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Fresh Market Cabbage in Tennessee: Production-Marketing Considerations

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John R. Brooker

Foreword

This report results from a contributed state project to Southern Regional Research Project S-178 entitled, "Structural and Operational Efficiency of the Fruit and Vegetable Production-Marketing System."



Department of Agricultural
Economics and Rural Sociology

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Foreword

This report results from a contributed state project to Southern Regional Research Project S-178 entitled, "Structural and Operational Efficiency of the Fruit and Vegetable Production-Marketing System."

FRESH MARKET CABBAGE IN TENNESSEE:
PRODUCTION-MARKETING CONSIDERATIONS

John R. Brooker

Introduction

Commercial vegetable production in Tennessee was valued at slightly more than \$53 million in 1982 [23]. Three-fourths of this total was accounted for by fresh market sales and the remainder from sales to processors. This total sales proportion resulted from a shift from the near equal balance of 50 percent fresh and 50 percent processing in 1970. Tennessee's acreage of vegetables and melons for fresh market increased 69.2 percent during the ten-year period, 1970-1980 (Table 1). Mississippi was the only other southern state that had a larger 1980 acreage of fresh market vegetables than was reported in 1970. However, Tennessee's fresh market acreage was the lowest among these seven southern states in 1970 and next to the lowest in 1980. Over the same period, Tennessee's acreage for the processing market declined nearly 10 percent. Georgia was the only state that did not experience a processing acreage reduction between 1970 and 1980.

While total United States acreage devoted to commercial production of fresh market vegetables and melons remained nearly constant between 1970 and 1980, the volume increased 17.4 percent. Some of this increase was consumed by the expanding U.S. population. Also, per capita

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Table 1. Percentage change in acreage, production, and value of vegetables and melons produced in 1970 and 1980 for fresh and processing markets in seven southern states and the United States

State	Rank among seven states ^a		Acres	Production percent	Value ^b
	1970	1980			
<u>Fresh market^c</u>					
Alabama ^d	4	4	-24.0	-30.0	52.8
Georgia ^d	3	1	- 9.7	- 7.3	20.6
Louisiana ^d	5	7	-88.7	-90.2	-81.8
Mississippi ^d	6	5	6.1	2.8	20.0
North Carolina ^d	1	2	- 8.5	7.7	-26.5
South Carolina	2	3	-32.7	- 6.6	- 9.4
Tennessee	7	6	69.2	35.6	50.2
United States	--	--	0.3	17.4	18.6
<u>Processing market^c</u>					
Alabama ^d	5	6	-75.2	-75.2	-86.7
Georgia ^d	6	5	26.1	46.3	50.0
Louisiana ^d	7	7	-81.8	-96.4	--
Mississippi ^d	3	4	-67.0	-92.2	-96.4
North Carolina ^d	1	1	- 5.3	20.9	3.2
South Carolina	4	3	-22.6	-22.1	-20.0
Tennessee	2	2	- 9.9	-37.2	-51.8
United States	--	--	-11.5	15.1	-12.6

^aRanked in descending order based on acreage.

^bValues adjusted by Consumer Price Index for all food.

^cIncludes 27 vegetable and melon crops, excluding potatoes and sweet potatoes.

^dNorth Carolina, Louisiana, and Alabama are major supplier of potatoes and/or sweet potatoes.

^eIncludes 10 vegetable crops, excluding potatoes and sweet potatoes.

Source: Agricultural Statistics [15 & 16].

consumption of fresh vegetables and melons (excluding potatoes) increased from 122.1 pounds in 1970 to 129.6 pounds in 1980 [6].

The basic issue confronting present and potential vegetable growers in Tennessee contemplating expanding production for commercial markets is the competitive position of Tennessee and other supply origins with respect to available market destinations. This issue acquires considerable complexity when the interrelated factors are recognized. First, certain vegetable products may be readily produced in Tennessee with good yields and quality, yet not be economically feasible for commercial markets due to even better yields and quality, or lower production costs, in other producing regions. Second, for other vegetable products there may appear to be a potential for increased production and sales due to a perceived "market window," yet production of this product for marketing during such a time constraint may be difficult in terms of yield, quality, and cost due to adverse growing conditions.¹ Third, expanded production of many vegetables, and especially the production of vegetables not presently produced in Tennessee in large quantities, is curtailed due to market access limitations [2 & 3]. All of these factors are included in the economic concept of interregional competition, which refers to the competitive position of spatially defined production regions. In a dynamic, competitive market system as with fresh market vegetables, changes in production functions, factor prices, institutions, and demand functions all interact to generate differential regional changes in

¹Marketing window is a term used to denote a period of time when the product under consideration is occasionally in short supply or only available at higher than average prices.

product outputs, factor inputs, product and factor prices, and producer incomes. An indepth analysis of the competitive position of any production region to compete with other production regions involves the incorporation of many elements beyond the scope of this report.² However, competitive position can be reasonably assessed by an examination of how well one region can compete with other regions in supplying selected markets. "A given region has an advantage if it can produce, process, and transport a product to a given market at a lower price than competing regions. The lower price is possible in the long run if factor costs are lower" [9, p. 8]. Individual producers desiring to maximize income will select agricultural enterprises based on a comparison of opportunity costs of all production resources and obtainable product prices.

Objectives

The purpose of this report was to examine the current production-marketing situation for fresh market cabbage in Tennessee. Specific objectives were to 1) compare available production cost data in the southern region and identify problems in the use of these data for interstate cost comparisons; 2) identify shipping patterns of fresh market cabbage from southern states to select markets; 3) examine cabbage prices at two major wholesale markets; and 4) evaluate transportation costs of shipping fresh market cabbage from southern production regions to selected markets.

