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PREFACE

For several years major food processors have been contracting with South Alabama vegetable growers for the production of several vegetables for processing. Alabama vegetables are presently shipped to points in several surrounding states for freezing. At this time, however, there is no commercial freezing of fresh vegetables in Alabama.

Auburn University personnel involved in the preparation of this report wish to emphasize the lack of any relation to facilities or business organizations now existing. The report was prepared at the specific request of the State Planning and Industrial Development Board and local leaders in the study area. It was made possible by the existence of a current research project in the area of economic development of food processing in Alabama. The report examines the feasibility of establishing a vegetable freezing industry in extreme southwest Alabama. With minor adjustments, however, it is believed that the results of this study would be equally applicable anywhere in the State of Alabama.

The authors express particular appreciation to M. R. Gasscock, Specialist in Fruits and Vegetable Marketing, Alabama Cooperative Extention Service, for data relative to vegetable production patterns and producer attitudes in the area as well as other assistance throughout the course of the study. Appreciation is also expressed to members of the Southern Regional Marketing Committee, SM-30, for making available some of the research results reported in this study. The assistance of other Auburn University and U.S. Department of Agriculture personnel, representatives of the food processing industry, and L. B. Dixon of the State Planning and Industrial Development Board is likewise appreciated.

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PLANNING DEVELOPMENT OF VEGETABLE FREEZING IN SOUTHWEST ALABAMA*

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Planning for market development is by definition a study of possible change in the flow of resources to meet new or existing consumer demands through an economically efficient marketing channel. Completely new investment is representative of a change in the flow of resources and it is thought that the pay-off to induce new investment must in general be higher than average business returns because of additional risks in an unproven venture. A principal objective of this study was to show how the annual rate of return on risk capital is related to the several variables that affect feasibility of freezing southern peas, greens, speckled butterbeans, and snap beans in the Baldwin County area. General trends in resource use, marketing, and consumer demand now indicate a demand for this and other feasibility studies.

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General Trends In Resource Use

Development of resources in rural areas of Alabama is characterized in the sixties, as in the previous decade, by a decline in number of farms and an increase in size of farms. There were twenty per cent fewer farms in the Southeast in 1964 than in 1959, but commercial farms with more than 5,000 dollars gross sales increased in number. Farms in the Southeast with more than 20,000 dollars gross sales almost doubled in number. In Baldwin County, farms with more than 20,000 dollars gross sales increased from 159 to 258 or about 61 per cent. Twenty thousand dollars in sales seemed to be a significant volume as farms with less than this amount of sales decreased in number. Number of acres and dollars of sales are not perfectly correlated, but total farms in Baldwin County with less than 260 acres have also decreased in number while the number of farms with larger acreages has grown. Thus, farmers in Baldwin County with at least 20,000 dollars of gross sales and over 260 acres of land appear to have more possibilities of surviving under present conditions. There were 299 farms in Baldwin county with more than 260 acres at the time of the last census. There were 1,000 commercial farms of all sizes in the county in 1964 and about 1,000 part-time and part-retirement farms which were non-commercial. Total cropland harvested on all farms was 135,015 acres.

Cropland harvested in the county increased by 14,000 acres above the 1959 total and this contributed in part to an almost doubling in value of crops sold in 1964 as compared to 1959. Value increased from 6,991,000 dollars to 12,730,000. Value of vegetables sold increased in about the same proportion from 357,000 dollars to 705,000 dollars. All segments of the livestock industry of the county were down slightly with the exception

of dairy products. General changes in Baldwin county were not dissimilar to general changes occurring in the rest of the state, but were greater in magnitude (13).

Increased acreages of potatoes, soybeans, and wheat contributed most to increased field crops sales in the county. Acreage of potatoes increased from 9,000 to 11,286 acres and production increased from 1,049,000 to 1,541,000 hundredweight. Soybean acreage was increased from 73,954 acres to 89,839 acres and wheat acreage was up from 7,381 acres to 22,928. Rates of adjustment in cropland use are, perhaps, significant for planning vegetable production in the county as a shift in land use of less than the shift of 14,000 acres that has occurred would provide more than an adequate base for a food processing plant as this base was developed in a latter part of the report.

