes, bell peppers and squash. This combination would stretch the packing season over three and one-half months-- July, August, September, and part of October. Again, the most realistic, profitable packinghouse combination included the 300 carton-per-hour tomato line operating at 70 percent of capacity with a 200 hour season length combined with any of the season lengths of the squash and bell pepper line. The 100 hour season lengths for squash and bell peppers would require 15.7 acres of bell peppers and 27.3 acres of squash.

In addition to examining production and packaging considerations for various vegetable crops in the Claiborne County area, the potential for marketing the two most promising vegetables--tomatoes and bell peppers--was also examined in this study. First, the potential effects on the prices of these two products were investigated to determine whether the output handled by the packinghouse models presented in Chapter III would be sufficient to alter the prices received by the respective packinghouses. With both tomatoes and bell peppers, the volume of produce from these packinghouses was determined to have a negligible effect on the prices of these products in their respective markets. That is, the firms face a perfectly elastic demand function.

Second, the actual potential for marketing Tennessee tomatoes and bell peppers was evaluated by examining their respective competitive advantages in transportation costs in terms of Tennessee's proximity to various distribution centers over those of other leading producing areas (California in particular). Assuming production costs and quality of the product are similar, Tennessee's potential to increase its share of the tomato market appeared to be favorable in cities such as Detroit and New York where California's share of the market is substantial and where Tennessee's advantage in terms of transportation costs to these markets is superior to that of California. Marketing potential for bell peppers, however, appeared to be less favorable than that of tomatoes. The reason for this lies in the fact that Tennessee's major competition comes from states such as North Carolina which have transportation costs to major distribution centers similar to those of Tennessee.

In conclusion, considering the production, processing, and marketing potentials for vegetable production in the Claiborne County area, tomatoes packed in a single product packinghouse appear to have the most potential in establishing a successful commercial operation compared with the other vegetables considered in this study. Bell pepper production also appears to have some potential for success combined with a tomato operation although marketing potential for bell peppers is less optimistic than that for tomatoes.

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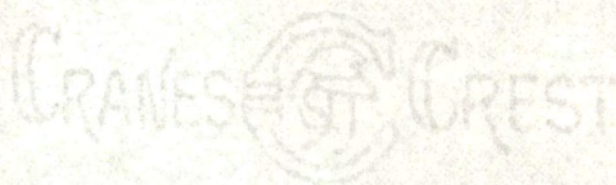


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APPENDIX

CRANES & CREST

TABLE 18. ENTERPRISE BUDGET FOR FRESH MARKET TOMATOES

Item	Unit	Quantity	Price	Amount
Revenue:				
Gross Revenue:				
1's and 2's	lb.	25,000	\$ 0.22	\$5,500.00
Salvage	lb.	10,000	0.08	800.00
			Total Revenue	\$6,300.00
Expenses:				
Variable:				
Plants--1"	thous.	5	25.00	\$ 125.00
Fertilizer:				
N	lb.	60	0.22	13.20
P2O5	lb.	160	0.18	28.80
K2O	lb.	240	0.11	26.40
Sidedress: N-3 applications of 30 lbs.	lb.	90	0.22	19.80
Lime	ton	1	7.25	7.25
Chemicals:				
Insecticide:				
Sevin 50 percent W.P.--12 applications of 4 lbs.	lb.	48	1.975	94.80
Fungicide:				
Maneb, 80 percent W.P.--5 applications of 2 lbs.	lb.	10	1.24	12.40
Bravo, 7 applications of 2 pts.	pt.	14	3.619	50.67
Herbicide:				
Diphenamid--50 percent W.P.	lb.	12	2.29	27.48
Twine--Binder	lb.	70	0.29	20.30
Tractor--60 horse	hr.	24.6	2.80	68.88
Truck--2 ton, 20 trips	hr.	20	12.90	258.00
Other Machinery				14.87

TABLE 18 (Continued)

Item	Unit	Quantity	Price	Amount
Labor:				
Stakes	hr.	15	\$ 2.50	\$ 37.50
Stringing	hr.	80	2.50	200.00
Suckering--3 times	hr.	80	2.50	200.00
Other Production	hr.	100	2.50	250.00
Harvesting--per 5 gal. buckets weighing 33 3/4 lbs.	ea.	1,037	0.50	518.50
Broker Fees--5 percent of \$5500				275.00
Packing Charges--\$1.50/20 lb. container (1250 boxes of 1's and 2's)				1,875.00
Interest on Operating Capital: 6 months at 9 percent on \$1,455.35a				65.49
		Total Variable Expenses		\$4,189.34
Fixed:				
Stakes ^b	thous.	5.8 x 20 per-	100.00	116.00
Buckets ^c	ea.	cent = 1.16/yr. 100; 1/3 re-	0.75	25.00
Tractor--60 horse	hr.	placed per year	1.85	45.51
Truck--2 ton	hr.	24.6	3.44	68.80
Other Machinery		20		27.71
		Total Fixed Expenses		\$ 283.02
		Total Variable and Fixed Expenses		\$4,472.36
		Net Return to Land, Capital, and Management		\$1,827.64
Less:				
Interest on Fixed Capital				
12 months at 7 1/2 percent on Machinery ^d				50.17
		Net Return to Land and Management		\$1,777.47

TABLE 18 (Continued)

- ^a Operating capital is calculated on the sum of all variable expenses except harvest labor, broker fees, interest on operating capital, and packing charges for a total of \$1,455.35.
- ^b Assumes stakes have an estimated life of 5 years so 20 percent will be replaced each year.
- ^c Assumes buckets have an estimated life of three years so 1/3 will be replaced each year.
- ^d Interest charged on a per hour use basis on an average value of machines at 7 1/2 percent which assumes part owned funds and part borrowed funds.

SOURCES:

Free, W.J., R.M. Banks, Paul Coldity and R.H. Gibson. A Feasibility Study of Fresh Vegetable Production and Marketing in Northwest Georgia, Tennessee Valley Authority, Division of Agricultural Development, Muscle Shoals, Alabama, August 1976.

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PRICES: Current prices were obtained from commercial establishments in Tazewell and Knoxville, Tennessee.

TABLE 19. ENTERPRISE BUDGET FOR FRESH MARKET BELL PEPPERS

Item	Unit	Quantity	Price	Amount
<u>Revenue:</u>				
Gross Revenue:	ton	6	\$340.00	\$2040.00
<u>Expenses:</u>				
<u>Variable:</u>				
Plants				
Fertilizer:	thous.	7.7	13.50	103.95
N	lb.	80	0.22	17.60
P ₂ O ₅	lb.	80	0.18	14.40
K ₂ O	lb.	80	0.11	8.80
Starter 10-52-17	lb.	9	0.65	5.85
Lime	ton	1	7.25	7.25
<u>Chemicals:</u>				
<u>Insecticide:</u>				
Sevin 50 percent W.P., 7 applications of 4 lbs.	lb.	28	1.975	55.30
<u>Fungicide:</u>				
Copper Sulfate	lb.	12	1.325	15.90
<u>Herbicide:</u>				
Diphenamid	lb.	12	2.29	27.48
Tractor--60 horse	hr.	20	2.80	56.00
Truck--2 ton, 10 trips	hr.	10	12.90	129.00
Other Machinery				8.00
<u>Labor:</u>				
Production	hr.	50	2.50	125.00
Harvesting	hr.	100	2.50	250.00
Other	hr.	6.1	2.50	15.25
Broker Fees--5 percent of \$2040				102.00

TABLE 19 (Continued)

Item	Unit	Quantity	Price	Amount
Packing Charges--\$1.50/30 lb. container (400 containers)				\$ 600.00
Interest on Operating Capital: 6 months at 9 percent on \$574.53 ^a		Total Variable Expense		25.85 \$1567.63
Fixed:				
Tractor--60 horse	hr.	20	\$ 1.85	\$ 37.00
Truck--2 ton	hr.	10	3.44	34.40
Other Machinery		Total Fixed Expenses		15.53 \$ 86.93
		Total Variable and Fixed Expenses		\$1654.56
		Net Returns to Land, Capital and Management		\$ 385.44
Less: Interest on Fixed Capital: 12 months at 7 1/2 percent on machinery ^b				\$ 30.16 \$ 355.28
		Net Return to Land and Management		

^a Operating capital is calculated on the sum of all variable expenses except harvest and other labor, broker fees, packing charges and interest on operating capital for a total of \$574.53.

^b Interest charges on a per hour use basis on an average of machines at 7 1/2 percent which assumes part owned funds and part borrowed funds.

SOURCES: Input-Output Coefficients:

TABLE 19 (Continued)

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PRICES: Current prices were obtained from commercial establishments in Tazewell and Knoxville, Tennessee.

