August 21, 1967

To the Graduate Council:

I am submitting herewith a thesis written by Kamal Mustafa Al-Habib entitled "Costs of Producing and Marketing Snap Beans in Two Upper East Tennessee Counties." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

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COSTS OF PRODUCING AND MARKETING SNAP BEANS IN TWO UPPER EAST TENNESSEE COUNTIES

A Thesis

Presented to

The Graduate Council of

The University of Tennessee

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

---

by

Kamal Mustafa Al-Habib

December 1967

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CHAPTER I

INTRODUCTION[1]

The average annual value of total snap bean production in Tennessee was $2,768,000 for the 5-year period, 1960-1964. For the same period the value of production per year for the fresh and processing markets averaged $411,000 and $2,357,000, respectively. The season average prices for fresh and processing markets were $7.70 per hundred pounds, and $114.00 per ten, respectively. Yield per acre for the fresh and processing markets was 2.2 and 2.1 tons, respectively.[2]

In 1930 less than 100 acres of snap beans were reported in both Carter and Johnson Counties.[3] By 1945 there were 3,703 acres in the two counties. Table I shows the changes in number of farms reported and the acres per county of snap beans by census periods, 1945 to 1964. Acreage fluctuated in Carter County from 1945 to 1964, while the acreage declined for each census period in Johnson County. The acreage for Carter County in 1945 was 185 compared with 280 in 1964. To illustrate the changes by census periods, the acreages for Carter County in 1945

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[1]The data were obtained from one phase of Regional Project SM-30 "Establishing Guides for Adjustments by Firms Marketing Fruits (noncitrus) and Vegetables in the Southern Region."

[2]Tennessee Commercial Vegetables and Strawberries (Nashville: USDA and Tennessee Department of Agriculture Statistical Reporting Service), December 10, 1966.

[3]H. J. Bonser, E. B. Fickel, and C. B. Allred, Costs, Returns, and Practices in Growing Snap Beans in Johnson County, Tennessee, 1942, Rural Research Series Monograph No. 182 (Knoxville: University of Tennessee, 1945).

TABLE I

NUMBER OF FARMS AND ACRES OF SNAP BEANS REPORTED IN CARTER AND JOHNSON COUNTIES, TENNESSEE BY CENSUS PERIODS, 1945 TO 1964

Year	Carter County			Johnson County		
	Farms Reporting	Total Acreage	Average Acres Per Farm	Farms Reporting	Total Acreage	Average Acres Per Farm
1945	92	185	2.02	1,279	3,518	2.75
1949	132	265	2.01	481	2,141	4.45
1954	112	226	2.02	666	2,088	3.14
1959	41	117	2.85	406	1,681	4.14
1964	26	280	10.77	226	1,430	6.33

Source: United States Department of Commerce, Bureau of the Census, United States Census of Agriculture, 1945 to 1964 (Washington: Government Printing Office).

and 1949 were 185 and 265, respectively, an increase of 80 acres. In Johnson County, however, acreage declined sharply from 3,518 in 1945 to 2,141 in 1949. The change in acreage may be attributed to the response of producers to a sharp decline in price of snap beans. In some instances producers respond to a price decline by producing more of a commodity when they do not have an alternative enterprise available. In Johnson County, the grower reduced snap bean acreage 39.1 per cent from 1945 to 1949. Bowman showed that snap bean prices were very low in 1947.[4] Processors from distant states withdrew from the Mountain City market because stocks of canned green beans were unusually high; moreover, demand for fresh market beans were unusually low, and prices were the lowest since 1943. Another factor that contributed to decline in acreage has been the shift of snap bean production to the Cumberland Mountain area. Increases in the average acres of snap bean per farm may be primarily attributed to more mechanization of farms. In 1945, considerably more horses and mules were used in the two counties than in 1964.

During the last decade most of the commercial production was confined to four areas in the state (Figure 1). The areas are: Upper East Tennessee which includes Carter, Cocke, and Johnson Counties (Carter and Johnson Counties are included in this study); the lower East Tennessee area, including Monroe, Meigs, and Rhea Counties, and the

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Victor V. Bowman, Marketing Snap Beans in the Mountain Tri-State Bean Area, U.S.D.A. Production and Marketing Administration, Fruit and Vegetable Branch (Washington, D. C.: Government Printing Office, 1949).

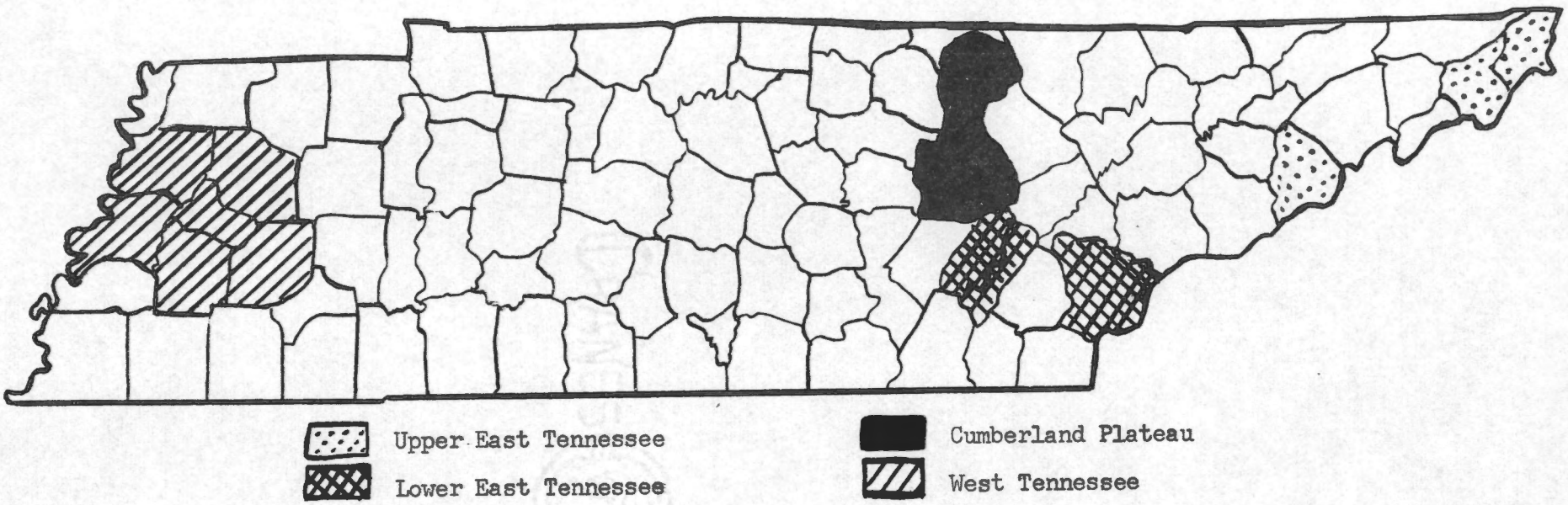


Figure 1. The commercial snap bean producing areas in the state which were used for compiling some data for this report.

Source: U. S. Department of Commerce, Bureau of the Census, United States Census of Agriculture, 1964 (Washington: Government Printing Office).

West Tennessee area, including Crockett, Dyer, Gibson, Haywood, Lauderdale, and Madison Counties.

In 1944 the Upper East Tennessee area snap bean acreage comprised 34.1 per cent of the acreage in the state, while the other counties listed contained about 45 per cent of the acreage, and additional counties near Tennessee's major cities contained the other 25 per cent of the acreage. However, from 1945 to 1964 the acreage has increased sharply in the Cumberland Plateau area while acreage has declined in the Upper East Tennessee and other county areas (Figure 2).

Figure 3 shows the changes in the per cent of snap bean producers in each area by census periods, 1945-1964. The Upper East Tennessee area in 1945 accounted for 17.9 per cent of the farms producing snap beans in the state, and 34.1 per cent of the acreage, while in 1964 this area accounted for 24 per cent of the farms and only 15 per cent of the acreage. The Cumberland Mountain area in 1945 and 1964 reported 8.8 and 69.9 per cent of the acreage, respectively. In the same years this area reports 4.3 and 10.8 per cent, respectively, of the Tennessee farms producing snap beans.

I. OBJECTIVES OF STUDY

The purpose of the study was to provide information for present and potential snap bean producers concerning the inputs of labor, material, cost of production and marketing, returns, and practices of producers in Carter and Johnson Counties, Tennessee.

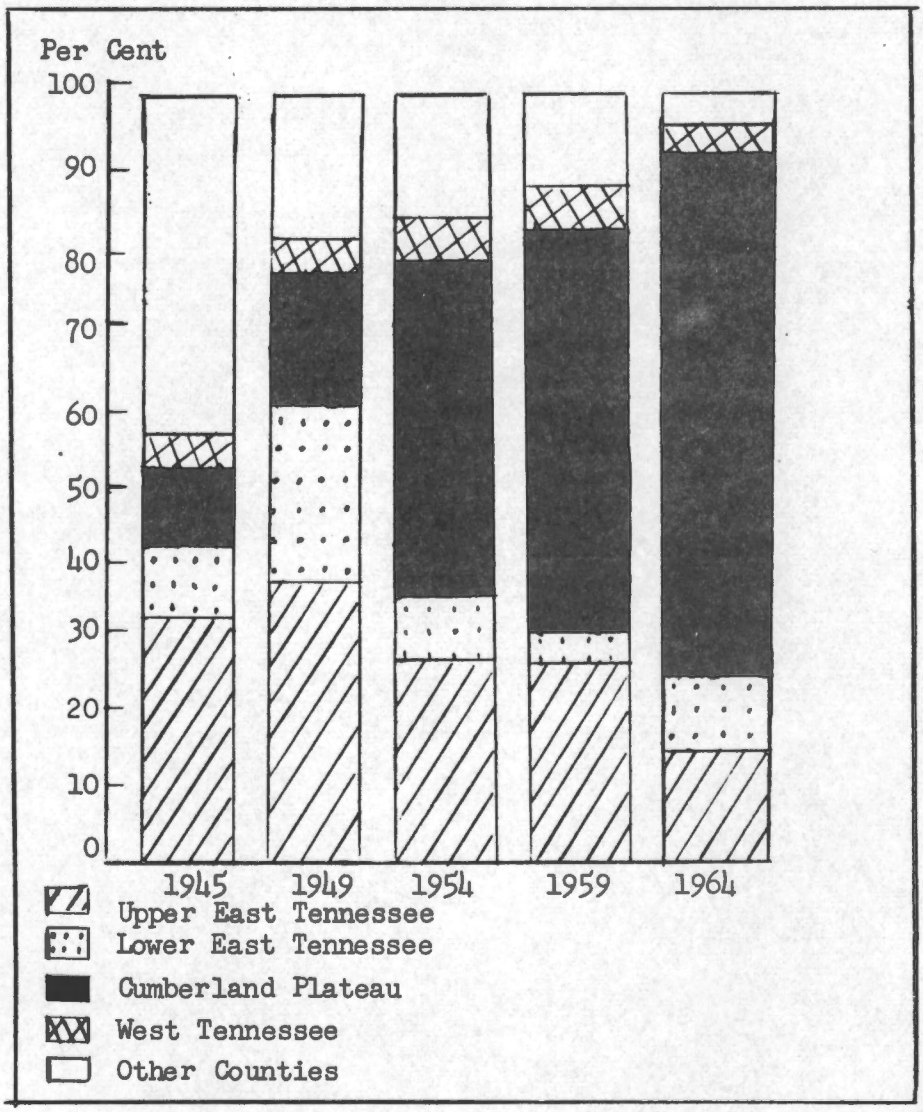


Figure 2. Per cent of total acreage of snap beans, by areas, in Tennessee, by census periods, 1945-1964.