²The reader interested in the data problems and limitations of mathematical programming analysis of comparative position studies in the fresh vegetable industry is referred to Mathia and Brooker [9].

Cabbage Production

The principal source of state level production data for many agricultural products is the U.S. Department of Agriculture's annual series entitled "Agricultural Statistics—19..." [15 & 16]. After 1980, data regarding cabbage and 14 other vegetable products were no longer reported in this series. Each state publishes an annual agricultural statistics series, but this series is also supported by the USDA Crop Reporting Service [17,18,19,10,11 & 22]. In 1980, a total of 10,650 acres of cabbage were reported as being harvested in Georgia, North Carolina, South Carolina, and Tennessee (Table 2). These four states accounted for 30 percent of the nation's supply during the spring season of April through June. Acreage figures for cabbage in Alabama, Louisiana, and Mississippi were too small to be reported in 1980. This is not uncommon since only the so-called major vegetables are reported for each state by the Crop Reporting Service.

Production Costs

In an effort to compare costs of production, budgets for fresh market cabbage were obtained from Alabama, Georgia, Louisiana, North Carolina, South Carolina, and Tennessee.³ Comparisons of vegetable budgets for several states are difficult and risky. Comparison is difficult because of the unique way in which each enterprise budget

³The states were selected on the basis of availability of production budgets and considerations presented in a Southern Cooperative Series Bulletin dealing with production and marketing potential [13].

Table 2. Fresh market commercial cabbage production in the United States, 1970 and 1980

Season and Location	Acreage harvested	
	1970 (acres)	1980 (acres)
Winter:		
South ^a	0	0
Other ^b	41,300	21,800
Spring:		
Georgia	2,500	1,700
Louisiana	1,800	--
Mississippi	400	--
North Carolina	1,400	2,000
South Carolina	800	700
Tennessee	900	750
Other	6,510	12,250
South (percent) ^c	(55)	(30)
Summer:		
Georgia	--	1,000
North Carolina	3,300	2,600
Other	15,250	19,790
South (percent) ^c	(18)	(15)
Fall:		
North Carolina	1,800	1,900
South Carolina	100	--
Other	31,930	19,830
South (percent) ^c	(6)	(9)

^a South used to represent the seven states of Alabama, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee.

^b All states not included in South category.

^c Share of seasonal production supplied by South category.

Source: Agricultural Statistics [15 & 16].

is organized to present the cost data. Comparison of budgets from different sources is risky due to the lack of conformity in underlying cost accounting procedures and the assumed level of entrepreneurial competence. In economic language this could be expressed as a problem of determining where the budget fits on the production function. Presumably the budgets would "fit" somewhere within Stage II.⁴ Adjustments in the specifications regarding production technology modifies the configuration of production functions. Therefore, economically sound conclusions regarding interregional competition among these states in cabbage production cannot be directly discerned from comparisons of these production budgets (Table 3). For the interested reader, the production budgets are presented in the appendix of this report.

Marketing Considerations

Cabbage is sold through three types of markets. The first involves sales to processors for processing into sauerkraut and slaw. Most of this production is grown under production contracts with processors. In Tennessee this involved an estimated 24 growers in 1974 [4]. Sales to these processors are obviously limited by the volume requirements of the processors.

The second market includes sales to final consumers at farmers' markets, roadside stands, and pick-your-own outlets. The number of growers utilizing these direct marketing outlets and the volume sold are not known. The potential for expanded sales at farmers' markets

⁴ Stage II is the jargon used in microeconomic production theory to identify on a production function the economically rational range of obtainable outputs within which the level of inputs to maximize profits are determined by input and output prices [8].

Table 3. Summary of fresh market cabbage production and harvesting costs from published budgets in six southern states

Item	State ^a					
	AL	GA	LA	NC	SC	TN
	dollars					
Preharvest cost: ^b						
Per acre	368.78	473.00	610.17	426.27	539.87	424.16
Per cwt.	2.95	2.36	4.88	1.89	2.70	2.12
Harvesting cost: ^b						
Per acre	435.00	760.00	348.84	742.50	600.00	501.09
Per cwt.	3.48	3.80	2.79	3.30	3.00	2.51
Fixed cost: ^b						
Per acre	95.21	144.00	153.57	105.99	142.13	82.91
Per cwt.	0.76	0.72	1.23	0.47	0.71	0.41
Total cost:						
Per acre	898.99	1377.00	1112.58	1274.76	1190.91	1008.16
Per cwt.	7.19	6.88	8.90	5.66	5.95	5.04
	cwt.					
Yield:						
Per acre	125	200	125	225	200	200

^aAll budgets were prepared for 1983 except for Georgia's, which was for 1982.

^bValue obtained from synthesis of data in published budgets (See Appendix Tables 2-7).

is considered to be greater than at roadside stands or pick-your-own outlets [13]. Expansion of sales volumes is directly associated with the number, location, and quality of farmers' markets and the number of consumers in the local area willing to shop and purchase at these markets.

The third market for cabbage is the commercial wholesale handlers. While sales to processors and sales via direct markets are important to those growers involved with those two market outlets, the greater potential for dependable growth is through packinghouse sales to purchasers for independent wholesalers and chain store wholesaler-retailers in nearby metropolitan centers [2 and 3].