TABLE 20. ENTERPRISE BUDGET FOR FRESH MARKET CABBAGE

Item	Unit	Quantity	Price	Amount
Revenue:				
Gross Revenue:	lb.	23,000	\$ 0.0525	\$1207.50
Expenses:				
Variable:				
Plants	thous.	11	20.00	220.00
Fertilizer:				
N	lb.	50	0.22	11.00
P ₂ O ₅	lb.	60	0.18	10.80
K ₂ O	lb.	90	0.11	9.90
Boran	lb.	2	1.17	2.34
Chemicals:				
Insecticide:				
Sevin 50 percent W.P.--4 applications of 3 lbs.	lb.	12	1.975	23.70
Diazinon Ag. 500	qts.	3	6.95	20.85
Fungicide:				
Maneb 80 percent W.P.	lb.	4	1.24	4.96
Herbicide:				
DCPA (Dachtal) 75 percent W.P.	lb.	13.33	2.49	33.19
Containers--50 lb. bags	ea.	100	0.45	45.00
Tractor--60 horse	hr.	15	2.80	42.00
Truck--2 ton	hr.	6	12.90	77.40
Other Expenses				2.76
Labor:				
Production	hr.	32	2.50	80.00
Harvest--per 50 lb. bag.	ea.	460	0.50	230.00
Broker Fees--5 percent on \$1207.50				60.37

TABLE 20 (Continued)

Item	Unit	Quantity	Price	Amount
Interest on Operating Capital: 6 months at 9 percent on \$538.90 ^a				24.25 \$ 898.52
Fixed:				
Tractor--60 horse	hr.	15	\$ 1.85	\$ 27.75
Truck--2 ton	hr.	6	3.44	20.64
Other Machinery				6.80
		Total Fixed Expenses		\$ 55.19
		Total Variable and Fixed Expenses		\$ 953.71
		Net Return to Land, Capital and Management		\$ 253.79
Less:				
Interest on Fixed Capital: 12 months at 7 1/2 percent on Machinery ^b				\$ 19.61
		Net Return to Land and Management		\$ 234.18

^aOperating capital is calculated on the sum of all variable expenses except expenses on containers, harvest labor, broker fees, and interest on operating capital for a total of \$538.90.

^bInterest charged on a per hour use basis on an average value of machines at 7 1/2 percent which assumes part owned funds and part borrowed funds.

SOURCES: Input-Output Coefficients:

Free, W.J., R.M. Banks, Paul Coldity and R.H. Gibson. A Feasibility Study of Fresh Vegetable Production and Marketing in Northwest Georgia, Tennessee Valley Authority, Division of Agricultural Development, Muscle Shoals, Alabama, August 1976.

TABLE 20 (Continued)

North Carolina Extension Service. Unpublished Vegetable Budgets, North Carolina State University, 1974.

Roberts, D.R., Dean E. Knavel, Harold G. Love, Stephen A. Allen and Luther H. Small. Commercial Production of Fresh Market Cabbage in Kentucky, Kentucky Extension Circular #631, Lexington, Kentucky 1972.

PRICES: Current prices were obtained from commercial establishments in Tazewell and Knoxville, Tennessee.

TABLE 21. ENTERPRISE BUDGET FOR FRESH MARKET SWEET CORN

Item	Unit	Quantity	Price	Amount
<u>Revenue:</u>				
Gross Revenue: ^a	doz. ears	1000	\$ 0.80	\$ 800.00
<u>Expenses:</u>				
Variable:				
Seed	lb.	13	3.20	41.60
Fertilizer:				
N	lb.	150	0.22	33.00
P205	lb.	52	0.18	9.36
K20	lb.	50	0.11	5.50
Lime	ton	1	7.25	7.25
Chemicals:				
Insecticide:				
Sevin 50 percent W.P.--3 applications of 3 lbs.	lb.	9	1.975	17.78
Herbicide:				
Atrazine 80 percent W.P.	lb.	2.5	2.30	5.75
Tractor--60 horse	hr.	4	2.80	11.20
Truck--2 ton	hr.	2	12.90	25.80
Other Machinery				2.50
Containers--Wirebound crate ^b	ea.	200	0.70	140.00
Other Expenses				20.00
Labor:				
Production	hr.	15	2.50	37.50
Harvest	crates	200	1.00	200.00
Hydrocool	crates	200	0.40	80.00
Broker Fees--5 percent of \$800				40.00
Interest on Operating Capital:				
6 months at 9 percent on \$357.24 ^c				16.08
Total Variable Expenses				\$ 693.32

TABLE 21 (Continued)

Item	Unit	Quantity	Price	Amount
Fixed:				
Tractor--60 horse	hr.	4	\$ 1.85	\$ 7.40
Truck--2 ton	hr.	2	3.44	6.88
Other Machinery				5.19
		Total Fixed Expenses		\$ 19.47
		Total Variable and Fixed Expenses		\$ 712.79
		Net Return to Land, Capital and Management		\$ 87.21
Less:				
Interest on Fixed Capital: 12 months at 7 1/2 percent on Machinery ^d				\$ 6.27
		Net Return to Land and Management		\$ 80.94

^aOne dozen ears of corn will weigh approximately 5 pounds. Therefore, gross revenue can also be expressed as 9000 lbs at 8.89 cents/lb. which equals \$800.00.

^bEach crate contains 5 dozen ears or 45 pounds of corn.

^cOperating capital is calculated on the sum of all variable expenses except harvest labor, hydrocooling, broker fees, and interest on operating capital for a total of \$357.24.

^dInterest charged on a per hour use basis on an average value of machines at 7 1/2 percent which assumes part owned funds and part borrowed funds.

SOURCES: Input-Output Coefficients:

Smith, Daniel, B., G. Ansel King and Dan O. Ezell. Selected Vegetable Budgets, South Carolina 1976. A.E. 390, Clemson University, Clemson, South Carolina, June 1976.

TABLE 21 (Continued)

North Carolina Extension Service. Unpublished Vegetable Budgets, North Carolina State University, 1974.

Extension specialists of the University of Tennessee.

PRICES: Current prices were obtained from commercial establishments in Tazewell and Knoxville, Tennessee.

TABLE 22. ENTERPRISE BUDGET FOR FRESH MARKET SQUASH

Item	Unit	Quantity	Price	Amount
<u>Revenue:</u>				
Gross Revenue:	bu.	225	\$ 5.00	\$1125.00
<u>Expenses:</u>				
<u>Variable:</u>				
Seed	lb.	3.5	7.77	27.20
Fertilizer:				
N	lb.	35	0.22	7.70
P ₂ O ₅	lb.	45	0.18	8.10
K ₂ O	lb.	30	0.11	3.30
Sidedressing of N	lb.	20	0.22	4.40
Chemicals:				
Insecticide:				
Sevin 50 percent W.P.--4 applications of 2 lbs.	lb.	8	1.975	15.80
Fungicide:				
Maneb 80 percent W.P.--4 applications of 2 lbs.	lb.	8	1.24	9.92
Herbicide:				
DCPA (Dacthal)--75 percent W.P.	lb.	13.33	2.49	33.19
Containers--bushel	ea.	225	0.90	202.50
Tractors--60 horse	hr.	10	2.80	28.00
Truck--2 ton	hr.	2	12.90	25.80
Other Machinery				2.85
Labor:				
Production	hr.	18	2.50	45.00
Harvest	bu.	225	1.00	225.00
Broker Fees--5 percent on \$1125.00				56.25
Interest on Operating Capital:				
6 months at 9 percent on \$413.76 ^a				18.62
Total Variable Expenses				\$ 713.63

TABLE 22 (Continued)

Item	Unit	Quantity	Price	Amount
Fixed:				
Tractor--60 horse	hr.	10	\$ 1.85	\$ 18.50
Truck--2 ton	hr.	2	3.44	6.88
Other Machinery				5.63
		Total Fixed Expenses		\$ 31.01
		Total Variable and Fixed Expenses		\$744.64
		Net Return to Land, Capital and Management		\$380.36
Less:				
Interest on Fixed Capital: ^b 12 months at 7 1/2 percent on Machinery				\$ 10.98
		Net Return to Land and Management		\$369.38

^aOperating capital is calculated on the sum of all the variable expenses except harvest labor, broker fees, and interest on operating capital for a total of \$413.76.

^bInterest charged on a per hour use basis on an average value of machines at 7 1/2 percent which assumes part owned funds and part borrowed funds.

SOURCES: Input-Output Coefficients:

Smith, Daniel B., G. Ansel King and Dan O. Ezell. Selected Vegetable Budgets, South Carolina 1976. A.E. 390, Clemson University, Clemson, South Carolina, June 1976.

Free, W.J., R.M. Banks, Paul Coldity and R.H. Gibson. A Feasibility Study of Fresh Vegetable Production and Marketing in Northwest Georgia, Tennessee Valley Authority, Division of Agricultural Development, Muscle Shoals, Alabama, 1976.

TABLE 22 (Continued)

North Carolina Extension Service. Unpublished Vegetable Budgets, North Carolina State University, 1974.

Extension specialists of the University of Tennessee.

PRICES: Current prices were obtained from commercial establishments in Tazewell and Knoxville, Tennessee.



TABLE 23. ENTERPRISE BUDGET FOR FRESH MARKET SNAP BEANS

Item	Unit	Quantity	Price	Amount
<u>Revenue:</u>				
Gross Revenue: (bu = 30 lbs.)	bu.	175	\$ 6.00	\$1050.00
<u>Expenses:</u>				
Variable:				
Seed	lb.	80	1.25	100.00
Fertilizer:				
N	lb.	45	0.22	9.90
P ₂ O ₅	lb.	60	0.18	10.80
K ₂ O	lb.	30	0.11	3.30
Chemicals:				
Insecticide:				
Sevin 50 percent W.P.--5 applications of 2 lbs.	lb.	10	1.975	19.75
Thiodan 50 percent W.P.--3 applications of 2 lbs.	lb.	6	6.70	40.20
Fungicide:				
Maneb 80 percent W.P.--5 applications of 2 lbs.	lb.	10	1.24	12.40
Terraclor 75 percent W.P.	lb.	2	1.49	2.98
Herbicide:				
Eptc	lb.	2.5	2.97	7.42
Containers--bushel	ea.	175	0.90	157.50
Tractor--60 horse	hr.	10	2.80	28.00
Truck--2 ton	hr.	4	12.90	51.60
Other Machinery				2.11
Labor:				
Production	hr.	20	2.50	50.00
Harvest	bu.	175	1.00	175.00
Broker Fees--5 percent of \$1050.00				52.50

TABLE 23 (Continued)

Item	Unit	Quantity	Price	Amount
Interest on Operating Capital: 6 monthsh at 9 percent on \$495.96 ^a				\$ 22.32 \$ 745.78
Fixed:				
Tractor--60 horse	hr.	10	\$ 1.85	18.50
Truck--2 ton	hr.	4	3.44	13.76
Other Machinery				4.56
		Total	Total Fixed Expenses	\$ 36.82
			Total Variable and Fixed Expenses	\$ 782.60
			Net Return to Land, Capital and Management	\$ 267.40
Less:				
Interest on Fixed Capital: 12 months at 7 1/2 percent on machinery ^b				14.12 \$ 253.28

^aOperating capital is calculated on the sum of all variable expenses except harvest labor, broker fees, and interest on operating capital for a total of \$495.96.