Source: U. S. Department of Commerce, Bureau of Census, United States Census of Agriculture 1945 to 1964 (Washington: Government Printing Office).

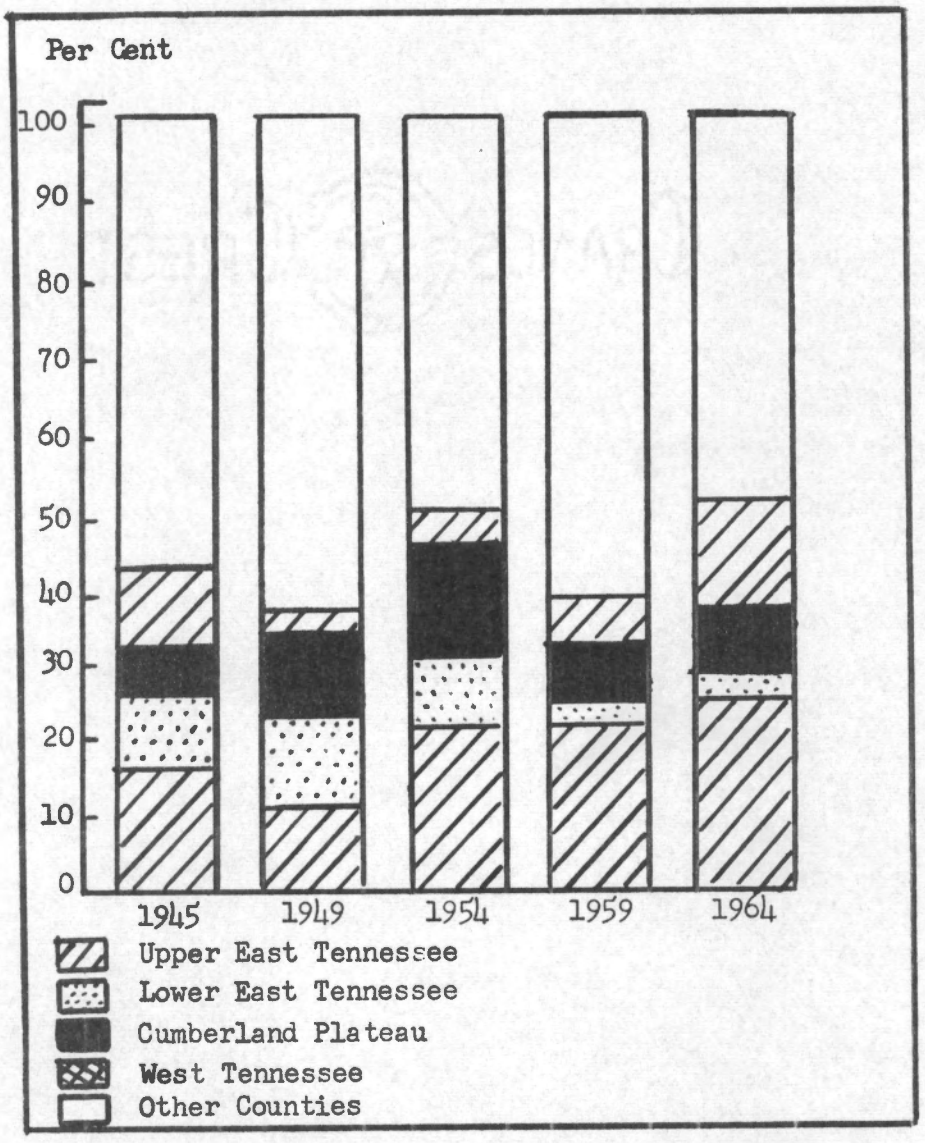


Figure 3. Per cent of total farms reporting snap beans, by areas, in Tennessee, by Census periods, 1945-1964.

Source: U. S. Department of Commerce, Bureau of Census, United States Census of Agriculture, 1945 to 1964 (Washington: Government Printing Office).

The specific objectives were:

1. To determine the labor and material requirements per acre for producing snap beans in small, medium, and large acreage groups.
2. To find the variable, fixed, and total costs and returns per farm and per acre for producing and marketing snap beans in the small, medium, and large acreage groups.
3. To determine whether the costs of material inputs and costs of production and marketing were significantly different between small, medium, and large acreage groups of snap bean producers.
4. To present information on the organization of the pertinent marketing area and to describe the marketing practices of snap bean growers.
5. To analyze fluctuations in snap bean prices by days, weeks, and months, for the 1964 and 1966 marketing seasons.

II. THE THEORY OF ECONOMIES OF SIZE

This report emphasizes the size of snap bean acreage to determine whether economies of size exist. The importance of size efficiency relationships and their economic value were studied by Madden, who said:

> Several modifications of the traditional economic theories are suggested here. Since theoretical treatments of production and cost curves abound in economic literature, only a brief statement of the conventional theory is given. These are the concepts of (a) long run versus short run planning horizons as related to fixed versus variable resources and costs, and (b) resource divisibility. Other

> modifications of economic theory are suggested to better take account of some apparent inconsistencies between existing theory and the observed behavior of farms.
>
> Economies-of-size analysis is usually couched in terms of long-run and short-run situations. Short-run economies are viewed as resulting from fuller utilization of fixed plant, long-run economies as resulting from efficiencies obtained by changing plant size, presumably involving a longer time period.[5]

This concept is represented graphically in Figure 4.

His statment is a good explanation of the importance of economies of scale between the three acreage groups of snap bean producers (small, medium, and large) covered by this study in Carter and Johnson Counties.

III. SOURCE OF DATA AND PROCEDURE

The labor inputs and material requirements for snap bean production were obtained by personal interviews with 129 growers in Carter and Johnson Counties during the summer of 1963. The snap bean acreage was arbitrarily divided into small (.50-4.99 acres), medium (5.00-19.99 acres), and large (20.0 acres and over). Lists of snap bean growers were obtained from the County Agent's Office, the Tri-State Growers' Association, and the Johnson County Bean Market. A disproportionate stratified random sample was drawn from the list, by communities where snap beans were grown in Carter and Johnson Counties. The sample consisted of 56 per cent or 92 growers in the small acreage group and all

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[5] J. Patrick Madden, Economies of Size in Farming, Theory, Analytical Procedures, and a Review of Selected Studies. U.S.D.A. Economic Research Service A. E. R. Report No. 107 (Washington: Government Printing Office, February, 1967), pp. 2-3.

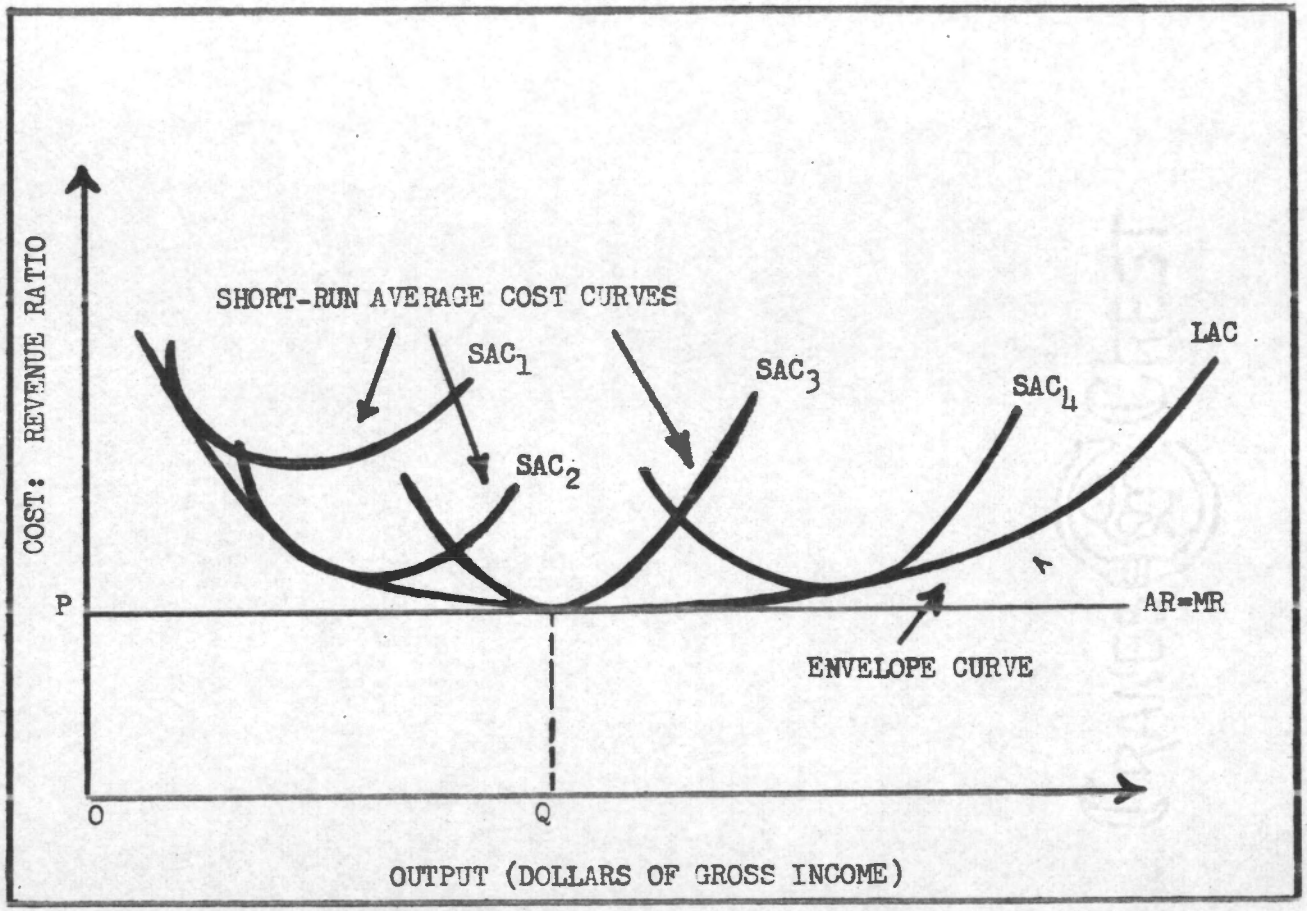


Figure 4. Theoretical illustration of short-run average cost curves and long-run average cost curve.

Source: J. Patrick Madden, Economies of Size in Farming, Theory, Analytical Procedures, and a Review of Selected Procedures. Economic Research Service, USDA (Washington, D. C., A.E.R. Report No. 107) p. 3.

growers in the medium and large acreage groups that comprised 23 and 14 growers, respectively. The total acreages of snap beans grown by the small, medium, and large acreage groups in the two counties were 175.7, 227.5, and 894.

Tests of significance on coefficients were done by analysis of variance to determine whether significant differences existed between the small, medium, and large acreage groups in the amounts of materials used and costs of production and marketing. A program for unequal sample size was used in the analysis.

Information concerning the items used in computing variable and fixed costs per unit are included in Tables II and III.

The study shows that about 20 per cent of the 114 farms in the sample (15 farmers did not furnish information) had under 15 acres of cropland, about 20 per cent had from 15.0 to 29.9 acres, and about 25 per cent of the farms had from 50.0 to 99.9 acres of cropland (Table IV).