Shipping Patterns

Consideration of the feasibility of shipping fresh market cabbage from Tennessee production regions to surrounding metropolitan centers requires examination of information regarding present supply origins for various destinations. The USDA assembles fruit and vegetable unload data for 41 cities in the U.S.⁵ These data best represent trends and patterns regarding origins of produce delivered to various cities as intermediate or final destinations. The volumes do not represent total volume shipped from a particular state or received at a particular city. "They do provide the best nationwide information that is available indicating sources of supply for various commodities" [7, p. 2].

During the spring and early summer months of April, May, June, and July, 1981, Tennessee shipped 8,000 cwt. of cabbage to cities included

⁵ Number of cities reduced to 23 effective October 1, 1981.

in the unload statistics (Table 4). The dominant suppliers were California, Florida, and Texas. The unloads from Florida and Texas declined rapidly over this four-month period. Unloads from California remained fairly steady. Among the southern states included in this report, Georgia, North Carolina, and South Carolina were the major origin states. The influence of northern states as fresh market cabbage suppliers during these four months is emphasized by the volumes unloaded from "other" states increasing from 63 to April to 488 in July.

Table 4. Origin of fresh market cabbage unloads during April, May, June, and July, 1981

State of origin	Month			
	April	May	June	July
	-----1,000 cwt.-----			
Alabama	--	--	2	1
California	134	144	139	113
Florida	311	279	56	--
Georgia	6	62	32	19
Louisiana	4	13	3	--
Mississippi	--	2	1	--
North Carolina	--	25	115	40
South Carolina	--	29	19	--
Tennessee	--	--	7	1
Texas	287	213	82	48
Other	63 ^a	30 ^b	218 ^c	488 ^d

^aNew York unloads accounted for 56 of the total.

^bNew York unloads accounted for 26 of the total.

^cNew Jersey and New York unloads accounted for 93 of this total.

^dIllinois, New Jersey, New York, Ohio, and Wisconsin unloads accounted for 262 of the total.

Source: Fresh Fruit and Vegetable Unloads [7].

The unload reports identified six of the 41 possible cities as destinations of Tennessee cabbage—Atlanta, Chicago, Cincinnati, Louisville, Memphis, and Nashville (Table 5). California, Florida, and Texas unloads were presented to reveal the general impact of these dominant suppliers on the destinations of Tennessee cabbage. Also, several other cities as destinations were included in Table 5 to examine the origins of supplies for other potential destinations within the relative range of existing destinations.

A notable point is the small number of unloads from California to the 15 cities listed. In the early spring, Florida and Texas ship large quantities to many of these cities. However, the Florida and Texas influence declines considerably in June and even more so in July. North Carolina and "other" states increase unloads to these 15 cities during June and July. The "other" supply group is dominated by Illinois, New Jersey, New York, and Ohio.

The shipping pattern illustrated in the 1981 unloads for April, May, June, and July in Table 5 emphasizes the advantage to Tennessee cabbage producers of having an early crop. In other words, Tennessee growers compete with suppliers at a shipping disadvantage regarding major northeast markets during the spring months. In June, suppliers from "other" states, such as New York and New Jersey, begin to supply northeastern markets. In July, Ohio, Illinois, and Wisconsin become major suppliers to midwestern destinations.

Again, it should be emphasized that the unload data do not represent total shipments from a producing state or total receipts at a destination

Table 5. Origin and destination of fresh market cabbage unloads during the months of April, May, June, and July, 1981

[illegible]

Table 5 (continued)

Destination	Month	State of origin										Other
		AL	CA	FL	GA	LA	MS	NC	SC	TN	TX	
----- 1,000 cwt. -----												
Louisville ^a	April	--	--	--	--	--	--	--	--	--	11	2
	May	--	--	3	4	--	--	--	--	--	7	1
	June	--	--	--	4	--	--	1	--	1	1	6
	July	--	--	--	--	--	--	1	--	--	--	10
Memphis ^a	April	--	--	--	--	--	--	--	--	--	9	0
	May	--	--	--	2	--	1	--	--	--	9	0
	June	--	--	--	--	--	--	--	--	2	1	0
	July	--	--	--	--	--	--	1	--	1	1	6
Nashville ^a	April	--	--	6	--	--	--	--	--	--	1	1
	May	--	--	5	1	--	--	--	--	--	1	1
	June	--	--	1	1	--	--	--	--	1	--	0
	July	--	--	--	--	--	--	--	--	--	--	2
New Orleans	April	--	1	1	--	4	--	--	--	--	11	0
	May	--	2	4	--	5	--	--	--	--	4	1
	June	--	2	4	--	2	--	4	--	--	1	1
	July	--	2	--	1	--	--	3	--	--	2	7
New York	April	--	--	59	--	--	--	--	--	--	7	31
	May	--	--	58	2	--	--	5	4	--	3	13
	June	--	--	11	--	--	--	18	3	--	--	46
	July	--	--	--	--	--	--	--	--	--	--	64
Philadelphia	April	--	--	34	2	--	--	--	--	--	1	5
	May	--	--	26	3	--	--	3	4	--	1	4
	June	--	--	5	1	--	--	7	1	--	--	22
	July	--	--	--	--	--	--	1	--	--	--	27
Pittsburg	April	--	--	18	--	--	--	--	--	--	6	1
	May	--	--	20	--	--	--	1	2	--	--	0
	June	--	--	3	--	--	--	9	1	--	--	12
	July	--	--	1	--	--	--	2	--	--	--	21
Other cities	April	--	128	52	--	--	--	--	--	--	175	
	May	--	137	41	3	4	--	3	--	--	146	
	June	--	135	9	4	--	1	14	10	--	76	
	July	--	111	--	1	--	--	10	--	--	45	

^aExcluded after October 1, 1981.