^bInterest charges on a per hour use basis on an average value of machines at 7 1/2 percent which assumes part owned funds and part borrowed funds.

SOURCES: Input-Output Coefficients:

Smith, Daniel B., G. Ansel King and Dan O. Ezell. Selected Vegetable Budgets, South Carolina 1976. A.E. 390, Clemson University, Clemson, South Carolina, June 1976.

Free, W.J., R.M. Banks, Paul Coldity and R.H. Gibson. A Feasibility Study of Fresh Vegetable Production and Marketing in Northwest Georgia, Tennessee Valley Authority, Division of Agricultural development, Muscle Shoals, Alabama, August 1976.

TABLE 23 (Continued)

North Carolina Extension Service. Unpublished Vegetable Budgets, North Carolina State University, 1974.

Extension specialists of the University of Tennessee.

PRICES: Current prices obtained from commercial establishments in Tazewell and Knoxville, Tennessee.

TABLE 24. EFFECTS OF VARYING PRODUCTION AND PRICE ON NET RETURNS TO LAND AND MANAGEMENT OF ONE ACRE OF FRESH MARKET TOMATOES

Rate of Production	Total Expenses Per Acre ^a	Price per pound (Dollars) ^b				
		.18 .06	.20 .07	.22 .08	.24 .09	.26 .10
		-----dollars-----				
20,000 lb. ^c 8,000 lb. ^d	3769.03	130.97	590.97	1050.97	1510.97	1970.97
25,000 lb. ^c 10,000 lb. ^d	4247.53	627.47	1202.47	1777.47	2352.47	2927.47
30,000 lb. ^c 12,000 lb. ^d	4726.03	1123.97	1813.97	2503.97	3193.97	3883.97

^aIncludes all expenses except brokerage fees since these are calculated as 5 percent of sales of U.S. grades 1 and 2. Changes in brokerage fees are included in the final figures for net return. Only changes in harvesting labor and packing charges from Appendix Table 18, page 97, were calculated for each rate of production even though slight variations in other production expenses may occur with changes in yield.

^bUpper level of prices are for U.S. grades 1 and 2. Lower level of prices are for salvage grades.

^cPounds of U.S. grades 1 and 2.

^dPounds of salvage grades.

TABLE 25. EFFECTS OF VARYING PRODUCTION AND PRICE ON NET RETURNS TO LAND AND MANAGEMENT OF ONE ACRE OF BELL PEPPERS FOR FRESH MARKET

Rate of Production	Total Expenses Per Acre ^a	Price per ton (Dollars)				
		300	320	340	360	380
		dollars				
5 tons	1,427.12	-2.12	92.88	187.88	282.88	377.88
6 tons	1,569.62	140.38	254.38	368.38	482.38	596.38
7 tons	1,712.12	282.88	415.88	548.88	681.88	814.88

^aIncludes all expenses except brokerage fees which are calculated as 5 percent of gross revenue. Changes in brokerage fees are included in the final figures for net return. Only changes in harvesting labor and packing charges shown in Appendix Table 19, page 100, were calculated for each rate of production even though slight variations in other production expenses may occur with changes in yield.

TABLE 26. EFFECTS OF VARYING PRODUCTION AND PRICE ON NET RETURNS TO LAND AND MANAGEMENT OF ONE ACRE OF CABBAGE FOR FRESH MARKET

Rate of Production	Total Expenses Per Acre ^a	Price per pound (Dollars)				
		.04	.045	.0525	.055	.06
		dollars				
20,000 lbs.	882.95	-122.95	- 27.95	114.55	162.05	257.05
23,000 lbs.	912.95	- 38.95	70.30	234.18	288.80	398.05
25,000 lbs.	932.95	17.05	135.80	313.93	373.30	492.05

^aIncludes all expenses except brokerage fees since there are calculated as 5 percent of gross revenue. Changes in brokerage fees are included in the final figures for net return. Only changes in harvesting labor from Appendix Table 20, page 103, were calculated for each rate of production even though slight variations in other production expenses may occur with changes in yield.

TABLE 27. EFFECTS OF VARYING PRODUCTION AND PRICE ON NET RETURNS TO LAND AND MANAGEMENT OF ONE ACRE OF SWEET CORN FOR FRESH MARKET

Rate of Production	Total Expenses Per Acre ^a	Price per dozen ears (Dollars)				
		.70	.75	.80	.85	.90
		-----dollars-----				
900 doz. ears	640.31	-41.81	.94	43.69	86.44	129.19
1000 doz. ears	682.31	-17.31	30.19	77.69	125.19	172.69
1100 doz. ears	724.31	7.19	59.44	111.69	163.94	216.19

^aIncludes all expenses except brokerage fees since these are calculated as 5 percent of gross revenue. Changes in brokerage fees are included in the final figure for net return. Changes in the expenses for containers, harvest labor, and hydrocooling from Appendix Table 21, page 106, were calculated for each rate of production. Other expenses were held constant even though slight variations in other production expenses may occur with changes in yield.

TABLE 28. EFFECTS OF VARYING PRODUCTION AND PRICE ON NET RETURNS TO LAND AND MANAGEMENT OF ONE ACRE OF FRESH MARKET SQUASH

Rate of Production	Total Expenses Per Acre ^a	Price per bushel (Dollars)				
		4.00	4.50	5.00	5.50	6.00
		-----dollars-----				
200 bushels	651.87	108.13	203.13	298.13	393.13	488.13
225 bushels	699.37	155.63	262.51	369.38	476.26	583.13
250 bushels	746.87	203.13	321.88	440.63	559.38	678.13

^aIncludes all expenses except brokerage fees since these are calculated as 5 percent of gross revenue. Changes in brokerage fees are included in the final figure for net return. Changes in container expense and harvest labor from Appendix Table 22, page 109, were calculated for each rate of production. Other expenses are held constant even though slight variations in other production expenses may occur with changes in yield.

TABLE 29. EFFECTS OF VARYING PRODUCTION AND PRICE ON NET RETURNS TO LAND AND MANAGEMENT OF ONE ACRE OF SNAP BEANS FOR FRESH MARKET

Rate of Production	Total Expenses Per Acre ^a	Price per bushel (Dollars)				
		5.40	5.70	6.00	6.30	6.60
		-----dollars-----				
150 bushels	696.72	72.78	115.53	158.28	201.03	243.78
175 bushels	744.22	153.53	203.41	253.28	303.16	353.03
200 bushels	791.72	234.28	291.28	348.28	405.28	462.28

^aIncludes all expenses except brokerage fees since these are calculated as 5 percent of gross revenue. Changes in brokerage fees are included in the final figure for net return. Changes in container expense and harvest labor from Appendix Table 23, page 112, were calculated for each rate of production. Other expenses were held constant even though slight variations in other production expenses may occur with changes in yield.

TABLE 30. INITIAL INVESTMENT REQUIRED FOR SINGLE PRODUCT VINE-RIPE
TOMATO PACKINGHOUSES WITH SELECTED HOURLY PACK-OUT CAPACITIES

Item	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
	-----dollars-----				
<u>Equipment</u>					
Field boxes ^a	2,282	2,984	4,388	7,546	14,918
Hand clamp truck ^b	254	254	507	761	1,268
Dumping ^c	3,584	3,584	5,295	3,931	4,128
Washing and drying ^c	2,867	2,867	2,867	3,315	4,426
Pregrading ^c	3,199	3,199	3,324	3,692	4,928
Packing ripers ^c	573	573	573	573	1,147
Waxing ^c	1,093	1,093	1,093	1,613	2,688
Grading no. 1's ^c	3,199	3,360	3,924	5,286	8,082
Sizing no. 1's ^c	6,630	6,630	7,347	9,318	10,752
Distributing no. 1's ^c	2,796	2,742	3,575	5,484	9,605
Packing no. 1's ^c	2,536	2,536	3,530	3,772	6,388
Grading no. 2's ^c	3,199	3,360	3,360	3,924	4,776
Sizing no. 2's ^c	6,630	6,630	6,630	6,630	7,347
Distributing no. 2's ^c	--	--	--	--	3,512
Packing no. 2's ^c	2,536	2,536	2,536	2,536	2,957
Grading no. 3's ^c	1,649	1,649	1,900	2,025	2,580
Packing no. 3's ^c	573	654	1,228	1,882	3,190
Hand clamp truck ^b	254	254	507	761	1,522
Conveying empty cartons ^c	--	--	--	385	547
Conveying culls ^c	4,557	4,636	4,971	5,326	6,252
Office equipment ^d	3,667	3,667	5,982	5,982	7,004
Freight and installation expense ^e	9,124	9,210	10,431	11,938	16,661
Total	61,202	62,418	73,968	86,680	124,678
<u>Building^f</u>					
Receiving ^g	634	634	792	1,014	1,268
Grading and packing ^h	12,365	12,238	16,627	21,269	40,765
Temporary holding ⁱ	5,528	6,963	9,706	14,643	23,548
Carton make-up ^j	3,798	3,798	5,064	3,110	3,962
Office ^k	575	1,151	2,302	2,302	3,452
Rest Rooms ^l	1,477	1,477	2,321	3,060	3,798
Aisles and unassigned ^m	14,559	16,500	19,454	26,586	32,283
Cull bin ⁿ	1,266	1,343	1,497	1,794	2,388
Total	40,202	44,104	57,763	73,778	111,464

TABLE 30 (Continued)

Item	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
	-----dollars-----				
Total building and equipment	101,404	106,522	131,731	160,458	236,142
<u>Plus</u>					
Miscellaneous ^o	10,140	10,652	13,173	16,046	23,614
Total initial investment	111,544	117,174	144,904	176,504	259,756

^aThe index used to update the cost of field boxes was the Wholesale Price Index for Machinery and Equipment--Agricultural, 1968 = 103.9 and 1976 = 182.6 (1967 = 100) located in the Bureau of Statistics, Wholesale Prices and Price Indexes, Government Printing Office, Washington, D.C., published monthly.