IV. CHARACTERISTICS OF FARMS

In general, farming operations in both counties are conducted on a small scale. The number of farms in Carter County was 1,826 and 1,323 in 1959 and 1964, respectively. The number of farms in Johnson County in 1959 and 1964 was 1,680 and 1,561, respectively. The farms in both counties ranged in size from less than 10 to more than 2,000 acres (Table V).[6]

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[6]United States Department of Commerce, Bureau of the Census, United States Census of Agriculture, Preliminary Report (Washington, D. C.: Government Printing Office, 1964).

TABLE II

COST PER UNIT FOR MATERIALS AND OTHER VARIABLE COSTS USED FOR GROWING SNAP BEANS IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Items	Unit	Average Price
Materials		
Seed	Lb.	$0.32
Fertilizer (6-12-12)	Cwt.	2.40
Fertilizer (16-0-0)	Cwt.	3.50
Insecticides	Lb.	.10
Other Cost Items		
Operator's labor	hour	$1.00
Picking containers	acre	2.00
Tractor (medium)	hour	.50
Hand harvest	bushel	.67
Hauling beans, 1½ ton truck	hour	1.30
Marketing commission		5 per cent of total revenue

TABLE III

COST PER UNIT FOR ITEMS INCLUDED UNDER FIXED EXPENSES FOR PRODUCING AND MARKETING SNAP BEANS, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Item	Unit	Price
Tractor	hour	$0.50
Other machinery	acre	2.00
1½ ton truck (hauling)	hour	1.90
General expenses		
Property tax		(a)
Motor license plus insurance	acre	2.00
Interest on investment	acre	(b)
Depreciation	acre	10.00

[a] Johnson County: $192.06 x acres x $2.32 x 30 per cent.
Carter County: $225.42 x acres x $2.35 x 35 per cent.

[b] $200.00 x .03 x acres (machinery).
$300.00 x .03 x acres (land and buildings).

TABLE IV

NUMBER OF SNAP BEAN PRODUCERS IN THE SAMPLE BY SIZE, AND NUMBER OF TRUCK CROPS IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Cropland Operated (Acres)	Farms in Size Groups (Number)	Present of Total	Number of Snap Bean Producers Growing Other Vegetables
Under 15.0	23	20.2	--
15.0-29.9	23	20.2	1
30.0-49.9	18	15.8	2
50.0-99.9	29	25.4	3
100.0-149.9	9	7.9	1
150.0-299.9	9	7.9	1
300.0-639.9	2	1.7	--
640 and over	1	0.9	--
Total	114	100.0	8

TABLE V

FARM SIZE IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1959 AND 1964

Farm Size (acres)	Carter		Johnson	
	1959	1964	1959	1964
less than 10 acres	377	230	302	270
10-49	993	730	757	659
50-69	186	140	203	195
70-99	122	101	148	177
100-139	68	43	115	104
140-179	33	33	59	70
180-219	19	13	37	33
220-259	12	10	10	16
260-499	13	15	32	24
500-999	2	6	14	8
1,000-1,999	--	--	3	4
2,000 or more	1	2	--	1
Total	1,826	1,323	1,680	1,561

Source: United States Department of Commerce, Bureau of the Census, United States Census of Agriculture, Preliminary Report, 1959, 1964.

V. INCOME FROM VEGETABLES

Income from vegetables in Carter and Johnson Counties has been a supplement to farm income for many years on a number of small farms where the income is limited. In 1964 value of all products sold on Carter and Johnson County farms averaged only $1,366.00 and $2,212.00 per farm, respectively. The 1964 income for the 46 farms in Carter and 258 farms in Johnson Counties that reported vegetables for sale averaged $1,029.39 and $1,260.62, respectively, per farm.

Other vegetables grown in the two counties include cabbage, potatoes, okra, sweet potatoes, and peas. Strawberries have been grown in Johnson County for a number of years.

VI. REVIEW OF LITERATURE

A short summary is presented on some of the studies relevant to inputs and costs of producing and marketing snap beans in Tennessee and other states. It has been over 20 years since the last study was done in Carter and Johnson Counties on snap bean production and marketing costs. Therefore, this study is justified to determine current inputs and costs that may be required to advise present and potential snap bean producers.

In 1945, Bonser, Fickel, and Allred of the Agricultural Economics and Rural Sociology Department of the University of Tennessee published a monograph about snap bean costs, returns, and practices in Johnson County, Tennessee. Costs for growing to harvest averaged $36.64 per

acre, harvesting cost $37.86, and marketing $4.30 per acre. Marketing costs averaged 5 cents a bushel. Returns per acre averaged $82.03 with an average deviation of $30.40.[7]

An additional report by the same authors was released by the Agricultural Economics Department at the University of Tennessee on December 3, 1945. This report included costs and returns in growing snap beans in Knox and Sevier Counties, Tennessee. The study shows that the average price received by growers was $1.09 per bushel of snap beans and $1.49 per bushel of pole beans. The growers' average gross return was $77.76 per acre of snap beans and $152.76 for pole beans. The net returns for snap beans were $14.90 per acfe and $58.15 per acre for pole beans.[8]

In 1953, a study was conducted by the Department of Agricultural Economics of the Pennsylvania State College to determine the labor requirements and cultural practices for snap beans on 10 farms in the Southeast area and 12 farms in the North Central area of Pennsylvania. The labor requirement was 192 man hours (per acre) for the Southeast area and 118 man hours (per acre) for the North Central area. The acres of snap beans per farm was 10 for the Southeast and 50 for the

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[7]H. J. Bonser, E. B. Fickel, and C. B. Allred, Costs, Returns, and Practices in Growing Snap Beans in Johnson County, Tennessee, 1942, Rural Research Series Monograph No. 182 (Knoxville: University of Tennessee, 1945).

[8]H. J. Bonser, E. B. Fickel, and C. B. Allred, Costs, Returns, and Practices in Growing Snap Beans, Knox and Sevier Counties, Tennessee, 1942, Rural Research Series Monograph No. 191 (Knoxville: University of Tennessee, 1945).

North Central area, and the yield of snap beans per acre was 1.9 tons in the Southeast area and 1.8 tons in the North Central area.[9]

In 1961, the Economic Research Service of the U.S.D.A. studied snap beans grown for processing on 10 farms in Virginia. The total cost of materials used per acre was $39.59. This included seed, fertilizer, lime, dust, spray, and baskets. The total cost of custom work hired per acre was $0.85. This included liquid fertilizer, sprayer and materials, and 2-row picker. The total acreage on 10 farms was 219.5 acres and the average yield was 3,060 pounds of snap bean growers in 11 other areas.[10]

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[9]Sidney Ishee and W. L. Barr, Snap Beans for Processing (State College: Pennsylvania State College, Department of Agricultural Economics and Rural Sociology, 1953).

[10]Earle E. Gavett, Truck Crop Production Practices, ERS 45 (Washington, D. C.: U.S.D.A., Economic Research Service, 1961).

CHAPTER II

PHYSICAL INPUTS REQUIRED

I. LABOR

Snap bean production is an operation that covers a relatively short period of time. If temperature and other factors are favorable, snap beans are ready for the first picking from 60 to 70 days after planting. Table VI shows that man hours and/or tractor hour requirements varied among the three acreage groups in all of the operations. The additional man hours and/or tractor hours required by the small acreage group resulted from more growers using horse power than in the other groups and utilizing smaller fields with steeper slopes. The total man hours required to grow, harvest, and market an acre of snap beans for the small, medium, and large groups averaged 218.6, 217.1, and 202.1, respectively. Horse and tractor hours for the small, medium, and large acreage groups were 20.6, 12.3, and 7.9, in the order named.

Picking snap beans in Carter and Johnson Counties accounted for approximately 90 per cent of the total man hours required to grow, harvest, and market the snap beans. Harvesting was done manually. The fields were small and the slope steep on many of the farms. Consequently, the two-row mechanical harvester used in the other production areas has not been used effectively. The small, medium, and large

TABLE VI

INPUTS OF LABOR AND POWER USED IN PRODUCING, HARVESTING, AND MARKETING SNAP BEANS FOR 92 SMALL, 23 MEDIUM, AND 14 LARGE SNAP BEAN PRODUCERS, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Operation	Times over Acreage	Acreage Groups: Small Total Man Hours	Small Total Power Hours	Medium Total Man Hours	Medium Total Power Hours	Large Total Man Hours	Large Total Power Hours
Preharvest							
Plowing	1	2.7	2.7	1.9	1.9	1.4	1.4
Discing	2	2.0	2.0	1.5	1.5	1.0	1.0
Harrowing and dragging	2	1.7	1.7	1.2	1.2	.7	.7
Planting and fertilizing	1	2.1	2.1	1.6	1.6	1.2	1.2
Cultivating	3	4.3	3.0	2.6	2.0	2.4	1.0
Side dressing	1	1.9	--	1.5	.7	1.4	.4
Dusting	2	2.0	--	1.5	.9	.7	.4
Total Preharvest		16.7	11.5	11.8	9.8	8.8	6.1
Harvest							
Picking		192.8		202.8		191.5	
Hauling to market		9.1	9.1	2.5	2.5	1.8	1.8
Total harvest and market		201.9	9.1	205.3	2.5	193.3	1.8
Total of all operations		218.6	20.6	217.1	12.3	202.1	7.9

acreage groups utilized 192.8, 202.8, and 191.5 man hours of labor per acre in harvesting. The average amounts harvested in the two counties per man hour by the small, medium, and large acreage groups were 1.09, 1.07, and 1.01 bushels, respectively.[1]

II. SEASONALITY OF OPERATIONS

Data used to prepare Figure 5 and the following tables and discussion on materials were based on 1297.2 acres of snap beans.

The land preparation operations start in January and continue until early July. Planting starts around April 20 and continues until the earlier part of July. Two crops were produced by some of the growers. Harvesting usually starts around the last week of June for the early crop, while harvesting for the last crop usually commences about September 1.

III. MATERIAL

All of the snap bean producers used fertilizer. Ninety-two of the small acreage producers reported the use of fertilizer. The use of fertilizer per acre ranged from 150 to 1,050 pounds with the most frequently reported level (32 producers) being 400-500 pounds. Eight different analyses were used, the most common being 6-12-12 and 10-10-10.

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[1]William E. Goble and William E. Erwin, Costs of Hand Vs. Machine Harvesting for Snap Beans, Bulletin 404 (Knoxville: Tennessee Agricultural Experiment Station, 1966), pp. 33-34.