Source: Fresh Fruit and Vegetable Unloads [7].

city. The data can best be used to examine relative product flows from origins to destinations.

Cabbage Prices

Published price series for fresh market cabbage are available at several of the major terminal markets where Federal-State Market News Service reporters are stationed. Two market news offices of particular interest to Tennessee growers are Atlanta and Cincinnati since these markets represent the nearest major distribution centers to the south and north of Tennessee. The USDA Market News Service does not have a vegetable price reporting office in Tennessee.

During the early spring months, cabbage from Florida and Texas are reported in Cincinnati with Georgia entering in late May and North Carolina in late June (Table 6). On the Atlanta market, cabbage prices are reported for shipments from Florida, Georgia, Texas, and North Carolina. Reasonably good pricing efficiency is revealed by the consistency of cabbage prices from various production regions in each wholesale market. This pricing efficiency is exhibited in week 24, because not only is the cabbage price consistent within each market, but the price in Cincinnati is higher than in Atlanta. This difference in price between markets is partially accounted for by the additional transportation cost needed to place the product in Cincinnati versus Atlanta.

As measured by the coefficient of variation⁶ (CV) of week to week price fluctuations, variation of average weekly prices in a given year

⁶ Coefficient of variation defined as $(s \div \bar{x})100$ where: s = standard deviation and $\bar{x}$ = mean.

Table 6. Average prices reported for green cabbage in 50-pound crates and cartons, medium to large, of generally good quality and condition by first receivers in wholesale lots at Atlanta, Georgia and Cincinnati, Ohio, 1982

Weeks of year		Wholesale market							
		Atlanta, GA				Cincinnati, OH			
		State of origin							
		FL	GA	TX	NC	FL	GA	TX	NC
Dollars per 50 lb. crate									
Jan.	1	8.75	5.00	8.75	--	--	--	7.00	--
	2	5.25	4.75	5.25	--	--	--	6.67	--
	3	10.50	10.50	10.75	--	8.75	--	8.87	--
	4	10.50	10.50	10.75	--	--	--	10.75	--
Feb.	5	7.25	7.25	8.50	--	--	--	9.50	--
	6	9.50	--	10.25	--	--	--	9.75	--
	7	9.50	--	10.25	--	--	--	10.50	--
	8	9.75	--	10.50	--	--	--	11.25	--
Mar.	9	8.50	--	9.50	--	--	--	9.50	--
	10	8.50	--	9.50	--	--	--	8.75	--
	11	6.25	--	6.75	--	--	--	7.75	--
	12	4.75	--	5.50	--	--	--	7.00	--
	13	4.75	--	5.50	--	6.00	--	6.75	--
Apr.	14	5.25	--	5.50	--	--	--	7.00	--
	15	7.50	--	7.50	--	--	--	8.00	--
	16	8.25	7.50	8.50	--	11.00	--	11.00	--
	17	7.75	7.25	8.25	--	9.00	--	9.00	--
May	18	11.75	10.00	--	--	10.50	--	10.50	--
	19	13.75	12.75	13.75	--	14.00	--	13.25	--
	20	13.00	12.50	12.75	--	13.50	--	13.50	--
	21	13.00	13.00	13.00	--	--	14.00	14.00	--
June	22	13.00	13.00	13.00	--	--	15.50	15.50	--
	23	12.00	12.00	12.00	--	--	15.00	14.00	--
	24	9.25	9.25	--	9.25	--	11.50	11.50	--
	25	6.50	6.50	--	6.50	--	7.50	--	7.50
	26	6.25	5.75	--	6.25	--	7.00	--	7.00
July	27	--	5.50	--	6.25	--	7.00	--	7.00
	28	--	5.50	--	6.25	--	--	--	--
	29	--	5.25	--	5.25	--	--	--	--
	30	--	4.75	--	4.75	--	--	--	--

Source: Fresh Fruit and Vegetable Wholesale Market Prices [10 & 11].

increased in the latter part of the 1970s. In 1970 the CV in Cincinnati for the first six months of the year 16.4, compared to 40.8 in 1977 [11]. A low CV of 8.4 was obtained in 1981 and a 27.4 in 1982. Analysis of the price movements within and between years over the 1970 - 1982 period did not reveal statistically significant patterns. One conclusion that can be made is that fresh market cabbage prices are highly volatile within a market season and from year to year.

Transportation Costs

Shipping costs fluctuate with the availability and demand for truck transportation during a season as well as between production regions. Competitive pricing of truck rates results in substantial variation within any one year. In 1982, representative monthly truck rates for cabbage shipments from Southern Florida to Atlanta varied from \$0.88 to \$1.08 per 50-pound package [12]. Shipments from the Rio Grande Valley, Texas, to Atlanta varied from \$1.73 to \$2.30 per package. Reported rates from these two origins to Atlanta, Chicago, Dallas, and New York City were used to estimate representative rates for shipments from the southern states.

$$SC = 1.65 \text{ when } M \leq 400$$

$$SC = 0.483 + 0.0029M \text{ when } M \geq 400; R^2 = .96.$$

where: SC = shipping cost in dollars per cwt.

M = mileage from origin to destination.

Usually transportation rates are presumed to increase with distance the product is shipped, but at a decreasing rate. However, over the range of distances between origins and destinations examined, the relationship was determined to be linear after a minimum rate. This minimum rate was estimated to be \$1.65 per cwt. for shipments up to about 400 miles.