Growers in Baldwin County have shown an ability to shift land into vegetable production. Green beans acreage has increased from 22 acres in 1959, to 825 acres in 1964, and to 4,500 acres in 1967. Southern peas have also been planted in larger acreages. Production of southern peas was 2,000 acres in 1967 compared to only 83 acres in 1964. Acreage planted per grower has also been significant as both southern pea acreage and green bean acreages have averaged over 60 acres per grower, Appendix Table .

Gross returns to 70 growers of green beans were approximately 360,000 dollars in 1967 and gross returns to 30 growers of southern peas were approximately 216,000 dollars. Ability of these and other growers of the area to produce profitably for processing will be a key factor in the decision to build a processing plant in the area. Budget material is, therefore, developed later in the report that analyzes the profitability of

selected vegetables.

General Trends in Consumption

Consumption of frozen vegetables has been increasing steadily. Estimated per capita consumption of all frozen vegetables, excluding potatoes, was 29 per cent greater in 1966 than the 1957-59 average. The actual increase was from 6.6 pounds to 8.5 pounds per person. Increased consumption of frozen potatoes has been even more rapid. One and six-tenths pounds per person were consumed in 1957-59 and 6.6 pounds in 1966 representing an increase of 312 per cent over the 1957-59 average (8). Frozen french fries have been the major item in this expansion, and as such have been of little benefit to the South where all of the potato pack has been in small whole potatoes or in mixed vegetables. Estimated pack of small whole potatoes in a recent year was estimated at 3.5 million pounds in three southern plants (17).

Increased demand for frozen food can perhaps be understood better in relation to changes that are taking place for other foods. Several comparisons are given in Table 1 where substantial increases are noted for frozen vegetables, beef, chicken, turkey, cheese, and edible fats. By contrast, fresh and canned vegetable consumption have been rather stable, although significant in amount, about 94 per cent of the vegetable market in 1966.

Part of the change in consumption of processed and fresh vegetables is partly a result of a change in relative prices. The retail food price index indicates that since 1956 the index of fresh fruit and vegetable prices has tended to rise faster than the price index for processed fruit and vegetables. Although there are seasonal highs and lows, processed

Table 1. Comparative Increases in Civilian Per Capita Consumption of Selected Foods, U.S.

Item	Average 1957-1959	1966	1966 as per cent of 57-59
	Pounds	Pounds	Per cent 1957-59=100
Meats			
Beef	82.1	100.3	122
Pork	63.0	57.6	91
Chicken	27.5	35.6	129
Dairy Products			
Cheese	7.9	9.6	122
Fluid milk and cream	335	300	90
Fats and oils			
Butter	8.2	5.9	72
Margarine	8.9	10.6	119
Other edible fats & oils	10.8	14.1	131
Vegetables			
Fresh	104.3	100.6	96
Canned[a]	43.0	44.3	103
Frozen[a]	6.6	8.5	129
Frozen potatoes	1.6	6.6	412
Sweet potatoes (fresh equiv.)	8.3	7.3	88

[a] Excludes potatoes and sweet potatoes.

Source: National Food Situation, ERS, USDA, August, 1966.

items are on the average about ten per cent higher in price now than in 1957-59. Fresh items by contrast have been as much as 41 per cent higher in price than in 1957-59. In 1965, the average increase in the fresh index was 21 per cent for the year. As prices in fresh markets continue to climb relative to processed market prices, consumption of processed vegetables can be expected to gain a larger share of the market (8).

Increased income of consumers also favors consumption of frozen items in relation to fresh. Families in the income class 10,000 - 14,999 dollars buy three times as much frozen vegetables as families having incomes under 3,000 dollars. The same high income families have been shown to buy only one and a-half times as much fresh vegetables. For certain items the income effect is even more striking. A recent household food survey has shown that consumption of frozen green beans, an item discussed later in this report, was 10 times greater in families having over 10,000 dollars income when compared to families having less than 3,000 dollars (3). The potential impact that increased incomes could have on frozen food consumption can be seen by the fact that the 1960 population census showed 308,871 families in Alabama with incomes less than 3,000 dollars and only 481,839 families with incomes greater than this amount (15). Similar situations exist in other southern states.