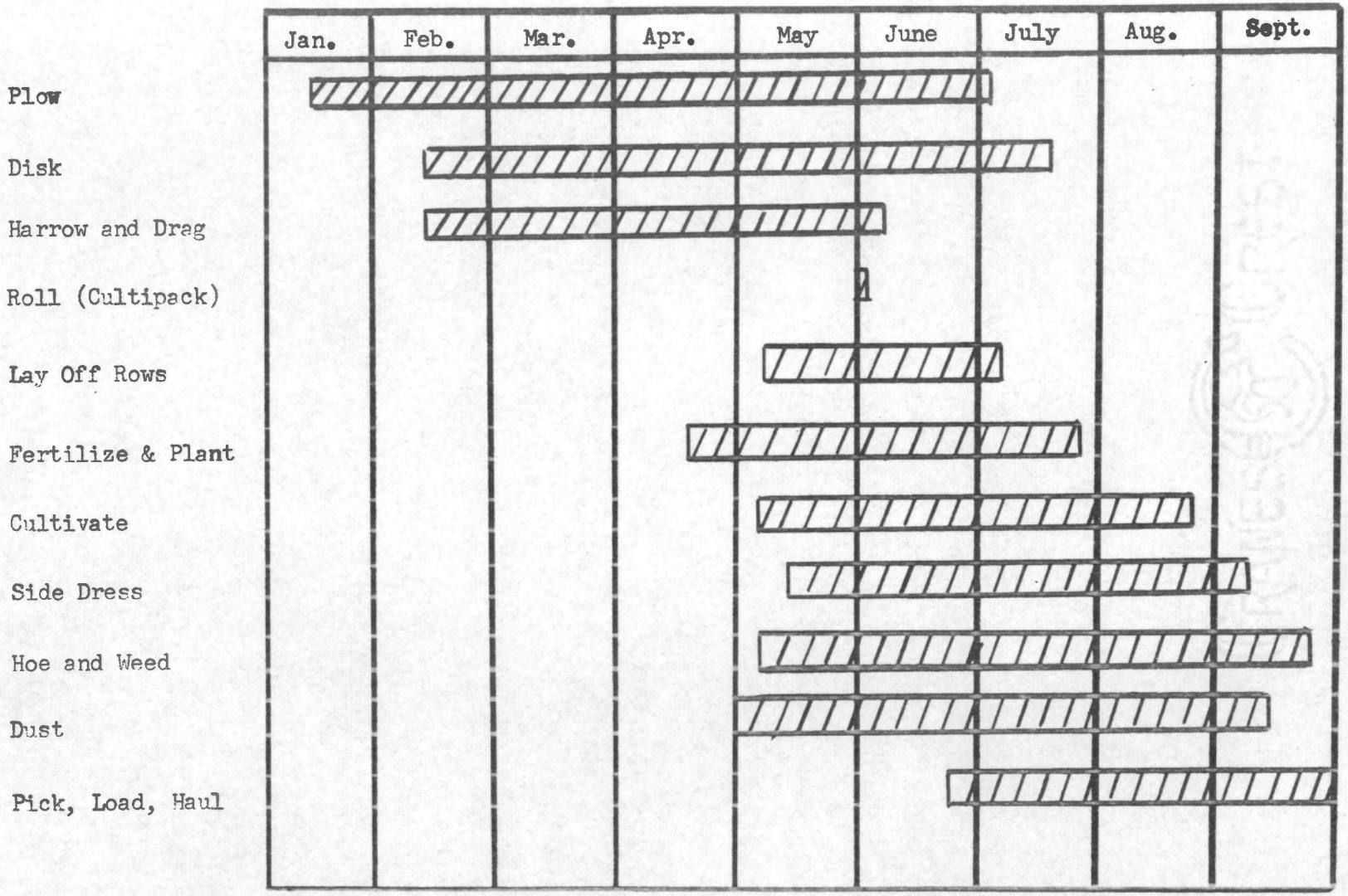


Figure 5. Seasonal sequence of typical operations on production and marketing of snap beans, Carter and Johnson counties, Tennessee, 1963.

The medium and large groups used from 350 to 758 pounds of fertilizer per acre. Eight of the 14 large producers used between 500-600 pounds per acre (Table VII).

The amount of seed used ranged from 32 to 92 pounds per acre for the small and medium groups. Forty-two small and 13 large acreage growers used 62 pounds of seed per acre. The large acreage group used from 42 to 67 pounds with 4 of them using 55 pounds (Table VIII). The two varieties which were grown by most growers, irrespective of acreage grouping were Wadex and Harvester (Table IX).

Insecticides used by the small group ranged from 15 to 105 pounds per acre. Thirty-nine growers used 20-29 pounds per acre. The medium and large acreage group use of insecticides ranged from 15 to 85 pounds. Eleven small and 6 large growers used 20-29 pounds per acre (Table X).

The picking containers generally used for harvesting snap beans consisted primarily of hampers and burlap sacks. The type of container varied considerably by size of operation. Most beans for processing were hauled loose (Table XI and Table XII).

TABLE VII

POUNDS OF FERTILIZER USED PER ACRE BY SNAP BEAN GROWERS ON THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963[a] and [b]

Fertilizer Used Pounds	Acreage Groups		
	Small	Medium	Large
	Numbers of Farms		
100 - 199	1	0	0
200 - 299	7	0	0
300 - 399	14	3	1
400 - 499	32	7	2
500 - 599	19	6	8
600 - 699	10	2	2
700 - 799	6	5	1
800 - 899	2	0	0
900 - 999	0	0	0
1,000 - 1,099	1	0	0

[a]The F test showed there was not a significant difference at the 0.05 level between the pounds of fertilizer used by the small, medium, and large acreage groups.

[b]See summary of analysis of variance in Table XIX, Appendix A.

TABLE VIII

POUNDS OF SEED USED PER ACRE BY SNAP BEAN GROWERS IN THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963[a] and [b]

Seed Used Pounds	Acreage Groups		
	Small	Medium	Large
	Number of Farms		
30 - 34	2	1	0
35 - 39	1	0	1
40 - 44	5	0	3
45 - 49	1	0	0
50 - 54	7	1	3
55 - 59	6	1	5
60 - 64	42	13	1
65 - 69	8	0	1
70 - 74	15	2	0
75 - 79	3	2	0
80 - 84	1	2	0
85 - 89	0	0	0
90 - 94	1	1	0

[a]The F test showed there was a significant difference at the 0.05 level between the pounds of seed used by the small, medium, and large acreage groups.

[b]See summary of analysis of variance in Table XVIII, Appendix A.

TABLE IX

VARIETIES OF SNAP BEANS USED BY SNAP BEAN GROWERS IN THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963[a]

	Varieties							
Group	Wadex	Harvester	Tender Best	Tender Green	Extender	White	Kanala	Cornelius
Small	66	18	5	5	4	0	0	0
Medium	10	14	2	1	4	1	1	0
Large	7	9	0	0	3	0	0	1
Total	83	41	7	6	11	1	1	1

[a]The number using seed totals 151, or 22 more than the total number of growers interviewed because some growers planted more than one variety of seed.

TABLE X

POUNDS OF INSECTICIDES USED PER ACRE BY SNAP BEAN GROWERS IN THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963[a] and [b]

Quantities of Insecticides Used Pounds	Acreage Groups		
	Small	Medium	Large
	Number of Farms		
10 - 19	10	1	2
20 - 29	39	11	6
30 - 39	7	4	1
40 - 49	4	2	4
50 - 59	15	3	0
60 - 69	1	0	0
70 - 79	11	1	0
80 - 89	1	1	1
90 - 99	1	0	0
100 - 109	3	0	0

[a]The F test showed there was not a significant difference at the 0.05 level between the pounds of insecticides used by the small, medium, and large acreage groups.

[b]See summary of analysis of variance in Table XX, Appendix A.

TABLE XI

NUMBER OF HAMPERS USED BY SNAP BEAN GROWERS IN THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Hampers Used	Acreage Groups		
	Small	Medium	Large
	Number of Farms		
4	1	1	2
5 - 9	7	5	2
10 - 14	11	3	0
15 - 19	2	2	0
20 - 24	2	0	0
25 - 29	8	10	9
30 - 34	0	0	0
35 - 39	0	0	0
40 - 44	1	0	0
45 - 49	0	0	0
50 - 54	0	0	0

TABLE XII

NUMBER OF SACKS USED BY SNAP BEAN GROWERS IN THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS FOR HARVESTING AND HAULING IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

	Acreage Groups		
Sacks Used	Small Frequency	Medium Frequency	Large Frequency
0 - 4	1	0	0
5 - 9	4	1	2
10 - 14	5	2	2
15 - 19	2	1	0
20 - 24	3	2	0
25 - 29	34	3	0
30 - 34	8	3	0
35 - 39	3	0	0
40 - 44	3	0	0
45 - 49	0	0	0
50 - 54	14	0	0
55 - 59	0	0	0
60 - 64	2	0	0
65 - 69	4	0	0
70 - 74	0	0	0
75 - 79	2	0	0
80 - 84	0	0	0
85 - 89	0	0	0
90 - 94	1	0	0
95 - 99	0	0	0
100 - 104	3	0	0
105 - 109	1	0	0
110 - 114	1	0	0
115 - 119	1	0	0
120 - 124	1	0	0

CHAPTER III

COSTS AND RETURNS

I. VARIABLE COSTS

Variable costs are those costs which vary with output for each of the three acreage groups included. These costs included such items as operator and family labor, power, machinery, seed, fertilizer, insecticides, chemicals for weed control, containers, hired labor, and hauling beans to market and the commission.

The small acreage group grew 175.7 acres of snap beans, or an average of 1.9 acres per grower. The average variable costs per acre, which included labor, power, and machinery used for land preparation and cultivation totaled $28.45, materials $47.04, harvesting $142.06, and marketing $31.87. The average total variable cost per acre was $249.49 (Table XIII).

The medium acreage group grew 227.5 acres of snap beans or an average of 7.9 acres per grower. The average variable costs per acre for labor, power, and machinery used for land preparation and cultivation totaled $20.60, materials $42.65, harvesting $135.04, and marketing $19.99. The average total variable cost per acre was $218.28 (Table XIII).

The large acreage group had 894 acres of snap beans with an average of 83.8 acres per grower. The average variable costs per

TABLE XIII

AVERAGE VARIABLE COSTS PER ACRE OF PRODUCING AND MARKETING SNAP BEANS BY SMALL, MEDIUM, AND LARGE ACREAGE GROUPS, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963[a] and [b]

Items	Acreage Groups		
	Small Average Cost Per Acre	Medium Average Cost Per Acre	Large Average Cost Per Acre
Labor, Power and Machinery for Production			
Plowing	$ 4.16	$ 2.81	$ 2.07
Discing	3.01	2.27	1.47
Harrowing and Dragging	2.54	1.79	.99
Planting and Fertilizing	3.20	2.45	1.86
Cultivating	6.52	3.86	3.58
Side Dressing	2.97	2.22	2.05
Dusting	3.03	2.20	1.04
Machinery Repair	3.02	3.00	3.00
Average Variable Cost	$ 28.45	$ 20.60	$ 16.06
Materials			
Seed	$ 21.35	$ 21.07	$ 22.73
Fertilizer	12.37	14.20	14.34
Side Dressing	7.45	2.78	7.16
Insecticides	5.87	4.60	2.69
Fungicides	----	----	----
Average Variable Cost	$ 47.04	$ 42.65	$ 46.92
Harvesting			
Containers	$ 2.10	$ 2.00	$ 2.00
Picking	139.96	133.04	132.13
Average Variable Cost	$142.06	$135.04	$134.13
Marketing			
Hauling Beans to Market	$ 13.65	$ 3.75	$ 2.77
Commission	18.22	16.24	16.53
Average Variable Cost	$ 31.87	$ 19.99	$ 19.30
Average Variable Cost for Growing, Harvesting, and Marketing	$249.42	$218.28	$216.41

[a]The F test showed there was a significant difference at the 0.05 level between the variable costs per acre for labor, power, and machinery and marketing. There was not a significant difference at the 0.05 level between the variable cost per acre for materials and harvesting between the small, medium, and large acreage groups.

[b]See summary of analysis of variance in Tables XXI, XXII, XXIII, and XXIV, Appendix A.

acre for labor, power, and machinery used for land preparation totaled $16.00, materials $46.92, harvesting $134.13, and marketing $19.30. The average total variable cost per acre was $216.41 (Table XIII).