The 400 mile cut-off point was determined by the intersection of the linear cost line with the minimum shipping charge per cwt. in the data set.

Total production and transportation costs to Atlanta and Cincinnati from six southern states are presented in Table 7.

Table 7. Summary of production and transportation costs of shipping fresh market cabbage from six southern states to Atlanta, Georgia and Cincinnati, Ohio

Origin	Total production cost as per budgets ^a	Transportation cost to: ^b		Total production and transportation cost to:	
		Atlanta	Cincinnati	Atlanta	Cincinnati
		-----dollars per cwt.-----			
Alabama	8.39 ^c	1.65	1.84	10.04	10.23
Georgia	6.88	1.65	2.41	8.53	9.29
Louisiana	10.30 ^c	2.14	2.88	12.44	13.18
North Carolina	5.66	1.68	2.45	7.34	8.11
South Carolina	5.95	1.65	2.20	7.60	8.15
Tennessee	6.64 ^c	1.65	1.65	8.29	8.29

^a See Table 3.

^b Estimated from representative rates reported in Vegetable Outlook and Situation [12].

^c Adjusted from figures presented in Table 3 to account for packaging in cardboard cartons at \$1.10 per 50 pounds rather than in bags or sacks.

The budgeted costs for Alabama, Louisiana, and Tennessee were adjusted to account for packaging in the more expensive cardboard cartons rather than in sacks. This is reasonable since the price statistics from Atlanta and Cincinnati are for cardboard packaged cabbage. These two destinations were selected to represent a major market to the south and north of Tennessee. Since both markets are within 400 miles of Tennessee's

production areas, the transportation cost was estimated at \$1.65 per cwt. to either destination. Tennessee's combined production and transportation cost was \$8.29 per cwt., which ranked third, being behind North Carolina and South Carolina when cabbage was shipped to either Atlanta or Cincinnati.

Concluding Remarks

The reader must be cautious when making comparisons of production cost data from different sources because of the unique procedures used to derive the production budgets. While the researchers in each case may adhere to sound objective procedures, differences in basic assumptions, specifications, and available data or resources may contribute to the heterogeneous nature of noncoordinated budget building efforts. As with the cabbage production cost data presented, Tennessee reported the lowest cost per cwt. (Table 3). Yet Tennessee falls behind Georgia, North Carolina, and South Carolina in shipments to the 15 major destinations reported in Table 5. Adjusting Tennessee's cost to include the more expensive cardboard cartons placed Tennessee third in per cwt. cost, ranking behind North Carolina and South Carolina (Table 7).

Since Tennessee's reported production in 1980 was greater than South Carolina's and probably greater than Louisiana's, it would be reasonable to question the accuracy of the unload data. Nashville and Memphis received, according to the unload data, 17,000 cwt. of cabbage in both April and May, but only 6,000 cwt. in June and 11,000 in July,

Consumption probably did not decline that drastically, nor was it likely that garden supplies filled the void. The logical explanation is that wholesalers and retailers received supplies that were not reported on the Market News Service's unload data series. Receipts from area suppliers which are not operating within the commercial wholesale markets may not be reported.

The production cost reported for fresh market cabbage in Tennessee plus the lower cost of shipping to Cincinnati suggests that Tennessee vegetable growers may have a favorable competitive position with respect to the five other southern states. Tennessee growers may also be competitive in supplying other major consumption centers to the north of Tennessee. As the time period moves into the early summer months, production in the northern states such as Ohio, Illinois, New Jersey, and New York replace most southern supply sources in the northeastern markets. This emphasizes the importance of producing for the early spring months of April and May. During these two months, Florida and Texas are dominant suppliers to most of the major markets north and northeast of Tennessee. Production for harvest in April may be precluded for Tennessee growers due to adverse weather. Even production for harvest in May is more risky than for June, but there appears to be substantially greater marketing opportunities in May than June. However, Tennessee's production budget does not include a cost factor to reflect the risk of crop damage due to cold weather when targeting production for the early market.

Potential production areas for any crop confront the market access barrier of supplying a viable quantity of acceptable quality

for a market that already receives this product from somewhere else. Tennessee vegetable growers must produce a high quality product and package it according to wholesaler specifications in order to even attempt to enter commercial markets for fresh vegetables. The foremost consideration would be whether Tennessee growers can produce and deliver the crop to markets at a favorable, competitive cost.

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Appendix Table 1. Input-output data regarding per acre production of cabbage for fresh market sales, as reported in published budgets in six southern states

Item ^a	State ^b					
	AL	GA	LA	NC	SC	TN
<u>Preharvest Variable Costs</u>	dollars					
Plants	90.00	148.00	240.00	161.00	136.00	86.95
Lime	7.50	12.00	9.90	--	8.58	7.20
Fertilizer	52.00	93.00	69.60	60.96	140.00	30.60
Sidedress W/N	22.80	15.00	--	9.00	20.50	22.50
Insecticide	80.00	30.00	15.00	45.00	49.50	109.45
Fungicide	--	24.00	--	18.00	21.26	--
Herbicide	2.25	5.00	27.40	6.50	6.60	6.29
Machinery	7.54	58.00	4.84	27.53	20.74	6.78
Tractors	44.55	c	52.30	43.15	36.08	40.17
Irrigation machine	--	19.00	1.48	--	--	--
Labor	52.92	45.00	146.94	35.77	82.67	85.72
Irrigation labor	--	--	17.00	--	--	--
Interest on operating capital	9.22	24.00	25.71	19.36	17.94	28.50
Totals	368.78	473.00	610.17	426.27	539.87	424.16
<u>Harvesting Costs</u>						
Harvesting labor	150.00	200.00	144.17	225.00	150.00	288.00
Packing labor	--	--	54.00	d	--	--
Containers ^e	125.00	440.00	100.00	517.50	400.00	120.00
Hauling	160.00	120.00	--	--	f	67.97
Brokerage	--	g	--	--	50.00	16.00
Machinery & tractor	--	--	50.67	--	--	9.12
Totals	435.00	760.00	348.84	742.50	600.00	501.09