An important fact for the South is that incomes are growing at a faster rate, about 3.6 per cent per year in Alabama, than in the nation as a whole, about 1.7 per cent (6). Increased population is another important factor affecting increased demand for food as consumption of many food items tends to increase by at least the same rate as population growth. The present growth rate in Alabama is about .75 per cent per year which is

slightly less than the national rate of about 1.8 per cent (6).

Growth in amount of frozen food demanded is expected to be significant. If present trends in income and population continue, aggregate consumption of frozen vegetables in the South alone should increase at least 20 per cent within the next 10 years(11). In terms of southern production in 1965 this would represent an increase of at least 40 million pounds. This new demand alone can be shown to support the output of plant sizes considered feasible in this study.

General Trends in Food Marketing

General trends in food marketing over the past decade reflect favorably upon opportunities for development of a food processing industry in vegetable producing areas. A development in food marketing that is of particular significance to Alabama is revealed in the latest census information that shows an important change in the location of the food processing industry. The relative change in location shows the industry shifting away from the North Central and Northeastern States. Value of the shift measured by gain in value added by manufacturers in developing areas of the country has been estimated to be 500 million dollars by Hammond (5). Fruit and vegetables processing is only a small part of all food processing but the determinants of location are probably similar throughout the industry. Those regions with conditions favorable to fruit and vegetable production and processing, specifically the South and the West, have increased industrial development in food processing.

Basic determinants of food industry location are availability of uniform, high quality raw materials, processing costs, transportation costs and market proximity. Costs of transporting raw materials along with their

perishable nature strongly favor location of vegetable processing plants near vegetable producing centers. However, in net import areas, which is the position of Alabama and the South in vegetable processing, both general and very specific local conditions must be favorable before investment in an import industry is made. The economics of location indicate that basic competitive conditions have, in the past, been more favorable in other parts of the country.

Development of an import industry, such as food processing, will have important consequences for the continued development of an area as it is not only a new market for farmers, but it is a new market for all farm suppliers and a new market for the suppliers of the farm supply industry, etc. The resulting new wages, rents, interests and profit from all industries of the area are new demands for all other goods of the area including food processing. This circular flow of wealth if estimated to result in more than one dollar of spending added to the area economy as a result of a new dollar of sales. On the basis of an input-output study by Heady and Carter that has been adapted to Alabama conditions it has been estimated that $1.65 in value of goods and services is generated for every new dollar of vegetable processing sales (7).

New freezing plants have been economically feasible in recent years. The Bureau of Census reported 405 U.S. plants engaged primarily in the freezing of fruits, vegetables, and fruit juices in 1963 compared with 302 in 1958, an increase of 34 per cent in plant numbers (2). Seventy-eight per cent of the freezing plants surveyed in a 1965 U.S. Department of Agriculture study experienced an increased output over this period 1954-1964. Nearly all plants experiencing a decrease were small while all large

plants reported increases, Table 2. The 1965 survey also indicated a pattern of freezing plant size variation among regions. The Southeast and Pacific regions had predominantly large plants; the Northeast, small plants; and the Midwest, medium-size plants.

Freezing plants are also increasing the number of products they process. The above survey indicated that 45 per cent of freezing plants operating continuously since 1946 or established after that date had expanded product lines while only 18 per cent reported a reduction. Three-fourths of the plants in the Northeast packed three or less products and two-thirds of the firms in the rest of the country packed four or more products.

A special study of 23 established fruit and vegetable freezing plants was made by the National Commission on Food Marketing in 1965 for the purpose of measuring costs and profits in this industry. Average returns to stockholders' equity and on total assets employed for 1963 and 1964 are shown in Table 3.

Despite the relatively sound position of the average firm on the basis of returns to stockholder equity, the amount of standard deviation indicated that some firms experienced losses in both years. Returns to total assets employed in freezing operations were considerably below those to stockholders' equity.