^bThe index used to update the cost of the hand clamp trucks was the Wholesale Price Index for Machinery and Equipment--Construction, 1968 = 105.7 and 1976 = 198.6 (1967 = 100) located in the bureau of Labor Statistics, Wholesale Prices and Price Indexes.

^cThe index used to update these equipment costs was the Wholesale Price Index for Machinery and Equipment--Special Industry, 1968 = 105.2 and 1976 = 188.5 (1967 = 100) located in the Bureau of Labor Statistics, Wholesale Prices and Price Indexes.

^dThe index used to update office equipment costs was the Wholesale Price Index for Machinery and Equipment--Miscellaneous Machines, 1968 = 104.3 and 1976 = 171.9 (1967 = 100) located in the Bureau of Labor Statistics, Wholesale Prices and Price Indexes.

^eEstimated at 20 percent of all equipment except field boxes, hand clamp trucks, and office equipment.

^fIndex used to update all building costs was the "E.H. Boeckh, Building Cost Index of Commercial and Factory Buildings" which can be found in the U.S. Department of Commerce, Bureau of Domestic Commerce, Construction Review, Vol. 23, No. 3, April/May 1977, Table E-1. This is an average index of 20 cities based on building costs. Wage rates used for both common and skilled labor and also includes payment of sales taxes and social security payroll taxes. This index was used because it

TABLE 30 (Continued)

separated commercial and factory construction from other types of construction. The index for 1968 was 106.8 and 1976 was 204.9 where 1967 = 100.

^g1968 price = \$1.65 per square foot, 1976 price = \$3.17 per square foot.

^h1968 price = \$4.40 per square foot, 1976 price = \$8.44 per square foot.

ⁱ1968 price = \$4.40 per square foot, 1976 price = \$8.44 per square foot.

^j1968 price = \$4.40 and \$2.00 per square foot, 1976 price = \$8.44 and \$3.84 per square foot.

^k1968 price = \$5.00 per square foot, 1976 price = \$9.59 per square foot.

^l1968 price = \$11.00 per square foot, 1976 price = \$21.00 per square foot.

^m1968 price = \$4.40 per square foot, 1976 price = \$8.44 per square foot.

ⁿ1968 prices ranged from \$11.00 to \$8.30 per square foot, 1976 prices ranged from \$21.10 to \$15.92 per square foot.

^oEstimated at 10 percent of equipment and building costs to cover architectural and engineering services, utility connections, site fees, survey, legal, and plant shakedown costs.

SOURCES: Basic input-output coefficients and 1968 base price levels were obtained from Brooker, John R. and James L. Pearson (eds.). Planning Data for Marketing Selected Fruits and Vegetables in the South, Part III--Fresh Vegetable Packing Handbook. Southern Cooperative Series Bulletin No. 152. Raleigh: North Carolina Agricultural Experiment Station, May 1970. Tables 86 and 88.

Structural format based on Brooker, John R. and James L. Pearson. Factors Affecting the Feasibility of Investment in Tomato Packinghouses. Agricultural Economics Report No. 25. Gainesville, Florida: Florida Agricultural Experiment Station, Institute of Food and Agricultural Sciences, University of Florida, July 1971. See Table 3, page 17.

TABLE 31. ANNUAL PACK-OUT OF VINE-RIPE TOMATOES IN PACKINGHOUSES WITH
SELECTED HOURLY PACK-OUT CAPACITIES OPERATING AT 50 AND 70
PERCENT OF RATED CAPACITY

Operating Level and Season Length	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
	-----20-pound cartons-----				
<u>50 Percent</u>					
100 hours	7,500 ^a	15,000	30,000	60,000	120,000
200 hours	15,000	30,000	60,000	120,000	240,000
300 hours	22,500	45,000	90,000	180,000	360,000
400 hours	30,000	60,000	120,000	240,000	480,000
<u>70 Percent</u>					
100 hours	10,500	21,000	42,000	84,000	168,000
200 hours	21,000	42,000	84,000	168,000	336,000
300 hours	31,500	63,000	126,000	252,000	504,000
400 hours	42,000	84,000	168,000	336,000	672,000

^aQuantities for annual pack-out are obtained by multiplying the hourly pack-out capacity times the season length and then multiplying this total by the operating level. For example: $(150 \times 100) \times 0.50 = 7500$, 20-pound cartons.

TABLE 32. TOTAL REVENUE RECEIVED BY VINE-RIPE TOMATO PACKINGHOUSES WITH SELECTED HOURLY PACK-OUT CAPACITIES AT TWO OPERATING LEVELS, FOUR SEASON LENGTHS, AND PACKING MARGIN OF \$1.50 PER CARTON

Operating Level and Season Length	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
	-----dollars-----				
50 Percent					
100 hours	11,250 ^a	22,500	45,000	90,000	180,000
200 hours	22,500	45,000	90,000	180,000	360,000
300 hours	33,750	67,500	135,000	270,000	540,000
400 hours	45,000	90,000	180,000	360,000	720,000
70 Percent					
100 hours	15,750	31,500	63,000	126,000	252,000
200 hours	31,500	63,000	126,000	252,000	504,000
300 hours	47,250	94,500	189,000	378,000	756,000
400 hours	63,000	126,000	252,000	504,000	1,008,000

^aFound by multiplying the annual pack-out from Appendix Table 31 by the packing margin of \$1.50 per carton.

TABLE 33. HOURLY OPERATING COSTS FOR SINGLE PRODUCT, VINE-RIPE TOMATO PACKINGHOUSES WITH SELECTED HOURLY PACK-OUT CAPACITIES OPERATING AT 50 AND 70 PERCENT OF CAPACITY

Item	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
Labor^a					
Receiving	\$ 2.30	\$ 2.30	\$ 4.60	\$ 6.90	\$ 11.50
Dumping	2.30	2.30	2.30	4.60	6.90
Pregrading	2.30	4.60	6.90	11.50	23.00
Packing ripe	2.30	2.30	2.30	2.30	4.60
Grading U.S. No. 1's	4.60	6.90	13.80	27.60	55.20
Packing U.S. No. 1's	12.00	18.00	24.00	45.00	87.00
Grading U.S. No. 2's	2.30	4.60	6.90	11.50	20.70
Packing U.S. No. 2's	3.00	3.00	6.00	15.00	24.00
Grading U.S. No. 3's	2.30	2.30	4.60	6.90	13.80
Packing U.S. No. 3's	3.00	6.00	18.00	15.00	27.00
Carton Make-up	-	4.60	9.20	16.10	34.50
Transporting for shipment	2.30	2.30	6.90	9.20	18.40
Miscellaneous	4.60	6.90	13.80	23.00	43.70
TOTAL WAGES	\$ 43.30	\$ 66.10	\$119.30	\$194.60	\$ 370.30
PLUS: Social Security Taxes ^b	2.53	3.87	6.98	11.38	21.66
TOTAL HOURLY WAGES	\$ 45.83	\$ 69.97	\$126.28	\$205.98	\$ 391.96
Supplies and Utilities^c					
Fiberboard Containers:					
50 percent of capacity	\$ 34.20	\$ 68.18	\$136.35	\$272.70	\$ 545.40
70 percent of capacity	47.88	95.45	190.89	381.78	763.56
Wax: ^d					
50 percent of capacity	0.64	1.27	2.55	5.09	10.18
70 percent of capacity	0.89	1.78	3.56	7.12	14.25
Waste Disposal: ^e					
50 percent of capacity	0.89	1.78	3.56	7.12	14.24
70 percent of capacity	1.25	2.49	4.98	9.97	19.94
Utilities:					
Electricity ^f	0.59	0.61	0.79	0.91	1.28
Water and sewer ^g	2.06	2.10	2.22	3.66	6.42
Repair work and supplies ^h	2.45	2.50	2.96	3.47	4.99
TOTAL SUPPLIES AND UTILITIES:					
50 percent of capacity	\$ 40.83	\$ 76.44	\$148.43	\$292.95	\$ 582.51
70 percent of capacity	55.12	104.93	205.40	406.91	810.44

TABLE 33 (Continued)

Item	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
TOTAL HOURLY OPERATING COSTS:					
50 percent of capacity	\$ 86.66	\$146.41	\$274.71	\$498.93	\$ 974.47
70 percent of capacity	100.95	174.90	331.68	612.89	1,202.40

^aWage rates are \$2.30 per hour for all stages of the packing operation except the actual packing of 1's, 2's and 3's which is \$3.00 per hour. This is up from the 1968 wage rates of \$1.60 and \$2.25 per hour.