II. FIXED COSTS

Fixed costs are any costs that do not vary with output. The following items are included under fixed costs: property tax, motor license, and insurance and depreciation on machinery and buildings. The average fixed cost was approximately $40.00 per acre for each of the acreage groups (Table XIV).

III. TOTAL COSTS

Total costs were approximately $33.00 per acre higher on the small acreage group than on the two other groups.

Average total costs were $290.04 per acre for the small acreage group, $257.08 for the medium acreage group, and $256.52 for the large acreage group (Table XV).

Factors influencing higher cost for the small acreage group were smaller fields which required more inputs for land preparation and cultivation. In addition, the small acreage group incurred more expense in hauling small loads of beans to market than the medium and large acreage groups.

IV. RETURNS BY SIZE GROUPS

Snap bean sales were dependent upon the yield in each area and the prices received by producers when the snap beans were marketed.

TABLE XIV

AVERAGE FIXED COSTS PER ACRE OF PRODUCING AND MARKETING SNAP BEANS BY SMALL, MEDIUM, AND LARGE ACREAGE GROUPS IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963[a] and [b]

Items	Acreage Groups		
	Small Average Cost Per Acre	Medium Average Cost Per Acre	Large Average Cost Per Acre
Property Tax, Motor License, Insurance	$ 15.63	$ 13.80	$ 15.11
Depreciation			
Machinery	$ 6.00	$ 6.00	$ 6.00
Buildings	4.00	4.00	4.00
Interest on Investment			
Machinery	$ 8.99	$ 9.00	$ 9.00
Land Investment and Buildings	6.00	6.00	6.00
Average Fixed Costs, General Expenses, Depreciation, and Interest on Investment	$ 40.62	$ 38.80	$ 40.11

[a]The F test showed there was not a significant difference at the 0.05 level between the fixed costs per acre for general expenses between the small, medium, and large acreage groups.

[b]See summary of analysis of variance in Table XXV, Appendix A.

TABLE XV

AVERAGE TOTAL COST PER ACRE OF PRODUCING AND MARKETING SNAP BEANS BY SMALL, MEDIUM, AND LARGE ACREAGE GROUPS IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Items	Acreage Groups		
	Small Average Per Acre	Medium Average Per Acre	Large Average Per Acre
Variable Costs	$249.42	$218.29	$216.41
Fixed Costs	40.62	38.80	40.11
Total Cost	$290.04	$257.08	$256.52

As might be expected the variation in net returns per farm was large. The snap bean acreages for the small, medium, and large size groups were 1.9, 9.9, and 59.7, respectively. The average net returns per farm for these groups were $191.17, $1,025.48, and $7,111.17, respectively. The net return per acre of benas was less for the small size group than for medium and large groups by $3.68 and $11.36, respectively, per acre (Table XVI).

TABLE XVI

RETURNS TO SNAP BEAN GROWERS BY SMALL, MEDIUM, AND LARGE ACREAGE GROUP, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Items	Acreage Groups		
	Small	Medium	Large
Net Returns Per Acre	100.09	103.68	111.36
Net Returns Per Farm	191.17	1,025.48	7,111.17
Average Size of Bean Acreage	1.9	9.9	59.7

CHAPTER IV

MARKETING AND PRICES

I. MARKETING

Outlets

The sharp increase in the production of snap beans in the area from 1941 to 1943, when acreage was tripled, required the establishment of a local market for snap beans.[1] There were two firms in Johnson County, Mountain City, where snap beans were sold in 1966. The firms were:

1. Tri-State Growers, Incorporated, which was established to buy and sell vegetables and also to sell farm supplies. This is a cooperative where the beans are sold by auction. In addition, the cooperative buys strawberries, peppers, onions, cabbage, and tomatoes.

2. Johnson County Bean Market, which was established in 1962 to purchase beans primarily for processing.

Historically, the bean market of Tri-State Growers, Incorporated, was organized in January, 1945. The facilities are located in a former railroad depot purchased from Southern Railway. These facilities are now being replaced with a modern building.

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[1]Victor B. Bowman, "Marketing Snap Beans in the Mountain Tri-State Area" (Washington: U.S.D.A., Production and Marketing Administration, May, 1949). (Multilithed.)

When the growers were interviewed, they were asked to indicate where their beans were marketed. About 71 per cent sold their beans to Tri-State Growers, Incorporated, and 27 per cent sold directly to Johnson County Bean Market. The growers sold one per cent of their beans to a broker and one per cent of them to a processor.[2]

The snap bean producing sections served for several years by Tri-State Growers, Incorporated, were in the mountainous Tri-State Area of North Carolina, Virginia, and Tennessee. There were 5 counties in Southwestern Virginia, 10 to Western North Carolina, and the counties of Carter and Johnson in Tennessee. However, in recent years there has been an infestation of Japanese beetles in part of the production area which has made it necessary for the beans to pass an inspection for Japanese beetles anf for growers to obtain a certificate indicating there is no evidence of beetles before they can be transported over state lines. As a consequence, most of the beans marketed at Mountain City in 1966 were produced in Carter and Johnson Counties.

II. PRICES

Daily Average Prices

During the 1964 season the highest average daily price of $1.93 per bushel was on Monday at the Tri-State Growers' Auction Market. The

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[2]William E. Goble, "Progress Report on Production, Acreage, Outlets, and Utilization," Tennessee Farm and Home Science, 49:6-7, 1964.

minimum price was on Wednesday and Saturday with an average price of $1.75 each per bushel. The average daily price on Thursday and Friday increased to $1.78 and $1.85 per bushel, respectively. See Table XXI (Appendix A) for details. These daily price changes are attributed to changes in the supply and demand for snap beans. On Monday morning the retailers' and wholesalers' supplies have almost disappeared and there is an increase in demand for snap beans. By Wednesday the supply has increased enough to depress price. By Thursday and Friday merchants increase buying for a heavy volume of sales on Friday and Saturday. Since a large percentage of retail stores are closed on Sunday, the volume of beans purchased is decreased on Saturday with a depressing effect on prices. Buyers at Mountain City consider fresh market prices at major terminal markets, processor demand, and the local supply before bids are submitted.

When the 1966 average daily price for snap beans was compared with the 1964 price by days of the week, the 1966 prices were appreciably higher (Figure 6).

Weekly Average Prices

The highest weekly average price for snap beans for 1966 was $3.52, while the highest price for 1964 was $3.04. The lowest weekly average price for both 1964 and 1966 was $1.55, but in 1964 the lowest price of $1.55 was paid during the week ending August 8, while in 1966 the lowest price of $1.55 was paid during the week ending September 26. The price during the second week of August was $2.38 in 1966 or $0.83

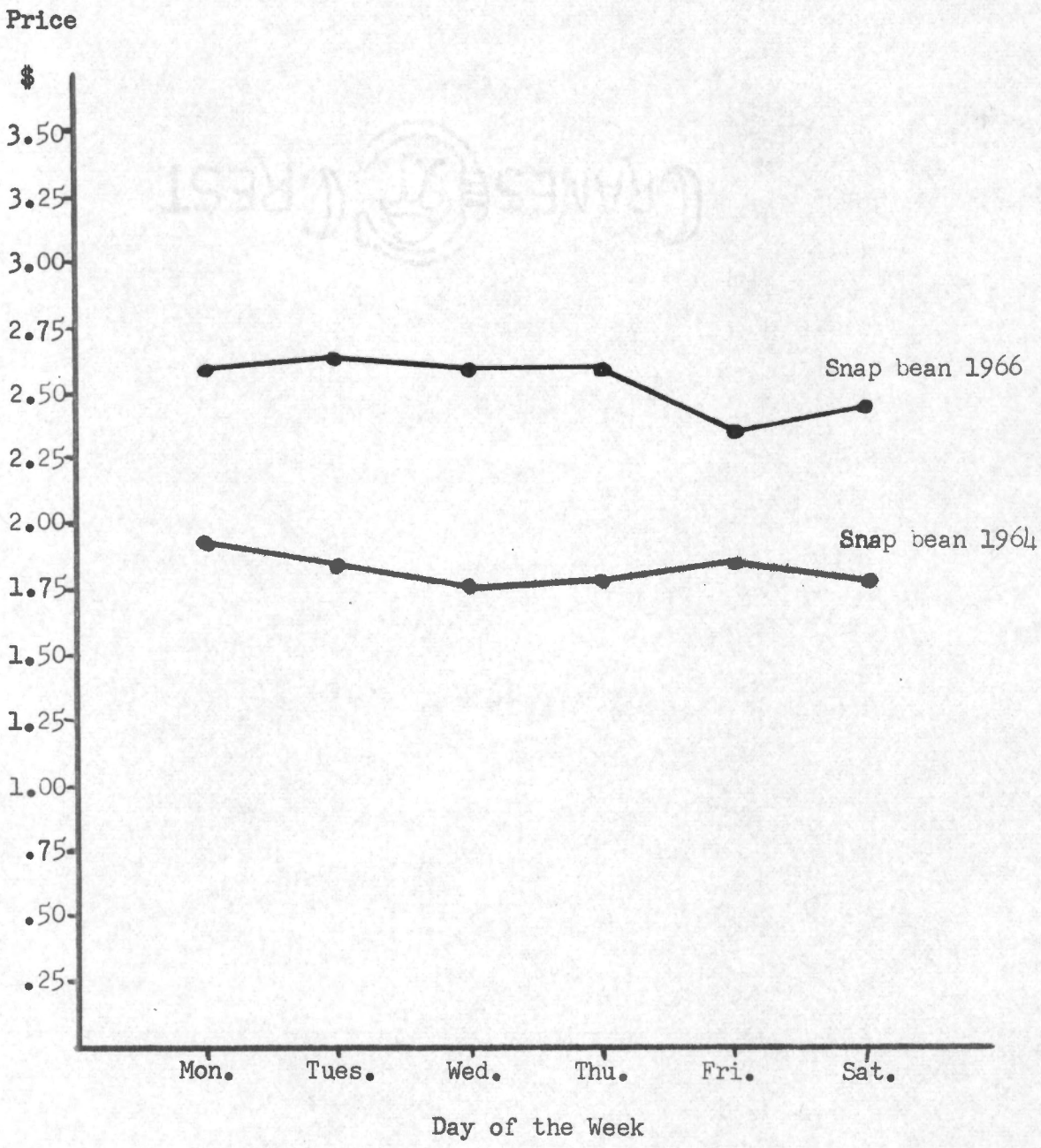


Figure 6. Average price of snap beans by days of the week at the Tri-State Growers' Market, Mountain City, Tennessee, 1964-1966 seasons.

higher than the September 26 price of $1.55 (Figure 7). The 1966 weekly price was $2.46 per bushel while for 1964 was $1.84 per bushel, making the price per week for 1966 $0.62 higher than 1964.

Monthly Average Prices

Monthly average prices during 1966 for snap beans were as follows: $3.13 in July, $2.40 in August, and $1.31 per bushel in September, while the 1964 prices were $1.78, $1.62, and $1.86, respectively. The monthly average price for 1966 was also higher than in the 1964 season by $1.35 for July, $0.38 for August, and minus $0.55 for September (Figure 8).