Competition in Producing Frozen Vegetables

Per capita consumption of individual vegetables is not generally available for estimation of consumer demand. Data on amounts of individual vegetables processed do exist, however, and amount demanded by consumers is known indirectly since inventories are not appreciably different from

Table 2. Changes in Volume of Products Processed During Period 1954-64, by Size of Plant, 55 Freezing Plants, 1964

Direction of change in output	Small a/		Medium b/		Large c/		Total	
	Number of plants	Per-cent	Number of plants	Per-cent	Number of plants	Per-cent	Number of plants	Per-cent
Volume up	10	53	16	89	17-	94	43	78
Volume down	8	42	2	11	---		10	18
Volume same	1	5	---				1	2
Not ascertained	---				1	6	1	2
Total	19	100	18	100	18	100	55	100

a/Plants with annual output of less than 8,500,000 pounds.
b/Plants with annual output of 8,500,000 to 25,000,000 pounds.
c/Plants with annual output of more than 25,000,000 pounds.

Source: U.S. Department of Agriculture, ERS freezer survey, 1965.

Table 3. Measure of Returns for Firms Specializing in the Production of Frozen Fruits and Vegetables, 1963 and 1964

Return (after taxes)	Fruit and vegetable freezing firms	
	1963	1964
	Per cent	Per cent
To stockholders' equity:		
Weighted average	6.6	11.1
Simple average	5.5	10.7
Standard deviation	8.3	11.5
On total assets employed:		
Weighted average	3.2	4.9
Simple average	3.2	4.6
Standard deviation	2.7	2.5

Source: National Commission on Food Marketing study, 1965.

year to year. The relative demand for frozen items is given in Table 4.

Processing production is concentrated to some extent by commodity. Production in the South, i.e., Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Tennessee, Texas, and Virginia, has been estimated to be at least 220 million pounds in a recent unpublished survey (16).[1/] Thus, 543 million pounds of the 763 million pounds of vegetables cited for the South and East in Table 4, would have been produced in the East. Furthermore, of the total 543 million pounds produced in the East, 358 million pounds are potato products produced exclusively in the East. When potato products are excluded, East with about 188 million pounds, South with 220 million pounds and midwest with about 219 million pounds would have had similar shares of the remaining frozen vegetable market. Output of freezing plants in the South was estimated by Williams to have been 100 million pounds in 1959, slightly less than half of the 1965 estimate (1). The outstanding sectional leader in 1965 was the West with 1,176 million pounds, excluding potato products, or about five times the output of each of the other regions. Frozen vegetables produced in the West, however, are not in direct competition with production in the South except in the case of green beans, butterbeans, and spinach. Processors in the South were estimated to have packed not more than 30 million pounds of green beans or about one third as much as in the West. Practically all specl led butterbeans were processed in the South. The West in 1965 produced twice as much butterbeans products as the South.

1/ More recent pack statistics are available, but 1965 data were used to allow comparison with a survey taken in the South in 1965.

Table 4. The 1965 Pack of Frozen Vegetables Excluding Principal Southern Vegetables a/

Vegetable	East and South	Midwest	West	Total
	(Pounds, 000 omitted)			
Asparagus	8,881	(b)	21,985	30,866
Beans, lima, baby	25,626	4,072	51,098	81,425
Beans, lima, Fordhook	9,175	(b)	54,927	64,102
Broccoli	12,943	(c)	109,368	122,310
Brussels sprouts	4,954	....	32,385	37,339
Carrots	16,341	(b)	93,198	109,538
Cauliflower	3,875	(b)	42,336	46,211
Corn, cut	27,212	58,404	136,569	222,185
Corn-on-cob	6,701	7,655	25,981	40,337
Kale	.....	....	....	4,337
Mixed vegetables	17,780	11,745	27,561	57,086
Onions	6,082	(b)	9,712	15,794
Okra	30,365	....	....	30,365
Peas	51,886	42,794	348,608	443,289
Peas and carrots	6,224	(b)	15,442	21,666
Potato products	357,709	(b)	860,820	1,218,529
Pumpkin and squash	6,800	2,052	8,538	17,390
Rhubarb	1,882	(b)	3,919	5,801
Spinach	37,819	(b)	84,445	122,264
Squash, summer	10,987	....	(b)	10,987
Succotash	2,294	1,636	2,742	6,672
Miscellaneous vegetables	8,584	4,979	11,924	25,488
Total d/	762,744	218,896	2,036,891	3,018,530