^bThe employer's contribution to the Social Security Tax in 1976 was 5.85 percent of wages paid.

^cThe index used to update the cost of the fiberboard containers was the Wholesale Price Index for Paper and Allied Products. 1968 = 101.1 and 1976 = 179.4 (1967 = 100) located in the Bureau of Labor Statistics Wholesale Prices and Price Indexes, Government Printing Office, Washington, D.C., published monthly.

^dThe index used to update the cost of wax was the Wholesale Price Index for Chemicals and Allied Products. 1968 = 99.8 and 1976 = 187.0 located in the Bureau of Labor Statistics' Wholesale Prices and Price Indexes.

^eThe index used to update the cost of waste disposal was the Wholesale Price Index for All Commodities, 1968 = 102.5 and 1976 = 182.9 located in the Bureau of Labor Statistics' Wholesale Prices and Price Indexes.

^fThe electric utility rate was provided by the Powell Valley Power Company which supplies Claiborne County. The rate used was \$0.029 per kilowatt-hour which was the rate in effect during the fall of 1976.

^gThe water and sewer rate was obtained from the City of Tazewell Water Department. The rate used was \$1.75 per thousand gallons of water and \$1.38 per thousand gallons of sewage.

^hRepair work and supplies is estimated at .00004 of initial investment in equipment.

1. The first part of the report deals with the general situation of the country and the results of the survey.

2. The second part of the report deals with the results of the survey in the different regions of the country.

3. The third part of the report deals with the results of the survey in the different sectors of the economy.

4. The fourth part of the report deals with the results of the survey in the different social groups.

5. The fifth part of the report deals with the results of the survey in the different administrative units.

6. The sixth part of the report deals with the results of the survey in the different educational institutions.

7. The seventh part of the report deals with the results of the survey in the different cultural institutions.

8. The eighth part of the report deals with the results of the survey in the different health institutions.

9. The ninth part of the report deals with the results of the survey in the different sports institutions.

10. The tenth part of the report deals with the results of the survey in the different scientific institutions.

TABLE 33 (Continued)

SOURCES: Basic input-output coefficients and 1968 base price levels were obtained from:

Brooker, John R. and James L. Pearson (eds.) Planning Data for Marketing Selected Fruits and Vegetables in the South, Part III--Fresh Vegetable Packing Handbook. Southern Cooperative Series Bulletin No. 152. Raleigh: North Carolina Agricultural Experiment Station, May 1970. Tables 87 and 90, pp. 123 and 125.

Brooker, John R. and James L. Pearson. Factors Affecting the Feasibility of Investment in Tomato Packinghouses. Agricultural Economics Report No. 25. Gainesville, Florida: Florida Agricultural Experiment Station, Institute of Food and Agricultural Sciences, University of Florida, July 1971. Appendix Table 6, p. 33.

TABLE 34. TOTAL OPERATING COSTS FOR SINGLE PRODUCT, VINE-RIPE TOMATO PACKINGHOUSES WITH SELECTED HOURLY PACK-OUT CAPACITIES AT 50 PERCENT OPERATING LEVEL AND \$1.50 PACKING MARGIN

Selected Season Length and Operating Cost	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
	-----dollars-----				
100 Hour Season					
Hourly Costs ^a	8,666	14,641	27,471	49,893	97,447
Salaries ^b	1,621	1,852	3,242	3,242	4,400
Property Taxes ^c	1,014	1,065	1,317	1,605	2,361
Interest ^d	390	659	1,236	2,245	4,385
Insurance ^e	1,014	1,065	1,317	1,605	2,361
Office Expenses ^f	225	293	549	998	1,949
Annual Repair ^g	1,521	1,598	1,976	2,407	3,542
Miscellaneous ^h	562	1,125	2,250	4,500	9,000
TOTAL	15,013	22,298	39,358	66,495	125,445
200 Hour Season					
Hourly Costs	17,332	29,282	54,942	99,786	194,894
Salaries	3,242	3,705	6,483	6,483	8,799
Property Taxes	1,014	1,065	1,317	1,605	2,361
Interest	780	1,318	2,472	4,490	8,770
Insurance	1,014	1,065	1,317	1,605	2,361
Office Expense	347	586	1,099	1,996	3,898
Annual Repair	1,521	1,598	1,976	2,407	3,542
Miscellaneous	1,125	2,250	4,500	9,000	18,000
TOTAL	26,375	40,869	74,106	127,372	242,625
300 Hour Season					
Hourly Costs	25,998	43,923	82,413	149,679	292,341
Salaries	4,862	5,558	9,724	9,724	13,198
Property Taxes	1,014	1,065	1,317	1,605	2,361
Interest	1,170	1,977	3,709	6,736	13,155
Insurance	1,014	1,065	1,317	1,605	2,361
Office Expense	520	879	1,648	2,994	5,847
Annual Repair	1,521	1,598	1,976	2,407	3,542
Miscellaneous	1,687	3,375	6,750	13,500	27,000
TOTAL	37,786	59,440	108,854	188,250	359,805
400 Hour Season					
Hourly Costs	34,664	58,564	109,884	199,572	389,788
Salaries	6,483	7,410	12,966	12,966	17,598
Property Taxes	1,014	1,065	1,317	1,605	2,361
Interest	1,560	2,635	4,945	8,981	17,540
Insurance	1,014	1,065	1,317	1,605	2,361

TABLE 34 (Continued)

Selected Season Length and Operating Cost	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
	-----dollars-----				
Office Expense	693	1,171	2,198	3,991	7,796
Annual Repair	1,521	1,598	1,976	2,407	3,542
Miscellaneous	2,250	4,500	9,000	18,000	36,000
TOTAL	49,199	78,008	143,603	249,127	476,986

^aFrom Appendix Table 33; calculated by multiplying the total hourly operating costs of the 50 percent capacity rate times the length of season.

^bSalaries are calculated on an hourly basis on 50 percent more hours than the particular length of the operating season. The index used to update salaries was the Index of Unit Labor Costs-Manufacturers from the Bureau of Labor Statistics' Employment and Earnings. 1968 = 102.3, 1976 = 157.9 (1967 = 100). Salaries ranged from \$3.09 per hour for secretaries to \$9.26 per hour for managers.

^cEstimated as 1 percent of initial investment of equipment and building excluding "miscellaneous" from Appendix Table 30, page 119.

^dCalculated as 9 percent of hourly costs for six months.

^eEstimated as 1 percent of initial investment in equipment and buildings excluding "miscellaneous" from Appendix Table 30.

^fIncludes telephone, materials, etc. and is estimated to be 2 percent of gross sales (see Appendix Table 32).

^gEstimated as 1.5 percent of initial investment in equipment and building excluding "miscellaneous" from Appendix Table 30.

^hEstimated at 5 percent of total packinghouse margin receipts (see Appendix Table 32), and assumed to include such expenses as legal fees, auditing, travel expenses, and other miscellaneous items.

SOURCES: Basic input-output coefficients and 1968 base price levels were obtained from:

Brooker, John R. and James L. Pearson (eds.). Planning Data for Marketing Selected Fruits and Vegetables in the South, Part III--Fresh Vegetable Packing Handbook. Southern Cooperative Series Bulletin No. 152. Raleigh: North Carolina Agricultural Experiment Station, May 1970. Table 89, p. 125.

TABLE 34 (Continued)

Brooker, John R. and James L. Pearson. Factors Affecting the Feasibility of Investment in Tomato Packinghouses. Agricultural Economics Report No. 25. Gainesville, Florida: Florida Agricultural Experiment Station, Institute of Agricultural Sciences, University of Florida, July 1971. Appendix Table 7, page 34.

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TABLE 35. TOTAL OPERATING COSTS FOR SINGLE PRODUCT, VINE-RIPE TOMATO PACKINGHOUSES WITH SELECTED HOURLY PACK-OUT CAPACITIES AT 70 PERCENT OPERATING LEVEL AND \$1.50 PACKING MARGIN

Selected Season Length and Operating Cost	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
	-----dollars-----				
100 Hour Season					
Hourly Costs ^a	10,095	17,490	33,168	61,289	120,240
Salaries ^b	1,621	1,852	3,242	3,242	4,400
Property Taxes ^c	1,014	1,065	1,317	1,605	2,361
Interest ^d	454	787	1,493	2,758	5,411
Insurance ^e	1,014	1,065	1,317	1,605	2,361
Office Expenses ^f	315	630	1,260	2,520	5,040
Annual Repair ^g	1,521	1,598	1,976	2,407	3,542
Miscellaneous ^h	788	1,575	3,150	6,300	12,600
TOTAL	16,822	26,062	46,923	81,726	155,955
200 Hour Season					
Hourly Costs	20,190	34,980	66,336	122,578	240,480
Salaries	3,242	3,705	6,483	6,483	8,799
Property Taxes	1,014	1,065	1,317	1,605	2,361
Interest	909	1,574	2,985	5,516	10,822
Insurance	1,014	1,065	1,317	1,605	2,361
Office Expenses	630	1,260	2,520	5,040	10,080
Annual Repair	1,521	1,598	1,976	2,407	3,542
Miscellaneous	1,575	3,150	6,300	12,600	25,200
TOTAL	30,095	48,397	89,234	157,834	303,645
300 Hour Season					
Hourly Costs	30,285	52,470	99,504	183,867	360,720
Salaries	4,862	5,558	9,724	9,724	13,198
Property Taxes	1,014	1,065	1,317	1,605	2,361
Interest	1,363	2,361	4,478	8,274	16,232
Insurance	1,014	1,065	1,317	1,605	2,361
Office Expenses	945	1,890	3,780	7,560	15,120
Annual Repair	1,521	1,598	1,976	2,407	3,542
Miscellaneous	2,362	4,725	9,450	18,900	37,800
TOTAL	43,366	70,732	131,546	233,942	451,334
400 Hour Season					
Hourly Costs	40,380	69,960	132,672	245,156	480,960
Salaries	6,483	7,410	12,966	12,966	17,598
Property Taxes	1,014	1,065	1,317	1,605	2,361
Interest	1,817	3,148	5,970	11,032	21,643
Insurance	1,014	1,065	1,317	1,605	2,361