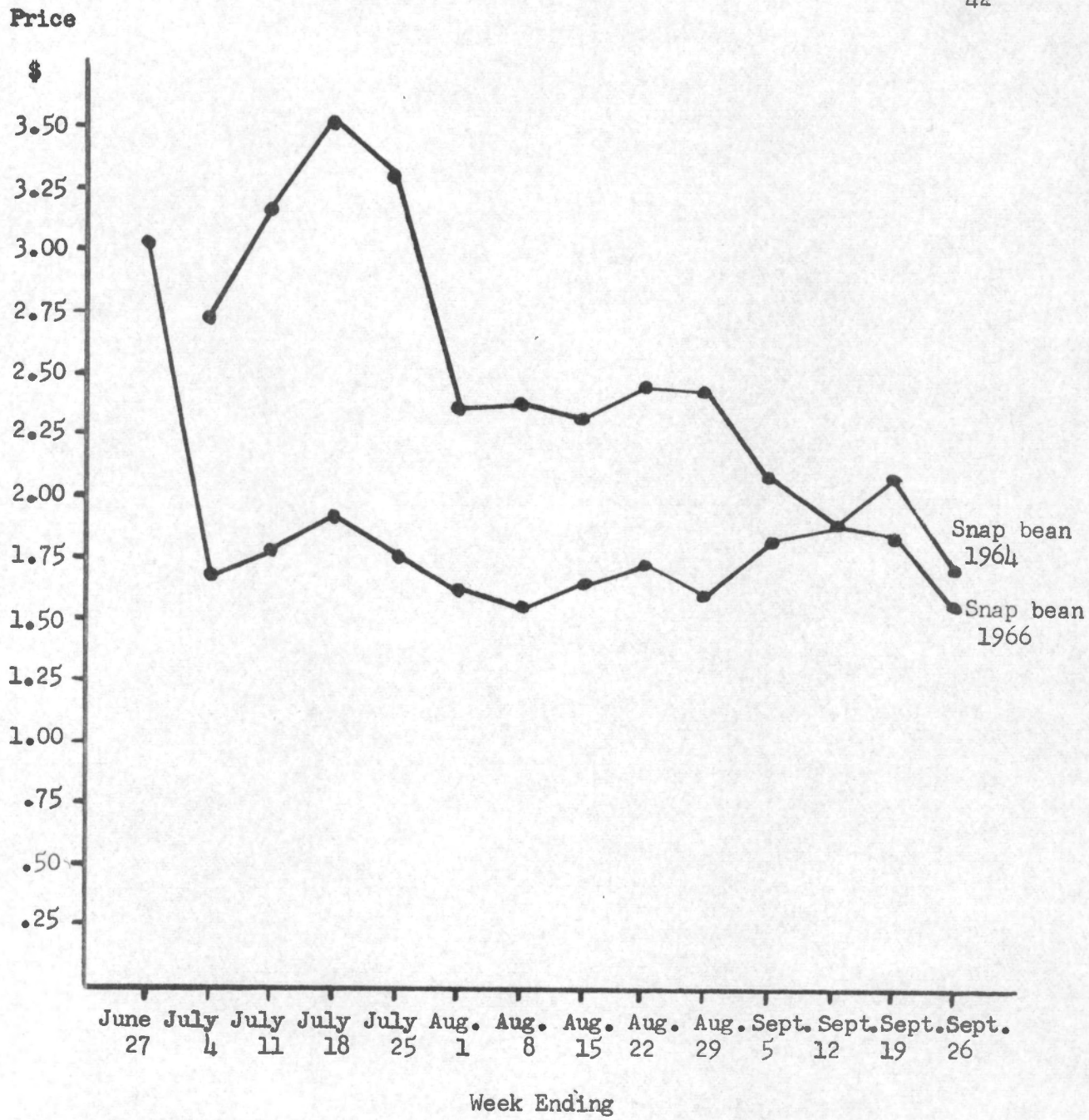


Figure 7. Average price of Snap Beans by weeks at the Tri-State Growers' Market, Mountain City, Tennessee, 1964-1966 Seasons.

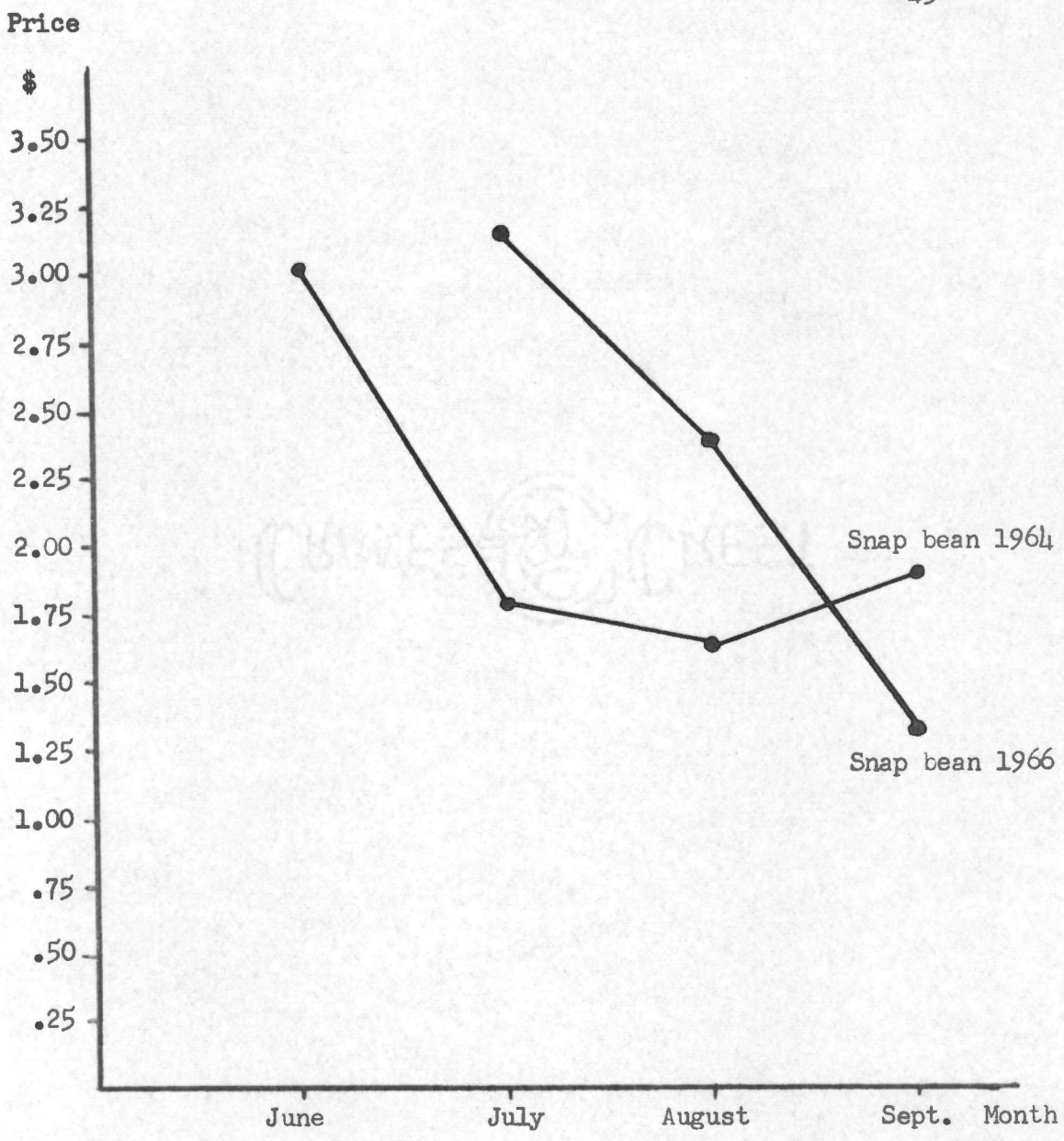


Figure 8. Average monthly price of snap beans at the Tri-State Growers' Market, Mountain City, Tennessee, 1964-1966.

CHAPTER V

SUMMARY

Snap beans may be produced in most counties of Tennessee, but most of the commercial production is located in four areas of the state. These areas are: Upper East Tennessee which includes Carter, Cocke, and Johnson Counties (Carter and Johnson Counties are included in this study); the Cumberland Plateau area, including Cumberland and Fentress Counties; and the West Tennessee area, including Crockett, Dyer, Gibson, Haywood, Lauderdale, and Madison Counties.

Vegetables production has been a supplement to farm income for many years on a number of small farms where the income is limited. The average farm income for 1964 for Carter and Johnson Counties was $1,366.00 and $2,212.00, respectively. The 1964 income for 46 farms in Carter and 258 farms in Johnson County that reported vegetables for sale averaged $1,029.39 and $1,260.62, respectively, per farm.

The total number of farms in Carter County in 1959 was 1,826 and 1,323 in 1964. For the same years the number of farms in Johnson County was 1,680 and 1,561, respectively.

A study conducted by Madden emphasized the importance of size efficiency relationships between the size of acreage groups to determine whether economies of size exist.

The specific objectives of the study were:

1. To determine the labor and material requirements per acre for producing snap beans in the small, medium, and large acreage groups.
2. To find the variable, fixed and total costs and returns per farm and per acre for producing and marketing snap beans in the small, medium, and large acreage groups.
3. To determine whether the cost of material inputs and costs of production and marketing were significantly different between small, medium, and large acreage groups of snap bean producers.
4. To present information on the organization of the marketing area and the marketing practices of snap bean growers.
5. To analyze fluctuation in snap bean prices by days, weeks, and months for the 1964 and 1966 marketing seasons.

A disproportionate stratified random sample was drawn from a list by communities where snap beans were produced in Carter and Johnson Counties. The sample consisted of 92 growers in the small acreage group and all growers in the medium and large acreage groups, consisting of 23 and 14 each in the order named. The acreages of snap beans grown by the small, medium, and large acreage groups were 175.7, 227.5, and 894.0, respectively.

Tests of significance were done by analysis of variance to determine whether significant differences existed between the three acreage

groups in respect to materials used, cost of production and marketing. A program for unequal size sample was used for the analyses.

The snap bean acreage was divided into small (.50-4.99 acres); medium (5.00-19.99 acres); and large (20.00 and over acres) groups. The number of growers interviewed was 129 with 92 small, 23 medium, and 14 large acreage groups.

The total man hours required to grow, harvest, and market an acre of snap beans averaged 218.6 for the small acreage group, 217.1 for the medium acreage group, and 202.1 for the large acreage group. The (horse and tractor) power hours for the small, medium, and large acreage groups were 20.6, 12.3, and 7.9, respectively.

All of the snap bean producers used fertilizer. Thirty-two of the small growers used from 400 to 499 pounds per acre, seven of the medium growers used on the average 400 to 499 pounds, also, and seven of the large growers used from 500 to 599 pounds per acre. Eight different analyses were used. The most common analyses were 6-12-12 and 10-10-10.

The use of insecticides per acre ranged from 15-105 pounds for the small group, from 15-85 pounds for the medium group, while the large group's use of dust ranged from 15-85 pounds per acre.

Hampers and burlap sacks were the picking containers generally used for harvesting snap beans. The type varied by the size of the operation. Eighty-three snap bean growers planted Wadex and 41 planted Harvester varieties of snap beans. The variable costs included labor,

power, and machinery used for land preparation and cultivation, and also materials, harvesting, and marketing. The average variable cost per acre was $249.42 for the small group, $218.28 for the medium, and $216.41 for the large acreage group. Fixed costs included the following items: property tax, motor license, insurance, and depreciation on machinery and buildings. The average fixed cost was approximately $40.00 per acre for the small, medium, and large acreage groups.