a/ East and South: Ala., Ark., Conn., Del., Fla., Ga., Ky., La., Me., Md., Mass., Miss., Mo., N.C., N.J., N.Y., Okla., Pa., Tenn., Texas, and Va. Midwest: Ill., Ind., Mich., Minn., Neb., N.D., Ohio, Wis. West: Calif., Col., Idaho, Mont., Ore., Utah, Wash., Wyoming.

b/ Included in East and South.

c/ Included in West.

d/ Not necessarily column totals as most southern vegetables were omitted, see Table 5, but estimated production within area.

Source: Frozen Food Pack Statistics, 1965 National Association of Frozen Food Packers, Washington, D.C., April, 1966.

Less than five million pounds of spinach were packed in the South, mostly in Florida and Texas. The principal frozen products of the South, southern peas, all southern greens, and okra, were not processed or grown in competition with other areas. In addition to products listed above, processors in the South also freeze small amounts of broccoli, cauliflower, green peas, green peppers, squash, and strawberries.

Trends in output of selected southern vegetables are shown in Table 5. Only corn, carrots, and potatoes in the national market have shown a near doubling in production since 1959 that has been shown for turnip greens and southern peas. Demand for southern peas was such in 1967 that one important Southern processor had sold his total retail pack before December, 1967. Growth rates on all other frozen products in the U.S. have been more similar to that shown for green beans (4).

The market at this time would, therefore, indicate that a new plant in the South should consider packing those products for which the region appears to have an advantage. These would be southern peas, southern greens (turnip greens, collard, mustard and kale), okra, green beans, speckled butterbeans, and sweetpotatoes. Furthermore, demand for these products, with the exception of sweet potatoes has been increasing. Consumption of sweetpotatoes frozen are about the same now as five years ago and for this reason were excluded from the processing cost section that follows. The development of new products from sweetpotatoes, especially at Auburn University, indicates that further study is needed. A frozen puree has been developed at Auburn that is superior in quality to sweetpotato products now on the market.

Okra was also excluded from further analysis though output in the

Table 5. Trends in Processing Output of Selected Southern Vegetables[a/]

Year	Turnip greens	Collards	Mustard	Southern peas	Butter-beans	Green beans
			(Pounds, 000 omitted)			
1950	2,738			1,280		
1951	4,571			2,725		
1952	5,386			4,156		
1953	5,272			6,431		
1954	7,497			5,697		
1955	9,495			10,227		
1956	10,345			6,737		
1957	10,871			11,624		
1958	11,041			13,011		[b/]
1959	13,730			14,821		75,814
1960	17,150	[b/]	[b/]	16,678	[b/]	86,859
1961	15,840	10,840	5,406	18,683	5,593	96,335
1962	18,743	7,589	6,742	18,380	8,061	90,929
1963	14,232	8,848	6,113	15,639	4,453	90,970
1964	20,575	9,002	8,287	23,452	5,367	108,614
1965	20,971	12,301	7,860	26,037	6,404	112,476
1966	20,442	12,277	8,428	29,780	6,863	136,357

[a/]Estimated processing in the South except for green beans, U.S. total.

[b/]Data not compiled before this date.

Source: Frozen Food Pack Statistics, 1966, National Association of Frozen Food Packers, Washington, D.C., April, 1967.

South has increased by 50 per cent in the last five years. Mechanized harvest has not been developed for okra and this was judged to be a primary disadvantage. Many southern processors, however, feel that it is necessary to process okra in order to offer the trade a complete mix of southern vegetables. A following section on processing costs attempts to outline only the feasibility of products that will be of major importance in the success of a competitive plant. Potatoes, unfortunately for Baldwin County, will also be a minor item for freezing until it is demonstrated that a product developed from southern potatoes will be competitive on the farm and in retail stores.