TABLE 35 (Continued)

Selected Season Length and Operating Cost	Hourly pack-out capacity in 20-pound cartons				
	150	300	600	1200	2400
	-----dollars-----				
Office Expenses	1,260	2,520	5,040	10,080	20,160
Annual Repair	1,521	1,598	1,976	2,407	3,542
Miscellaneous	3,150	6,300	12,600	25,200	50,400
TOTAL	56,639	93,066	173,858	310,051	599,025

^aFrom Appendix Table 33, page 124; calculated by multiplying the total hourly operating costs of the 70 percent capacity rate times the length of season.

^bSalaries are calculated on an hourly basis on 50 percent more hours than the particular length of the operating season. The index used to update salaries was the Index of Unit Labor Costs-Manufacturers from the Bureau of Labor Statistics' Employment and Earnings. 1968 = 102.3, 1976 = 157.9 (1967 = 100). Salaries ranged from \$3.09 per hour for secretaries to \$9.26 per hour for managers.

^cEstimated as 1 percent of initial investment of equipment and building excluding "miscellaneous" from Appendix Table 30, page 119.

^dCalculated as 9 percent of hourly costs for six months.

^eEstimated as 1 percent of initial investment in equipment and buildings excluding "miscellaneous" from Appendix Table 30.

^fIncludes telephone, materials, etc. and is estimated to be 2 percent of gross sales (see Appendix Table 32, page 123).

^gEstimated as 1.5 percent of initial investment in equipment and building excluding "miscellaneous" from Appendix Table 30.

^hEstimated at 5 percent of total packinghouse margin receipts (see Appendix Table 32), and assumed to include such expenses as legal fees, auditing, travel expenses, and other miscellaneous items.

SOURCES: Basic input-output coefficients and 1968 base price levels were obtained from:

Brooker, John R. and James L. Pearson (eds.) Planning Data for Marketing Selected Fruits and Vegetables in the South, Part III--Fresh Vegetable Packing Handbook. Southern Cooperative Series Bulletin 1070.

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TABLE 35 (Continued)

No. 152. Raleigh: North Carolina Agricultural Experiment Station, May 1970. Table 89, p. 125.

Brooker, John R. and James L. Pearson. Factors Affecting the Feasibility of Investment in Tomato Packinghouses. Agricultural Economics Report No. 25. Gainesville, Florida: Florida Agricultural Experiment Station, Institute of Food and Agricultural Sciences, University of Florida, July 1971. Appendix Table 7, p. 34.



TABLE 36. TOTAL REVENUE RECEIVED BY SINGLE PRODUCT, VINE-RIPE TOMATO PACKINGHOUSES WITH SELECTED HOURLY PACK-OUT CAPACITIES AT TWO OPERATING LEVELS, FOUR SEASON LENGTHS, AND PACKING MARGIN OF \$1.65 PER CARTON

Operating Level and Season Length	Hourly Pack-out Capacity in 20-Pound Cartons	
	150	300
	-----dollars-----	
<u>50 Percent</u>		
100 hours	12,375 ^a	24,750
200 hours	24,750	49,500
300 hours	37,125	74,250
400 hours	49,500	99,000
<u>70 Percent</u>		
100 hours	17,325	34,650
200 hours	34,650	69,300
300 hours	51,975	103,950
400 hours	69,300	138,600

^aFound by multiplying the Annual Pack-out from Appendix Table 31, page 122, by the packing margin of \$1.65 per 20-pound carton.

TABLE 37. ANNUAL PACK-OUT VOLUME AND ACRES OF RAW PRODUCT REQUIRED FOR SELECTED PACKINGHOUSE MODELS OF CABBAGE, SQUASH, AND BELL PEPPERS AT TWO OPERATING LEVELS AND FOUR SEASON LENGTHS

Pack-Out and Acres of Raw Product	Cabbage 200 crates/hour	Squash 75 crates/hour	Bell Peppers 75 crates/hour
<u>Annual Pack-Out</u>			
	-----Crates-----		
<u>50 percent of capacity</u>			
100 hour season	10,000 ^a	3,750	3,750
200 hour season	20,000	7,500	7,500
300 hour season	30,000	11,250	11,250
400 hour season	40,000	15,000	15,000
<u>70 percent of capacity</u>			
100 hour season	14,000	5,250	5,250
200 hour season	28,000	10,500	10,500
300 hour season	42,000	15,750	15,750
400 hour season	56,000	21,000	21,000
<u>Acres of Raw Product</u>			
	-----Acres-----		
<u>50 percent of capacity</u>			
100 hour season	22.9 ^b	19.5 ^c	11.2 ^d
200 hour season	45.8	38.9	22.4
300 hour season	68.6	58.4	33.6
400 hour season	91.5	77.9	44.8
<u>70 percent of capacity</u>			
100 hour season	32.0	27.3	15.7
200 hour season	64.1	54.5	31.3
300 hour season	96.1	81.8	47.0
400 hour season	128.1	109.0	62.6

^aQuantities for annual pack-out are obtained by multiplying the rated hourly pack-out capacity times the season length and then by multiplying this total by the operating level. For example: 200 crates per hour x 100 hours = 20,000 crates at maximum output; 20,000 crates x 50 percent operating level = 10,000 crates.

^bTo calculate acres of cabbage needed to supply these packinghouse models, multiply the annual pack-out calculated above times 50 pounds which is the estimated weight of each crate: 10,000 x 50 = 500,000 pounds. For this packinghouse type, a 95 percent pack-out of

TABLE 37 (Continued)

cabbage received can be assumed. Therefore, the next step is to find the number of pounds of raw product required: $500,000 \div .95 = 526,315.78$ pounds. From Appendix Table 20, page 103, average yield per acre of cabbage for fresh market is assumed to be 23,000 pounds. Therefore, dividing the required raw product pounds by 23,000 yields the number of acres of raw product required for this type packinghouse at 50 percent of capacity and 100 hour season: $526,315.78 \div 23,000 = 22.9$ acres.

^cThe calculations for deriving the number of acres of squash required to supply this type packinghouse is similar to the method used for cabbage. A pack-out of 95 percent is again assumed. Each crate holds approximately 1.11 bushels of squash, and from Appendix Table 22, page 109, the yield per acre of squash is assumed to be 225 bushels. Therefore, the equation for deriving the raw product requirement for this packinghouse operating at 50 percent of capacity and a 100 hour season length is:

$$\left[\frac{3750 \text{ crates} \times 1.11 \text{ bushels}}{.95} \right] \div 225 \text{ bushels per acre} = 19.5 \text{ acres of raw product}$$

^dAgain, the method for deriving the raw supply needs for a bell pepper packinghouse is similar to the methods used for deriving the raw product needs of cabbage and squash. Here, one crate weighs approximately 34 pounds, and from Appendix Table 19, page 100, approximate yield per acre of bell peppers is assumed to be 12,000 pounds. Also, a pack-out of 95 percent is again assumed. The equation is:

$$\left[\frac{3750 \text{ crates} \times 34 \text{ pounds}}{.95} \right] \div 12,000 \text{ pounds per acre} = 11.2 \text{ acres of raw product}$$

SOURCES: Basic input output coefficients were obtained from:

Brooker, John R. and James L. Pearson (eds.) Planning Data for Marketing Selected Fruits and Vegetables in the South, Part III--Fresh Vegetable Packing Handbook. Southern Cooperative Series Bulletin No. 152. Raleigh: North Carolina Agricultural Experiment Station, May 1970.

Cabbage: pp. 26-27.

Squash and bell peppers: pp. 92-93.

TABLE 38. REVISED TOTAL COST FIGURES FOR 150 CARTON-PER-HOUR TOMATO PACKINGHOUSE MODEL AT TWO OPERATING LEVELS AND FOUR SEASON LENGTHS^a

Operating Level and Season Lengths	Revised Costs
<u>50 Percent Operating Level</u>	
100 hour season	\$15,150
200 hour season	26,512
300 hour season	37,923
400 hour season	49,336
<u>70 Percent Operating Level</u>	
100 hour season	16,959
200 hour season	30,232
300 hour season	45,503
400 hour season	56,776

^aThese changes result from assuming the 150 carton-per-hour packinghouse is housed in the building sized for a 300 carton-per-hour packinghouse to allow for the extra space needed for another production line. From Appendix Table 30, page 119, new initial investment in equipment and building is:

Equipment (150 carton-per-hour size) -	\$61,202
Building (300 carton-per-hour size) -	<u>44,104</u>
	\$105,306

The resulting change in initial investment causes a change in several operating cost items--property taxes, insurance, and annual repair--since they are calculated as a percentage of initial investment. The revised costs shown above reflect these changes.