The net return per farm for the small acreage group was $191.17, $1,025.48 for the medium acreage group, and $7,111.17 for the large acreage group. The net return per acre for the small, medium, and large acreage groups was $100.09, $103.68, and $111.36, respectively.

There were two local markets for snap beans in Johnson County at Mountain City. These were:

1. Tri-State Growers, Incorporated. This is a cooperative where the beans were sold at auction.
2. Johnson County Bean Market. This is a market where beans were sold primarily for processing.

Out of the 184 producers of snap beans in Carter and Johnson Counties for the 1963 season, 149 sold their beans to an auction cooperative, 2 to brokers, 57 to processors, and 2 sold to retailers. The total number of growers selling to the specified outlets was 210 instead of 184 because some growers sold to more than one outlet.

The 1966 average daily price for snap beans was higher than the 1964 price. The weekly average price for 1966 is higher than the 1964

average for snap beans. The highest weekly average price for 1966 was $3.52 and the lowest was $1.55; thus, the price per week for 1966 was higher than 1964 by $0.48.

The monthly average price for 1966 was $3.13 in July, $2.40 in August, and $1.31 per bushel in September. The prices in 1964 were $1.78, $1.62, and $1.86 for the same months, respectively. The 1966 monthly prices were higher by $1.35 for July, and by $0.38 for August. The tests of significance were made by analysis of variance to determine whether significant difference existed between the three acreage groups with respect to materials used, costs of production, and costs of marketing.

In regard to materials, the F test showed there was a significant difference at the 0.05 level between the pounds of seed used by the small, medium, and large acreage groups. The F test showed there was not a significant difference at the 0.05 level between the pounds of fertilizer and insecticides used by the small, medium, and large acreage groups.

With respect to costs of production and marketing, the F test showed there was a significant difference at the 0.05 level between the variable costs per acre for labor, power and machinery, and marketing. There was not a significant difference at the 0.05 level between the variable cost per acre for materials and harvesting for the small, medium, and large acreage groups. The F test showed there was not a significant difference at the 0.05 level between the fixed

cost per acre for general expenses of the small, medium, and large acreage groups.

The small acreage group was highest in average total cost per acre, exceeding the medium and large acreage groups by $32.96 and $33.52, respectively. Most of the total cost difference between groups were in variable cost.

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APPENDIXES

APPENDIX A

TABLE XVII

SNAP BEAN AVERAGE PRICE FOR DAYS, WEEKS, AND MONTHS, 1964 AND 1966 SEASONS

Average Daily Price			Average Weekly Price			Average Monthly Price		
Day	1964	1966	Week Ending	1964	1966	Month	1964	1966
Monday	$1.93	$2.59	6-27	$3.04	---	June	$3.03	---
Tuesday	1.82	2.62	7-4	1.67	$2.74	July	1.78	$3.13
Wednesday	1.75	2.58	7-11	1.78	3.17	August	1.62	2.40
Thursday	1.78	2.59	7-18	1.92	3.52	September	1.86	1.31
Friday	1.85	2.34	7-25	1.75	3.31			
Saturday	1.77	2.44	8-1	1.61	2.35			
			8-8	1.55	2.38			
			8-15	1.64	2.32			
			8-22	1.72	2.45			
			8-29	1.58	2.44			
			9-5	1.82	2.06			
			9-12	1.93	1.90			
			9-19	2.08	1.84			
			9-26	1.71	1.55			

TABLE XVIII

ANALYSIS OF VARIANCE ON POUNDS OF SEED USED PER ACRE BY THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1967

Source of Variation	Degrees of Freedom	Mean Square	F
Between Groups	2	497.9720	4.059
Within Groups	126	122.6837	
Total	128		

TABLE XIX

ANALYSIS OF VARIANCE ON POUNDS OF FERTILIZER USED PER ACRE BY THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Source of Variation	Degrees of Freedom	Mean Square	F
Between Groups	2	34091.3120	1.476
Within Groups	126	23093.7084	
Total	128		

TABLE XX

ANALYSIS OF VARIANCE ON POUNDS OF INSECTICIDES USED PER ACRE BY THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Source of Variation	Degrees of Freedom	Mean Square	F
Between Groups	2	4223.4496	3.035
Within Groups	121	1391.4372	N. S.
Total	123		

TABLE XXI

ANALYSIS OF VARIANCE ON THE AVERAGE COST PER ACRE FOR LABOR, POWER, AND MACHINERY IN THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Source of Variation	Degrees of Freedom	Mean Square	F
Between Groups	2	2149.9828	12.649
Within Groups	125	249.0361	.010
Total	127		

TABLE XXII

ANALYSIS OF VARIANCE ON THE AVERAGE COST PER ACRE FOR MATERIALS BY THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Source of Variation	Degrees of Freedom	Mean Square	F
Between Groups	2	43.6451	0.228
Within Groups	126	191.0781	N. S.
Total	128		

TABLE XXIII

ANALYSIS OF VARIANCE ON THE AVERAGE COST PER ACRE FOR HARVESTING BY THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Source of Variation	Degrees of Freedom	Mean Square	F
Between Groups	2	105.7656	0.035
Within Groups	126	2999.4934	N. S.
Total	128		

TABLE XXIV

ANALYSIS OF VARIANCE ON THE AVERAGE COST PER ACRE FOR MARKETING BY THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS, CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Source of Variation	Degrees of Freedom	Mean Square	F
Between Groups	2	3312.5349	4.751
Within Groups	126	697.1808	.050
Total	128		

TABLE XXV

ANALYSIS OF VARIANCE ON THE AVERAGE COSTS PER ACRE FOR GENERAL EXPENSES BY THE SMALL, MEDIUM, AND LARGE ACREAGE GROUPS IN CARTER AND JOHNSON COUNTIES, TENNESSEE, 1963

Source of Variation	Degrees of Freedom	Mean Square	F
Between Groups	2	0.4946	0.157
Within Groups	126	3.1432	N. S.
Total	128		

APPENDIX B

DEFINITION OF TERMS USED IN THE PRODUCTION OF TRUCK CROPS

Pre-harvest--All work involved in preparing land and growing of a crop up to harvest time.

Pre-planting operations--All work involved in preparing the soil and seedbed for seeding of setting plants.

Cover crops--A crop grown to be plowed under while still green for its value as manure and humus. Rye, oats, and crimson clover are common cover crops. Also used to discourage weeds and to retard erosion of the soil during periods when the soil would ordinarily not be used.

Plowing--Turning the soil with a moldboard or disc plow, burying crop residues or cover crops. This is frequently the first pre-harvest operation.

Discing--Harrowing to break up the earth by the slicing and moving action of concave discs set at an angle with the direction of travel.

Single disc or one way--A harrow for discing, comprised of steel discs mounted on two shafts roughly end to end with discs on one shaft set in the opposite direction to those on the other shaft.

Offset disc--A disc harrow which has two shafts, one attached behind the other with chains. Length of the chain determines the angle of the shafts and the cutting section of the discs.

Tandem disc--A double set of single discs connected in tandem, with the angle of cut governed by a screw or lever attachment.

Springtooth--A harrow having a series of curved spring teeth which tear up plowed soil, sod, and trash. Frequently used after discing, particularly on new or sod ground or for control of weeds before planting.

Spiketooth--A harrow frequently called a smoothing harrow. A series of spikes mounted in a frame for the leveling and fine preparation of plowed soil to form the seedbed.

Middlebust, bed, furrow, list, row out--The operation used to lay out ridged beds or rows in which to plant the rows of seeds. Common tools used are the middlebuster or lister.

Drag--A machine made of horizontal steel beams or wood timbers, used to drag across a field to smooth minor roughness. Used in irrigated areas as final step in preparing land for planting.

Fertilizing--The application of commercial fertilizer to soil. It may be applied by bulk spreader or truck, by hand, in irrigation water, or with an attachment on a plow seeder, drill, or lister.

Pack, cultipack, roll, drag--Methods primarily for firming the soil after plowing and harrowing but also for smoothing the seedbed just prior to planting. The machines used include cultipacker, roller, or drag.

Plant, seed, sow, drill--The planting operation. The actual placing of seed in the soil. Variously done with machines that plant 1, 2, 4, or more rows at one time. Rarely done by hand except in home gardens.

Weed--To kill unwanted plants by pulling them free from the soil, smothering them with soil, or cutting them off. Common kinds of implements other than hand tools are cultivators equipped with teeth, shovels, sweeps, or discs; also rod and rotary weeders.

Dryland farming--To farm without irrigation.

Hoe, chop--To kill weeds, thin the stand, or loosen soil by use of a hand hoe.

Side-dress--Application of fertilizer alongside the rows of growing plants. Done either by hand or attachment on a cultivator.

Thin or single--To pull out part of the plants in a row or hill to get the desired stand of plants.

Dust or spray--To apply chemical dust or spray for the control of insects, diseases, or weeds. Dusting is applying the chemicals in the dry form and spraying is applying chemicals in the liquid form. Spraying and dusting may be done by hand, tractor, airplane, or by horse-drawn machine.

Pesticide--Any substance used to kill insects, nematodes, diseases, or weeds.

Insecticide--Any substance used to kill insects.

Grade--The sorting of a quantity of a crop into size, color, and/or quality groups.

Pack--To place the crops into containers for marketing.

Sack--To fill a sack with a product. A burlap, jute, or other type bag used for harvesting a product.

Load--Placing the crop on a truck, trailer, or wagon to haul to a packing shed or market.

Haul--The transportation of a crop from the field to shed or market. Some machines are used in harvesting. There may be special terms used in connection with these machines that have not been discussed above. For example, in mechanical harvesting of snap beans, when the beans are harvested, they may be bagged on the macnine or harvested in pallet boxes which are then loaded with a fork-lift mounted on a tractor for hauling to a factory.

SOME OF THE MORE COMMON MATERIALS USED IN THE PRODUCTION OF TRUCK CROPS

Fertilizer--Analysis of fertilizer is commonly expressed in terms of nitrogen, phosphoric acid, and potassium oxide. The farmer will express the analysis as 5-10-10, 20-0-0, 37% nitrogen, etc. The first figure is always nitrogen, the second phosphoric acid (P_2O_5), and the third potash (K_2O).

Seed inoculant--A substance used to treat the seed with nitrogen-fixing bacteria which are beneficial to peas, beans, and other leguminous crops; also to treat seed for prevention against insects and diseases. Arazan, spergon, ferbam, and mercury dust are common inoculants.

Some additional terms are:

Fresh market crops--Crops raised for fresh markets are crops grown to be sold to the consumer in essentially the same form as when grown. Some examples are unshelled lima beans, snap beans, and green peas.

Processed crops--Crops raised to be altered from their natural state before being sold to the consumer. Examples of some processed crops are snap beans and green peas, grown specifically to be canned or frozen.

Contract--In this study, a contract refers to a written agreement between two or more parties for the performance of some function. The farmer may agree in writing to produce snap beans, lima beans or

field peas of a certain variety, to harvest it at a certain stage of maturity, and to sell a certain percentage of the crop to a specific firm at a specific price.

APPENDIX C

PRODUCER'S SCHEDULE

Tennessee Agricultural Experiment Station
Department of Agricultural Economics

County_____ District_____ Date_____

Schedule No._____ Cl. No._____ Interviewer_____

Time interview started_____a.m. _____p.m.

Time interview ended _____a.m. _____p.m.