Appendix Table 1 (continued)

Item ^a	State ^b					
	AL	GA	LA	NC	SC	TN
	----- dollars -----					
<u>Fixed Costs</u>						
Tractors	34.14	38.00	29.34	51.21	21.50	25.73
Machinery (incl. trucks)	26.07	^h	35.58	54.78	29.44	28.50
Irrigation machinery	--	35.00	27.32	--	--	--
Overhead	35.00	71.00	61.33	--	91.19	28.68
Management	--	ⁱ	--	--	--	--
Land	--	^j	--	--	30.00	--
Totals	95.21	144.00	153.57	105.99	172.13	82.91
<u>Total Budgeted Cost</u>						
Total	898.99	1,377.00	1,112.58	1,274.76	1,190.91 ^k	1008.16
Per cwt.	7.19	6.88	8.90	5.66	5.95	5.04

^aCost items adjusted on several budgets to fit this format.

^bAll budgets prepared for 1983 except Georgia's which was for 1982 (See Appendix Tables 2-7).

^cIncluded with machinery.

^dIncluded with harvesting labor.

^eWirebound crates in SC and NC; bags or sacks in AL, LA, and TN; cardboard cartons in GA.

^fIncluded with harvesting labor.

^gIncluded with hauling expense.

^hIncluded with tractor expense.

ⁱGeorgia's budget was the only one to specify a cost for management, and it was titled overhead and management.

^jRange of rental rates from \$25 to \$70 per acre.

^kExcluding the charge for land.

Source: Appendix Tables 2-7 [1,5,6,14,24,&25].

Appendix Table 2. Alabama: production budget for fresh market cabbage

CABBAGE FOR FRESH MARKET, 1983
ESTIMATED COSTS AND RETURNS PER ACRE
FOLLOWING RECOMMENDED MANAGEMENT PRACTICES

	Unit	Price or cost/unit (dollars)	Quantity	Value or cost (dollars)	Your cost (dollars)
1. Gross receipts					
Cabbage 50# bags	Each	5.00	250.00	1250.00	
Total				1250.00	
2. Variable costs					
Preharvest					
Plants	Thous.	9.00	10.00	90.00	
Fertilizer	Cwt.	10.40	5.00	52.00	
Lime	Tons	15.00	.50	7.50	
Herbicide	Lbs.	4.50	.50	2.25	
Ammonium nitrate	Cwt.	9.50	2.40	22.80	
Insecticide	Acre	80.00	1.00	80.00	
Planting labor	Hr.	3.75	8.00	30.00	
Machinery	Acre	7.54	1.00	7.54	
Tractors	Acre	44.55	1.00	44.55	
Interest on oper. capital	Dol.	.14	65.86	9.22	
Subtotal, pre-harvest				345.86	
Harvest costs					
Harvest labor	Hr.	3.75	40.00	150.00	
Hauling	Mile	.40	400.00	160.00	
50# bags	Each	.50	250.00	125.00	
Subtotal, harvest				435.00	
Total variable cost				780.86	
3. Income above variable costs				469.14	
4. Fixed costs					
Machinery	Acre	26.07	1.00	26.07	
Tractors	Acre	34.14	1.00	34.14	
General overhead	Acre	35.00	1.00	35.00	
Total fixed costs				95.21	
5. Labor costs					
Preharvest labor	Hour	3.75	6.11	22.92	
(tractor & machine)					
Total labor costs				22.92	
6. Total costs				898.98	
7. Net returns to land & management				351.02	

Fertilizer rates (120-120-120) based on medium level of soil fertility
Recommend soil test for fertilizer requirements on individual farm
Based on hand harvest

Source: [1]

Appendix Table 3. Georgia production budget for fresh market cabbage

CABBAGE, 1982
ESTIMATED PRODUCTION COSTS PER ACRE
BASED ON 200 CWT. YIELD

Item	Unit	Quantity	Price (dollars)	Amount (dollars)	Your Estimate (dollars)
<u>Pre-Harvest Variable Costs</u>					
Plants	1000	16	9.25	148.00	
Lime, applied	Ton	.5	24.00	12.00	
Fertilizer	Cwt.	12	7.75	93.00	
Sidedressing				15.00	
Herbicide				5.00	
Fungicide	Appl.	10	2.40	24.00	
Insecticide				30.00	
Labor	Hr.	10	4.50	45.00	
Machinery	Hr.	6.0		58.00	
Irrigation	Appl.	3	6.25	19.00	
Interest on operating cap.	\$	449	16% (4 mos.)	24.00	
Total pre-harvest variable costs				473.00	
<u>Pre-Harvest Fixed Costs</u>					
Machinery	Hr.	5.3		38.00	
Irrigation	Acre	1	35.00	35.00	
Land	--	--	--	--	
Overhead & management	\$	473	15%	71.00	
Total pre-harvest fixed costs				144.00	
Total preharvest costs (excluding land)				617.00	
<u>Harvest and Marketing Costs</u>					
Containers (cardboard)	Each	400	1.10	440.00	
Hired labor	Hr.	50	4.00	200.00	
Hauling & marketing	Cwt.	200	.60	120.00	
Total harvest costs				760.00	
Total estimated production costs				1377.00	

Source [25].