TABLE 39. INITIAL INVESTMENT REQUIRED IN EQUIPMENT DESIGNED TO PACKAGE SQUASH AND BELL PEPPERS AT A RATED CAPACITY OF 75 WIRE-BOUND CRATES PER HOUR^a

Equipment Items	Cost
Dumping	\$ 3,190
Washing	3,459
Grading	1,478
Conveying Culls	1,837
Packing	178
Freight and Installation Expense ^b	2,028
TOTAL	\$12,170

^aThese are only additional equipment requirements which were not included in the single product, 150 and 300 carton-per-hour vine-ripe tomato packinghouse models shown in Appendix Table 30, page 119. Other equipment needed to operate a squash/bell pepper line is already included in the equipment listed for the tomato packinghouse models.

^bEstimated at 20 percent of all preceding equipment items.

SOURCE: Basic input-output coefficients were obtained from:

Brooker, John R. and James L. Pearson (eds.). Planning Data for Marketing Selected Fruit and Vegetables in the South, Part III--Fresh Vegetable Packing Handbook. Southern Cooperative Series Bulletin No. 152. Raleigh: North Carolina Agricultural Experiment Station, May 1970. Table 64, p. 93-94.

TABLE 40. HOURLY OPERATING COSTS FOR BOTH A. SQUASH AND BELL PEPPER PACKINGHOUSE RATED AT 75 CRATES PER HOUR OPERATING AT 50 AND 70 PERCENT OF RATED CAPACITY^a

Item	Hourly Cost
<u>Labor^b</u>	
Receiving	\$ 2.30
Dumping	2.30
Grading	4.60
Packing	9.00
Transporting for Shipment	2.30
Miscellaneous	4.60
TOTAL WAGES	\$25.10
Plus: Social Security Taxes ^c	1.47
TOTAL WAGES	\$26.57
<u>Supplies and Utilities</u>	
Wire-bound Crates: ^d	
50 percent of capacity	\$28.80
70 percent of capacity	40.33
Waste Disposal ^e	
50 percent of capacity	0.80
70 percent of capacity	1.12
Utilities:	
Electricity ^f	0.12
Water and Sewer ^g	0.78
TOTAL SUPPLIES AND UTILITIES:	
50 percent of capacity	\$30.50
70 percent of capacity	\$42.35

^aHourly costs are the same for each packinghouse therefore they were included in one table. However, these costs are not combined costs but rather should be considered as separate for each type packinghouse.

^bWage rates are \$2.30 per hour for all stages of the packing operation except the actual packing which is \$3.00 per hour. These rates are up from the 1968 wage rates of \$1.60 and \$2.25 per hour.

^cThe employer's contribution to the Social Security Tax in 1976 was 5.85 percent of wages paid.

TABLE 40 (Continued)

^dThe index used to update the cost of the wire-bound crates was the Wholesale Price Index for Containers, Intermediate Stage of Processing found in the Wholesale Price Indexes by Stage of Processing located in the Bureau of Labor Statistics' Wholesale Prices and Price Indexes, Government Printing Office, Washington, D.C., published monthly. 1968 = 102.4, 1976 = 181.5 where 1967 = 100.

^eThe index used to update the cost of waste disposal was the Wholesale Price Index for All Commodities located in the Bureau of Labor Statistics' Wholesale Prices and Price Indexes. 1968 = 102.5 and 1976 = 182.9 where 1967 = 100.

^fThe electric utility rate was provided by the Powell Valley Power Company which supplies Claiborne County. The rate used was \$0.029 per kilowatt-hour which was the rate in effect during the fall of 1976.

^gThe water and sewer rate was obtained from the City of Tazewell Water Department. The rate used was \$1.75 per thousand gallons of water and \$1.38 per thousand gallons of sewage.

SOURCE: Basic input-output coefficients were obtained from:

Brooker, John R. and James L. Pearson (eds.). Planning Data for Marketing Selected Fruits and Vegetables in the South, Part III--Fresh Vegetable Packing Handbook. Southern Cooperative Series Bulletin No. 152. Raleigh: North Carolina Agricultural Experiment Station, May 1970. Tables 65 and 68, pp. 95 and 97.

TABLE 41. TOTAL OPERATING COSTS FOR THE BELL PEPPER COMPONENT OF A TOMATO AND BELL PEPPER MULTIPRODUCT VEGETABLE PACKINGHOUSE RATED AT 75 CRATES OF BELL PEPPERS PER HOUR OPERATING AT 50 AND 70 PERCENT OF RATED CAPACITY, FOUR SEASON LENGTHS AND PACKING MARGIN OF \$1.50 PER CRATE

Selected Season Length and Operating Cost	Costs at 50 Per- cent of Capacity	Costs at 70 Per- cent of Capacity
<u>100 Hour Season</u>		
Hourly Costs ^a	\$ 3,050	\$ 4,235
Salaries ^b	926	926
Property Taxes ^c	122	122
Interest ^d	137	191
Insurance ^e	122	122
Office Expenses ^f	112	158
Annual Repair ^g	183	183
Miscellaneous ^h	281	394
TOTAL	<u>\$ 4,933</u>	<u>\$ 6,331</u>
<u>200 Hour Season</u>		
Hourly Costs	\$ 6,100	\$ 8,470
Salaries	1,851	1,851
Property Taxes	122	122
Interest	274	381
Insurance	122	122
Office Expenses	225	315
Annual Repair	183	183
Miscellaneous	562	788
TOTAL	<u>\$ 9,439</u>	<u>\$12,232</u>
<u>300 Hour Season</u>		
Hourly Costs	\$ 9,150	\$12,705
Salaries	2,776	2,776
Property Taxes	122	122
Interest	412	572
Insurance	122	122
Office Expenses	338	472
Annual Repair	183	183
Miscellaneous	844	1,181
TOTAL	<u>\$13,947</u>	<u>\$18,133</u>

TABLE 41 (Continued)

Selected Season Length and Operating Cost	Costs at 50 Per- cent of Capacity	Costs at 70 Per- cent of Capacity
<u>400 Hour Season</u>		
Hourly Costs	\$12,200	\$16,940
Salaries	3,702	3,702
Property Taxes	122	122
Interest	549	762
Insurance	122	122
Office Expenses	450	630
Annual Repair	183	183
Miscellaneous	1,125	1,575
TOTAL	\$18,453	\$24,036

^a Hourly costs are obtained by multiplying the appropriate total hourly operating costs derived in Appendix Table 40 by the number of hours in the production season.

^b Salaries are calculated on an hourly basis on 50 percent more hours than the particular length of the operating season. The index used to update salaries was the Index of Unit Labor Costs--Manufacturers from the Bureau of Labor Statistics' Employment and Earnings. 1968 = 102.3, 1976 = 157.9 where 1967 = 100. Since bell peppers are being processed during the same period as tomatoes, a manager and a secretary are already present and are assumed to have a sufficient amount of slack time available to take on the additional line of bell peppers. However, a packinghouse foreman has been added to this particular budget at \$6.17 per hour to assure an adequate supply of supervisory personnel.

^c Property taxes were estimated as 1 percent of additional initial investment in equipment not previously charged under the tomato packinghouse budgets (see Appendix Table 39). Additional equipment is \$12,170. $\$12,170 \times 1 \text{ percent} = \121.70 .

^d Interest is calculated as 9 percent of hourly costs for six months.

^e Insurance was estimated as 1 percent of additional initial investment in equipment not already charged under the tomato packinghouse budgets (see Appendix Table 39). Additional equipment is \$12,170. $\$12,170 \times 1 \text{ percent} = \121.70 .

TABLE 41 (Continued)

^fOffice expenses include telephone, materials, etc. and are estimated to be 2 percent of gross sales (see Appendix Table 42).

^gAnnual repair expense is estimated at 1.5 percent of additional equipment not covered under the tomato packinghouse budgets (see Appendix Table 39). Additional equipment is \$12,170. $\$12,170 \times 1.5$ percent = \$182.55.

^hMiscellaneous expense is estimated at 5 percent of gross sales (see Appendix Table 42) and is assumed to include such expenses as legal fees, auditing, travel expenses, and other miscellaneous items.

SOURCES: Basic input-output coefficients were obtained from:

Brooker, John R. and James L. Pearson (eds.) Planning Data for Marketing Selected Fruits and Vegetables in the South. Part III--Fresh Vegetable Packing Handbook. Southern Cooperative Series Bulletin No. 152. Raleigh: North Carolina Agricultural Experiment Station, May 1970. Tables 67 and 68, p. 97.

TABLE 42. CONTRIBUTION TO TOTAL REVENUE OF MULTIPRODUCT PACKINGHOUSE FROM GROSS SALES OF SQUASH AND BELL PEPPERS ON A PACKING LINE RATED AT 75 WIRE-BOUND CRATES PER HOUR AT TWO OPERATING LEVELS, FOUR SEASON LENGTHS AND A PACKING MARGIN OF \$1.50 PER CRATE

Operating Level and Season Length	Squash -----dollars-----	Bell Pepper
<u>50 Percent</u>		
100 hours	5,625 ^a	5,625
200 hours	11,250	11,250
300 hours	16,875	16,875
400 hours	22,500	22,500
<u>70 Percent</u>		
100 hours	7,875	7,875
200 hours	15,750	15,750
300 hours	23,625	23,625
400 hours	31,500	31,500

^a Found by multiplying the annual pack-out from Appendix Table 37, page 134 by the packing margin of \$1.50 per crate.