Operator's name_____

Address_____

SUGGESTED INTRODUCTION: Good (morning)(evening). I'm_____.
I am working for the Agricultural Economics Department, University of Tennessee, College of Agriculture, conducting a study of farmers' practices and some of the costs involved in producing and marketing truck crops in the important areas of Tennessee. (The _____ area is one that has been chosen for this study, and your farm is included in one of the sample areas that has been randomly selected to represent this county.) The information you give will be used to derive summary information on this area and no individual farm operations will be disclosed. So we are interested in your operation only insofar as it affects the summary of information for growers in this county.

1. Owner_____ Tenant_____ If tenant, amount of rent_____

2. Tractor owner: Yes____ No____ If yes, size_____
horsepower

3. Type of vehicle owned _____ (auto, auto trailer, truck) Size of truck _____ (½ ton, 1 ton, etc.)

4. Livestock units marketed, 1962:

Species	Number

SECTION A. Since this study concerns truck crops it is necessary to first talk about the size and nature of your last year's truck crop operation.

OBTAIN INFORMATION FOR THE 1963 CROP YEAR

1. How many acres of (crop) _____ did you harvest for fresh market? _____ Processing _____ last (season) _____ (circle double-cropped acres.)

8. Was this crop produced under contract or agreement with a dealer, processor or cooperative? (CHECK)

	A. FRESH		B. PROCESSED		FRESH		PROCESSED	
Variety	Season	Acres	Season	Acres	Yes	No	Yes	No
Asparagus								
Green lima beans								
Snap beans								
Cabbage								
Cantaloups								
Carrots								
Sweet corn								
Cucumbers and pickles								
Greens								
Lettuce and romaine								
Dry onions								
Okra								

SECTION B. (Continued)

Variety	A. FRESH Season	A. FRESH Acres	B. PROCESSED Season	B. PROCESSED Acres	FRESH Yes	FRESH No	PROCESSED Yes	PROCESSED No
Green peas								
Field peas								
Sweet peppers								
Tomatoes (g.w.)								
Tomatoes (P)								
Squash								
Strawberries								
Watermelons								
Other truck crops								
(Specify)_____								
_____								
_____								

2. Total _____

3. Acres of all truck crops harvested _____ (2A + 2B)

4. Acres of truck crops "double-cropped"_____

5. Acres of all cropland in truck crops harvested _____ (3 - 4)

6. Acres of all "other" crops, idle land, and crop failure_____

7. Acres of cropland operated_____ (5 + 6)

IF YES TO QUESTION 8, PROCEED TO SECTION B.

IF NO TO QUESTION 8, PROCEED TO SECTION C.

9. In addition to being a grower, are you also a:
   A. Processor?
      Yes_____
      No _____
   B. Dealer?
      Yes_____
      No _____

10. Do you operate your own packing shed:
    Yes_____
    No _____

SECTION B. FARMER CONTRACTS. If the operator produced crops under contracts or agreement (Section A, question 8), obtain the following information for the three most important crops contracted.

---

1. Major crops contracted:
   a. Crop _____ _____ _____
   b. Intended market _____ _____ _____
   c. Acres or quantity contracted _____ _____ _____
   d. Unit _____ _____ _____

2. With whom did you make a contract?
   a. Dealer _____
   b. Processor _____
   c. Coop. _____
   d. Other _____
      Specify _____

3. Name _____ Address _____

4. Did contract or agreement state: (CHECK)	Yes	No	Yes	No	Yes	No
a. the price?						
b. how price is figured?						
c. the place of delivery?						
d. the grade to deliver?						
e. the time of delivery?						
f. the variety of crop?						
g. the cultural practice to follow?						

5. Did the contract make any provisions for the kind, quantity, or application of:						
a. seed?						
b. fertilizer?						
c. pesticides?						

6. Did the dealer, processor, or cooperative furnish all or part of the:						
a. machinery or equipment for:						
(1) production?						
(2) harvesting?						
b. labor for:						
(1) production?						
(2) harvesting?						
c. seed?						
d. fertilizer?						
e. pesticide materials?						
f. containers?						

SECTION B. (Continued)

	Yes	No	Yes	No	Yes	No
7. Did the dealer, processor, or cooperative provide a field man to advise you and make inspections?	___	___	___	___	___	___

	Dollars	Dollars	Dollars
8. How much credit did the dealer, processor, or cooperative provide for:			
a. machinery or equipment?	_____	_____	_____
b. seed?	_____	_____	_____
c. fertilizer?	_____	_____	_____
d. pesticides?	_____	_____	_____
e. other?	_____	_____	_____

9. Source of financing vegetable crops other than cooperative, dealer, or processor:

Source	Amount Borrowed	Interest Rate	Length of Loan
Landlord	_____	_____	_____
PCA	_____	_____	_____
C. Bank	_____	_____	_____
Merchant	_____	_____	_____
Other (specify)			
_____	_____	_____	_____
_____	_____	_____	_____

PROCEED TO SECTION C, CROP INSERT

CROP INSERT QUESTIONNAIRE

PRODUCTION AND MARKETING SCHEDULE

SECTION C

Crop Insert Number_____ Date_____

County_____ District_____

Schedule No._____ Cl. No._____Interviewer_____

Time Interview Started_____a.m. _____p.m.

Time Interview Ended _____a.m. _____p.m.

Operator's Name_____

Address_____

Let us now discuss the production of _____

that you have raised for (fresh market)(processing market).

1. You stated that you harvested _____ acres. (From questions 1a or 1b on basic questionnaire.)

2. What was the total amount produced

Quantity				Unit
1963	1962	1961	1960	
____	____	____	____	_____

3. Was any part of this crop irrigated? Yes____ No____

   If yes to question 3, check whether this part of crop is:
   Irrigated: _____ Non-irrigated_____
   and treat each part as a separate crop.

4. Was there any major differences in the practices followed:
   a. such as the production of pole or bunch beans. Yes____ No____
   b. and/or machine harvested. Yes____ No____

   If yes to either a. or b., treat as a separate crop.

5. Rotation:

First Crop	Date of Planting	Date of Harvesting	Previous Crop	Date of Planting	Date of Harvesting

SECTION C1

Let us now discuss all of the operations that were performed on this crop, from the start of land preparation through harvesting and marketing or at the point where you no longer have title to the crop.

Type Soil_____

PRODUCTION PRACTICES AND LABOR INPUTS

Operation (List chronologically) (a)	Dates performed Start (b)	Dates performed End (c)	Acres done (d)	Times over (e)	Kind of power, type and size of equipment: Horse (H) or tractor (T) (f)	Kind of power, type and size of equipment: Type and size of machine (g)	Labor Used: Kind of worker (SEE CODE BELOW) (h)	Labor Used: Avg. no. workers (i)	Labor Used: Avg. hrs. per day per worker (j)	Labor Used: No. days worked (k)	Labor Used: Piece-rates paid: Wage (l)	Labor Used: Piece-rates paid: Unit (m)
1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												
11.												
12.												

H = Home farm family workers (including operator)
M = Migratory workers
MS = Mexicans
L = Local seasonal workers
Y = Year-round hired workers

13. Off-farm employment of family members living at home.

	No.	Ages	Weeks worked	Salary	Off-farm income
Men					
Women					

14. Resident labor force.

	No. families	Men 15+	Women 15+
Operator			
Cropper			

SECTION C2

Operation number (list) (a)	Item (b)	Variety analysis (c)	Acres covered (from C1d) (d)	Quantity used per acre: Quant. (e)	Quantity used per acre: Unit (f)	Cost per unit (g)	OFFICE USE ONLY: Total quantity	OFFICE USE ONLY: Total cost
15.								
16.								
17.								
18.								
19.								
20.								
21.								
22.								
23.								

SECTION C3: Work performed on crop by custom operator or processor.

Operation number (list) (a)	Job done by: Custom operator (b)	Job done by: Processor (c)	Cost: Unit (d)	Cost: Quant. (e)	Cost: Per unit (f)	Cost: Total (g)	Items included in cost: Size of crew no. (h)	Items included in cost: Machinery or equipment provided (i)	Items included in cost: Other (specify) (j)
24.									
25.									
26.									
27.									
28.									
29.									
30.									
31.									
32.									

33. Was there serious damage to your 1962 crop of (snap beans, lima beans, field peas) from:

Yes____ No____ If "yes" specify:

a. Diseases	Per Cent of Crop Damage	Control Method
_____	_____	_____
_____	_____	_____
_____	_____	_____

Yes____ No____ If "yes" specify:

b. Insects	Per Cent of Crop Damage	Control Method
_____	_____	_____
_____	_____	_____
_____	_____	_____

c. Hail: Yes____ No____

d. Other (specify)_____

34. Stage of maturity when harvested:

a. _____ b. _____

c. _____ d. _____

e. _____ f. _____

35. Containers used for harvest of (snap beans, lima beans, field peas):

a. hamper____, cost @____; b. baskets____, cost @____;

c. sacks _____, cost @____; d. other _____ (specify)_____

cost @ _____

36. Do you use a shelter for grading? Yes____ No____

37. Time crop is exposed to sun after harvest_____ hours.

MARKETING SCHEDULE

1.

Distance to market Miles	Average time to and from market Hours	Average time spent at market per trip Hours	Average size of load No. containers

2. Number of times you went to market in 1962_____.
   Average sales per trip_____.

3. Estimated per cent of (snap beans, lima beans, and field peas) sold at the following markets during 1962 (percentage added across should total 100).

						(Write in)
		Processor		Retail		
Auction	Co-op	Canner	Freezer	Chain	Independent	
1	2	3	4	5	6	

	At my farm					
Broker	Canner	Freezer	Retailer	Trucker	Other (specify)	Total
7			8	9	10	100

4. What are the principal complaints you have concerning any of these markets and the remedies you suggest for each complaint?

Complaint	Suggested remedy

5.

Costs other than transportation for the crop

Item or service	Cash Cost	Unit
Grading and packing		
Picking container		
Hauling pickers		
Marketing container		
Auction fee		
Broker fee		

6. What type of pricing information is available at or before time of sale of (snap beans, lima beans, field peas)? None_____ Buyer's published price_____ Buyer's radio broadcast_____ Neighbor_____ County Agent_____ Federal Market news report_____ Other_____ Other_____ Other_____.

7. Do you receive a bonus at the end of the season as an incentive to sell beans and peas to dealer? (Amount) 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____ 9_____ 10_____

8. Does any buyer purchase only best quality? 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____ 9_____ 10_____

9. Does any buyer operate on a two-price system (one price up to desired volume; another price in excess of committments)? 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____ 9_____ 10_____

10. Do buyers in your area pay the same price for snap beans, lima beans, and field peas of similar quality? Yes____ No____

11. When pricing information is available does the pricing information include:

the range of prices at previous sale_____; minimum price stated by buyer_____; an average price_____; average price for each grade _____? In the absence of Federal-State inspection can you tell whether you are paid a price equivalent to the quality of the snap beans, lima beans, and field peas?

12. In the absence of Federal-State inspection on beans and peas, do you know sellers who have sold lower quality for as much as you received for snap beans, lima beans, and field peas sold at the same time? Yes____ No____ Explain_____

_____

13. Do you separate beans and peas of different quality on your truck? Yes____ No____

14. Do you favor Federal-State inspection on beans and peas for both processing and fresh market? Yes____ No____ Why?_____

_____

15. How many buyers do you usually contact before you sell your snap beans, lima beans, and field peas?_____

16. Do you use USDA market news prices in your business? Yes___No___ If yes, how? General information_____ In setting prices (directly or indirectly)?_____

_____

_____