Appendix Table 4. Louisiana: production budget for fresh market cabbage

PROJECTED COSTS PER ACRE AND BREAKEVEN PRICES PER UNIT,
AVERAGE YIELD, SPRING CABBAGE, IRRIGATED, FRESH MARKET,
ONE-ROW EQUIPMENT, LOUISIANA, 1983

Item	Unit	Cost/Unit (dollars)	Quantity	Cost (dollars)
Gross receipts from production				
Cabbage	Sack 50#	--	250.00	--
Total				--
Variable costs				
Preharvest				
Limestone	Cwt.	1.50	6.60	9.50
Nitrogen	Cwt.	24.00	1.40	33.60
Phosphate	Cwt.	24.00	1.00	24.00
Potash	Cwt.	12.00	1.00	12.00
Plants	100	2.00	120.00	240.00
Herbicide	Lbs.	6.85	4.00	27.40
Insecticide	Qt.	5.00	3.00	15.00
Overhead	Acre	51.52	1.00	51.52
Machinery - fuel, lube & repair	Acre	4.84	1.00	4.84
Tractor - fuel, lube & repair	Acre	52.30	1.00	52.30
Irrigation - fuel, lube & repair	Acre	1.48	1.00	1.48
Labor (tractor & machinery)	Hour	5.00	17.39	86.54
Labor (irrigation)	Hour	5.00	3.40	17.00
Other labor	Hour	5.00	12.00	60.00
Interest on oper. capital	Dol.	.14	183.68	25.71
Subtotal, preharvest				661.69
Harvest costs				
Packing sacks	Each	.40	250.00	100.00
Harvest labor	Hr.	4.50	16.00	72.00
Packing labor	Hr.	4.50	12.00	54.00
Machinery - fuel, lube & repair	Acre	43.35	1.00	43.35
Tractor - fuel, lube & repair	Acre	7.32	1.00	7.32
Labor (tractor & machinery)	Hour	5.00	14.43	72.17
Subtotal, harvest				348.85
Total specified variable costs				1010.54
Breakeven price, variable costs	Sack 50#			4.042
Fixed costs				
Machinery	Acre	35.58	1.00	35.58
Tractors	Acre	29.34	1.00	29.34
Irrigation machinery	Acre	27.32	1.00	27.32
Overhead	Acre	9.81	1.00	9.81
Total specified fixed costs				102.05
Total specified costs				1112.59
Breakeven price, total costs	Sack 50#			4.450

Source: [5].

Appendix Table 5. North Carolina: production budget for fresh market cabbage

CABBAGE, FRESH MARKET: ESTIMATED REVENUE, OPERATING
EXPENSES, ANNUAL OWNERSHIP EXPENSES, AND NET REVENUE
PER ACRE, 1983

Category	Units	Price (dollars)	Quantity	Value (dollars)	Your value (dollars)
Production:					
Cabbage	Crate	3.40	450,000	1530.00	
Total receipts				1530.00	
Operating inputs:					
Cabbage plants ^a	Hrd.	1.15	140,000	161.00	
10-10-10 bulk	Cwt.	7.62	8,000	60.96	
Sidedress N _b	Lbs.	0.30	30,000	9.00	
Insecticide	Acre	9.00	5,000	45.00	
Fungicide	Acre	18.00	1,000	18.00	
Herbicide	Acre	6.50	1,000	6.50	
Custom harvest	Crate	0.50	450,000	225.00	
Wirebound crate	Each	1.15	450,000	517.50	
Tractor fuel and lube	Acre			29.67	
Tractor repair cost	Acre			13.48	
Machinery fuel & lube	Acre			6.98	
Machinery repair cost	Acre			20.55	
Total operating cost				1113.65	
Returns to land, labor, capital, machinery, overhead, and management				416.35	
Capital cost:					
Annual operating capital		0.14	138,304	19.36	
Tractor investment		0.14	202,338	28.33	
Machinery investment		0.14	184,817	25.87	
Total interest charge				73.56	
Returns to land, labor, machinery overhead, and management				342.79	
Ownership cost: (Depreciation, taxes, insurance)					
Tractor	Dol.			22.88	
Machinery	Dol.			28.91	
Total ownership cost				51.78	
Returns to land, labor, overhead, and management				291.00	
Labor cost:					
Machinery labor	Hr.	4.25	8,417	35.77	
Total labor cost:				35.77	
Returns to land, overhead, and management				255.23	

Prepared by E. A. Estes, Extension Economist and W. Lamont, Extension Horticulturist

^aFor direct seeding, hybrid seed will cost \$120 per acre.

^bFor tall crop, additional insecticide applications are necessary.

Source: [6].