Competitive Position of Plants in the South

A new plant located in the South in 1965 and processing southern vegetables would have competed with 20 other freezing establishments in the South, two of which produced less than a million pounds of frozen vegetables in conjunction with a canning operation. The remaining 18 plants processed only frozen items and ranged in size from one to more than 35 million pounds of southern vegetables per year in 1965. Freezing of vegetables in the South was concentrated in Tennessee. Texas ranked second. Ranked third were Georgia, Arkansas, Florida, and Louisiana where annual output was about equal to Tennessee. Production in these four states and in Virginia was similar with Georgia being the most important of the five. There was no freezing in Alabama, Mississippi, South Carolina, and North Carolina. Furthermore, according to a survey by Pearson there has been excess freezing processing capacity in the freezing industry that would be more than equivalent to the capacity of a new plant of the type proposed in the remainder of this report (10).

Excess capacity is evidence of economic inefficiency, but also, in the face of rising demand, excess capacity is one indication of scarce supplies. The recent rapid increase in production of green beans, southern peas and greens in Baldwin County is, perhaps, an indication of a search for supply areas. Historically, 82 per cent of all southern peas going into freezing have been grown within 100 miles of the plant as have 90 per cent of greens, 100 per cent of speckled butterbeans and 83 per cent of okra. Plant managers have in the past tended to buy green beans and potatoes from more distant areas. Sixty-one per cent of potatoes and 40 per cent of green beans have been purchased at distances greater than sixty miles. Baldwin County is more than 100 miles from plants now offering contracts to Baldwin County farmers indicating that buyers are now willing to travel greater than average distances for their supplies (1). Expanding demand and the fact that freezing plants have tended to be supply oriented, in the above sense, are primary factors that favorably contribute to economic feasibility of a plant in Baldwin County. Consideration of transportation costs and available raw material supply may mean that it is efficient to build at a favorable production site even though there is excess capacity in existing plants. Furthermore, if the plant can be shown to return profits that make it economically competitive within the county and the South Alabama area this return will be most important in the decision to build a plant.

Raw Material Supply

Results of a 1963 survey by the Alabama Cooperative Extension Service gives some indication of farmers' willingness to supply vegetables for processing. According to survey results compiled for this report an estimated

144 of 364 vegetable producers in the Baldwin, Mobile and Escambia Counties reported interest in growing 11,027 acres of vegetables for processing, Table 6. This table also gives acreage preferences according to crops and shows that green beans and turnip greens were preferred. Southern peas and butterbeans were least preferred; and, at the time of the survey, these were difficult crops for mechanical harvesting. Advances in harvesting peas and beans within the last year, 1967, has reportedly increased interest of farmers.

A comparison of grower preference for crops proposed in the processing plant is given in Table 7. Grower interest in green bean and leafy greens acreage was far greater than presently proposed processing needs.1/ Interest in butterbeans was almost as great as requirements, but interest in southern peas measured by acres was only 17 per cent of needs. Total acreage according to interest was, however, less than 200 acres short of the total plant requirements of 6,406 acres, Table 7.

The relationship between expressed interest in production and future response has been studied at length in a recent study by Brown (9). Responses were obtained from 48 farmers concerning a hypothetical opportunity to grow vegetables for processing. Responses were taken at two different times under different conditions by a survey method very similar to the Extension Service survey. Sixty-five per cent of the farmers surveyed by Brown indicated a willingness to grow an average of 47 acres each in the first interview. The second response was taken six months later. At this

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1/ Processing requirements for acreage are developed in the following section on Processing Costs.