TABLE 43. TOTAL OPERATING COSTS FOR THE SQUASH COMPONENT OF A TOMATO AND SQUASH MULTIPRODUCT VEGETABLE PACKINGHOUSE RATED AT 75 CRATES OF SQUASH PER HOUR OPERATING AT 50 AND 70 PERCENT OF RATED CAPACITY, FOUR SEASON LENGTHS AND PACKING MARGIN OF \$1.50 PER CRATE

Selected Season Length and Operating Cost	Costs at 50 Per- cent of Capacity	Costs at 70 Per- cent of Capacity
<u>100 Hour Season</u>		
Hourly Costs ^a	\$ 3,050	\$ 4,235
Salaries ^b	1,621	1,621
Property Taxes ^c	122	122
Interest ^d	137	191
Insurance ^e	122	122
Office Expenses ^f	112	158
Annual Repair ^g	183	183
Miscellaneous ^h	281	394
TOTAL	<u>\$ 5,628</u>	<u>\$ 7,026</u>
<u>200 Hour Season</u>		
Hourly Costs	\$ 6,100	\$ 8,470
Salaries	3,242	3,242
Property Taxes	122	122
Interest	274	381
Insurance	122	122
Office Expenses	225	315
Annual Repair	183	183
Miscellaneous	562	788
TOTAL	<u>\$10,830</u>	<u>\$13,623</u>
<u>300 Hour Season</u>		
Hourly Costs	\$ 9,150	\$12,705
Salaries	4,862	4,862
Property Taxes	122	122
Interest	412	572
Insurance	122	122
Office Expenses	338	472
Annual Repair	183	183
Miscellaneous	844	1,181
	<u>\$16,033</u>	<u>\$20,219</u>
<u>400 Hour Season</u>		
Hourly Costs	\$12,200	\$16,940
Salaries	6,483	6,483
Property Taxes	122	122
Interest	549	762
Insurance	122	122

TABLE 43 (Continued)

Selected Season Length and Operating Cost	Costs at 50 Per- cent of Capacity	Costs at 70 Per- cent of Capacity
Office Expenses	\$ 450	\$ 630
Annual Repair	183	183
Miscellaneous	<u>1,125</u>	<u>1,575</u>
TOTAL	\$21,234	\$26,817

^aHourly costs are obtained by multiplying the appropriate total hourly costs derived in Appendix Table 40, page 138, by the number of hours in the production season.

^bSalaries are calculated on an hourly basis on 50 percent more hours than the particular length of the operating season. The index used to update salaries was the Index of Unit Labor Costs--Manufacturers from the Bureau of Labor Statistics' Employment and Earnings. 1968 = 102.3, 1976 = 157.9 where 1967 = 100. Salaries ranged from \$3.09 per hour for the secretary to \$9.26 per hour for the manager. This particular size plant operating after the tomato harvesting season assumed a full time manager and a secretary 1/2 time.

^cProperty taxes were estimated as 1 percent of additional initial investment in equipment not already charged under the tomato packing-house budgets (see Appendix Table 39, page 137). Additional equipment is \$12,170. $\$12,170 \times 1 \text{ percent} = \121.70 .

^dInterest is calculated as 9 percent of hourly costs for six months.

^eInsurance was estimated as 1 percent of additional initial investment in equipment not already charged under the tomato packing-house budgets (see Appendix Table 39). Additional equipment is \$12,170. $\$12,170 \times 1 \text{ percent} = \121.70 .

^fOffice expenses include telephone, materials, etc. and are estimated to be 2 percent of gross sales (see Appendix Table 42).

^gAnnual repair expense is estimated at 1.5 percent of additional equipment not covered under the tomato packinghouse budgets (see Appendix Table 39). Additional Equipment is \$12,170. $\$12,170 \times 1.5 \text{ percent} = \182.55 .

TABLE 43 (Continued)

^hMiscellaneous expense is estimated at 5 percent of gross sales (see Appendix Table 42) and is assumed to include such expenses as legal fees, auditing, travel expenses, and other miscellaneous items.

SOURCES: Basic input-output coefficients were obtained from:

Brooker, John R. and James L. Pearson (eds.) Planning Data for Marketing Selected Fruits and Vegetables in the South. Part III--Fresh Vegetable Packing Handbook. Southern Cooperative Series Bulletin No. 152. Raleigh: North Carolina Agricultural Experiment Station, May 1970, Tables 67 and 68, p. 97.

TABLE 44. TOTAL OPERATING COSTS FOR THE BELL PEPPER COMPONENT OF A TOMATO, SQUASH AND BELL PEPPER MULTIPRODUCT VEGETABLE PACKINGHOUSE RATED AT 75 CRATES OF BELL PEPPERS PER HOUR OPERATING AT 50 AND 70 PERCENT OF RATED CAPACITY, FOUR SEASON LENGTHS AND PACKING MARGIN OF \$1.50 PER CRATE

Selected Season Length and Operating Cost	Costs at 50 Per- cent of Capacity	Costs at 70 Per- cent of Capacity
<u>100 Hour Season</u>		
Hourly Costs ^a	\$ 3,050	\$ 4,235
Salaries ^b	926	926
Property Taxes ^c	--	--
Interest ^d	137	191
Insurance ^e	122	122
Office Expenses ^f	112	158
Annual Repair ^g	183	183
Miscellaneous ^h	281	394
TOTAL	<u>\$ 4,811</u>	<u>\$ 6,209</u>
<u>200 Hour Season</u>		
Hourly Costs	\$ 6,100	\$ 8,470
Salaries	1,851	1,851
Property Taxes	--	--
Interest	274	381
Insurance	122	122
Office Expenses	225	315
Annual Repair	183	183
Miscellaneous	562	788
TOTAL	<u>\$ 9,317</u>	<u>\$12,110</u>
<u>300 Hour Season</u>		
Hourly Costs	\$ 9,150	\$12,705
Salaries	2,776	2,776
Property Taxes	--	--
Interest	412	572
Insurance	122	122
Office Expenses	338	472
Annual Repair	183	183
Miscellaneous	844	1,181
TOTAL	<u>\$13,825</u>	<u>\$18,011</u>

TABLE 44 (Continued)

Selected Season Length and Operating Cost	Costs at 50 Per- cent of Capacity	Costs at 70 Per- cent of Capacity
<u>400 Hour Season</u>		
Hourly Costs	\$12,200	\$16,940
Salaries	3,702	3,702
Property Taxes	--	--
Interest	549	762
Insurance	122	122
Office Expenses	450	630
Annual Repair	183	183
Miscellaneous	<u>1,125</u>	<u>1,575</u>
TOTAL	\$18,331	\$23,914

^aHourly costs are obtained by multiplying the appropriate total hourly operating costs derived in Appendix Table 40, page 138, by the number of hours in the production season.

^bSalaries are calculated on an hourly basis on 50 percent more hours than the particular length of the operating season. The index used to update salaries was the Index of Unit Labor Costs--Manufacturers from the Bureau of Labor Statistics' Employment and Earnings. 1968 = 102.3, 1976 = 157.9 where 1967 = 100. Since bell peppers are being processed during the same period as tomatoes, a manager and a secretary are already present and are assumed to have a sufficient amount of slack time available to take on the additional line of bell peppers. However, a packinghouse foreman has been added to this particular budget at \$6.17 per hour to assure an adequate supply of supervisory personnel.

^cNo additional property taxes were added here since they were previously calculated for the original building and equipment under the tomato budgets and for the additional equipment under the squash budget.

^dInterest is calculated as 9 percent of hourly costs for six months.

^eInsurance was estimated as 1 percent of additional initial investment in equipment not already charged under the tomato packinghouse budgets (see Appendix Table 39, page 137). Additional equipment is \$12,170. $\$12,170 \times 1 \text{ percent} = \121.70 .

^fOffice expenses include telephone, materials, etc. and are estimated to be 2 percent of gross sales (see Appendix Table 42).

TABLE 44 (Continued)

^gAnnual repair expense is estimated at 1.5 percent of additional equipment not covered under the tomato packinghouse budgets (see Appendix Table 39, page 137). Additional equipment is \$12,170. $\$12,170 \times 1.5 \text{ percent} = \182.55 .

^hMiscellaneous expense is estimated at 5 percent of gross sales (see Appendix Table 42, page 143) and is assumed to include such expenses as legal fees, auditing, travel expenses, and other miscellaneous items.

SOURCES: Basic input-output coefficients were obtained from:

Brooker, John R. and James L. Pearson (eds.) Planning Data for Marketing Selected Fruits and Vegetables in the South. Part III--Fresh Vegetable Packing Handbook. Southern Cooperative Series Bulletin No. 152. Raleigh: North Carolina Agricultural Experiment Station, May 1970. Tables 67 and 68, p. 97.

VITA

Thomas H. King, Jr. was born in Fall River, Massachusetts on October 15, 1946. He grew up, however, in Park Ridge, Illinois where he graduated from high school in 1964. In 1966, his family moved to Atlanta, Georgia where he attended Georgia State University graduating with a B.B.A. degree in August, 1969 and majoring in economics.

In September, 1969, Tom entered the Peace Corps and served for three and one half years as a volunteer in the Dominican Republic. His major activity there was to assist local agricultural and savings and credit cooperatives in the areas of bookkeeping and credit management. For an additional year and one half, he served as a Peace Corps staff member in the Dominican Republic first as the cooperative program manager and then as the director of the Peace Corps training center on the island.

He returned to the United States in April, 1975, and in June of that year, he began a graduate program in the Department of Agricultural Economics at the University of Tennessee, Knoxville. In December, 1977, he received his Master of Science degree in Agricultural Economics.

He is a member of Gamma Sigma Delta, the American Agricultural Economics Association, and the Southern Agricultural Economics Association.