Appendix Table 6. South Carolina: production budget for fresh market cabbage

SPRING CABBAGE FOR FRESH MARKET (CONTRACT HARVEST)
 1983 ESTIMATED COSTS AND RETURNS PER ACRE
 BASED ON IMPROVED PRODUCTION PRACTICES FOR COMMERCIAL PRODUCERS

	Unit	Price or cost/ unit (dollars)	Quantity	Value or cost per acre (dollars)	Value or cost per unit of production (dollars)	Your estimates (dollars)
1. Gross receipts from production:						
50# crt. (18-22cT)	Each	4.00	400.00	1600.00		
Total			400.00	1600.00	4.00	
2. Variable costs						
Preharvest						
Cabbage plants	Thou.	8.50	16.00	136.00	0.34	
Lime (spread)	Tons	26.00	0.33	8.58	0.20	
Side dress 33/5 N	Cwt.	10.25	2.00	20.50	0.05	
5-10-10 (spread)	Cwt.	7.00	20.00	140.00	0.35	
Pre-emerge herb	Pt.	4.40	1.50	6.60	0.02	
Transplant labor	Hr.	3.65	10.00	36.50	0.09	
Hand hoe	Hr.	3.65	3.00	10.95	0.03	
Fungicide	Pt.	3.15	6.75	21.26	0.05	
Insecticide	Pt.	5.95	3.00	17.85	0.04	
Insecticide	Qt.	7.50	3.00	22.50	0.06	
Insecticide	Pt.	4.50	2.00	9.00	0.02	
Sticker	Oz.	0.08	2.00	0.16	0.00	
Machinery	Acre	20.74	1.00	20.74	0.05	
Tractors	Acre	36.08	1.00	36.08	0.09	
Labor, tractor & mach.	Hr.	4.00	8.80	35.22	0.09	
Interest on op. cap.	Dol.	0.13	138.10	17.94	0.04	
Subtotal, pre-harvest				539.87	1.35	
Harvest costs						
Crates	Each	1.00	400.00	400.00	1.00	
Contract, Hrv.-haul	Cwt.	0.75	200.00	150.00	0.38	
Brokerage	Cwt.	0.25	200.00	50.00	0.13	
Subtotal, harvest				600.00	1.50	
Total variable cost				1139.87	2.85	
3. Income above variable costs				460.13	1.15	
4. Fixed costs						
Machinery	Acre	21.50	1.00	21.50	0.05	
Tractors	Acre	29.44	1.00	29.44	0.07	
Total fixed costs				50.94	0.13	
5. Total of above costs				1190.81	2.98	
6. Net returns to land, overhead, risk, and management				409.19	1.02	

(continued)

Appendix Table 6 (continued)

	Unit	Price or cost/ unit (dollars)	Quantity	Value or cost per acre (dollars)	Value or cost per unit of production (dollars)	Your estimate (dollars)
7. Land charge				30.00	0.07	
8. Overhead charge (8% of variable costs)				91.19	0.23	
9. Total costs				1312.00	3.28	
10. Returns to management & risk				288.00	0.72	

Source: [14].

Appendix Table 7. Tennessee: production budget for fresh market cabbage

CABBAGE, FRESH MARKET, SPRING CROP, HAND HARVESTED (1)
ESTIMATED RETURNS AND EXPENSES PER ACRE 1983

Item	Description	Unit	Quantity	Price (dollars)	Amount (dollars)	Your Farm
REVENUE						
Cabbage	50 lb bags (2)	bags	80	5.00	400.00	
			120	4.25	510.00	
			150	3.75	562.00	
			50	3.00	150.00	
	Total		400		1622.50	
EXPENSES						
Variable						
Plants (3)	Adapted variety	thous.	9.40	9.25	86.95	
Fertilizer (4)	N	lb.	90.00	0.25	22.50	
	P205	lb.	60.00	0.26	15.60	
	K20	lb.	90.00	0.15	13.50	
	Borate 48	lb.	15.00	0.10	1.50	
Lime		ton	0.60	12.00	7.20	
Herbicide	Treflan 4 EC	pt.	1.50	4.19	6.29	
Insecticide (5)	Lannate SP	lb.	3.00	15.05	45.15	
	Di-Syston 15 G	lb.	30.00	0.95	28.50	
	Monitor 4	gal.	0.25	55.71	13.93	
	Pydrin	lb.	0.20	109.35	21.87	
Bags	50 lb. mesh	ea.	400.00	0.30	120.00	
Tractor	40 HP	hr.	10.81	4.56	49.29	
Truck	2 ton	hr.	3.00	11.99	35.97	
Other Machinery					6.78	
	Total Variable Expenses				475.03	
Fixed						
Tractor	40 HP	hr.	10.81	2.38	25.73	
Truck	2 ton	hr.	3.00	5.74	17.22	
Other Machinery					11.28	
	Total Fixed Expenses				54.23	
	Total Fixed and Variable Expenses				529.26	
	Net Return to Land, Labor, Capital, and Management				1093.24	
INTEREST						
Operating capital	6 mo. @ 12%				28.50	
Fixed capital	12 mo. @ 12%				28.68	
					57.18	
	Net Return to Land, Labor, and Management				1036.06	

Appendix Table 7. (continued)

Item	Description	Unit	Quantity	Price (dollars)	Amount (dollars)	Your Farm
LABOR		hr.	105.43	4.00	421.72	
	Net Return to Land and Management				614.34	

FOOTNOTES

- 1 Fall crop production similar except for increased insecticides and labor distribution.
- 2 Harvesting will be by hand in 50 lb. units. Mesh bags will be the harvesting container.
- 3 Plants will be spaced 15" x 42" for a total population of 9794 plants per acre.
- 4 60 lbs. of N will be applied at planting and 30 lbs. will be sidedressed when heads begin to form.
- 5 Di-syston will be added to the furrow at planting. Monitor will be used prior to harvest and pydrin within 3 days of harvest. Fall crops will need heavier insecticide rates.

Source:[24].