Table 6. Growers Interest in Specific Crops and Acreage for Producing Vegetables for Processing in Baldwin, Mobile and Escambia Counties[a]

Crops	Baldwin		Mobile		Escambia		Total	
	Growers	Acres	Growers	Acres	Growers	Acres	Growers	Acres
	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)
Snap beans	60	2,544	22	154	18	98	100	2,796
Collards	32	680	8	40	0	0	40	720
Turnip greens	25	1,315	12	252	0	0	37	1,567
Southern peas	16	250	28	330	4	24	48	604
Other greens	4	120	2	8	0	0	6	128
Butterbeans	7	75	22	246	12	96	41	417
Irish potatoes	20	1,195	2	100	2	40	24	1,335
Other Vegetables	NA		NA		NA		NA	
Total		8,721		1,890		416		11,027

[a]/Estimated total number of growers expressing an interest was 144. Column totals for the counties sum to more than 144 because growers expressed an interest in more than one crop.

Table 7. Crops and Acreage for Producing Vegetables for Processing in Baldwin, Mobile and Escambia Counties According to Interest and Processing Plant Needs

Vegetables	Baldwin Initial Interest	Mobile Initial Interest	Escambia Initial Interest	Area Initial Interest	Need[a]
	(A.)	(A.)	(A.)	(A.)	
Snap beans	2,544	154	98	2,796	1,606
Leafy greens	2,105	300	0	2,415	650
Butterbeans	75	246	96	417	614
Field peas	250	330	24	604	3,536
Totals				6,232	6,406

[a]/See section on processing costs.

interview farmers were provided information on expected yields, methods of harvesting and the like, before they were asked if they would grow a specific vegetable crop. Only 31 per cent of the farmers expressed a willingness to grow vegetables at that time, and they were willing to grow only 32 acres each. When farmers in the second measurement were provided additional analysis of how vegetables would fit into a management plan for their farm, acreage plans were decreased to about 20 acres per farm.

A similar decrease of interest in the Baldwin County area would, thus, clearly indicate that an additional supply area would be needed to serve the plant. Forty per cent of the growers in the survey counties of Baldwin, Mobile, and Escambia indicated an original interest somewhat less than Brown's observation of 65 per cent. Average number of acres planned, however, was very similar. Baldwin area growers initially planned 43 acres per grower compared to 47 acres per grower in Brown's sample. A corresponding decline in interest with additional information such as that furnished by Brown would mean that the Baldwin area would fall short of required acreage. Other areas would normally be expected to supply the plant and an analysis of growers by county begins with Baldwin county in Table 8.

Number of growers by county is shown in Tables 8-9 that also classifies growers according to interest and attitude. Attitude was a subjective measurement made by the interviewer as an attempt to further refine measurement of interest. In general the interviewer thought that the respondents did give serious consideration to questions that were asked as 75 to 90 per cent of the respondents were graded excellent on attitude. Tables 8-9 indicate that Baldwin County was by far the most important in terms of numbers and also shows that farmers having gross sales over 5,000

Table 8. Growers Interest and Attitudes in Baldwin County for Producing Vegetables for Processing

Attitudes	INTEREST IN PRODUCING			
	Large growers[a]		Small growers[b]	
	Yes	No	Yes	No
	(No.)	(No.)	(No.)	(No.)
No information	0	0	0	0
Excellent	42	30	30	80
Good	6	18	0	5
Fair	6	8	0	5
Poor	0	0	0	0
Totals	54	56	30	90

a/A large grower was one with gross sales greater than $5,000 per year.

b/A small grower was one with gross sales less than $5,000 per year.

Table 9. Growers Interest and Attitudes in Mobile and Escambia Counties for Producing Vegetables for Processing

Attitudes	INTEREST IN PRODUCING			
	Mobile		Escambia	
	Yes	No	Yes	No
	(No.)	(No.)	(No.)	(No.)
No information	0	0	0	0
Excellent	40	26	14	18
Good	0	6	4	2
Fair	0	0	2	4
Totals	40	32	20	24

dollars were more interested in producing for processing than those with smaller sales. Farmers in Mobile County were not tabulated by size of sales. Farmers in Escambia County classified large were similar in size and gave responses similar to those in Baldwin.

An additional supply area in Alabama for the processing plant is the Wiregrass area where interest in processing was found in Houston, Geneva, Henry, Coffee, and Dale Counties. There, an estimated 646 of 801 vegetable growers or about 80 per cent expressed an interest in growing an estimated 15,975 acres of vegetables for processing, Table 10. Thus, interest was significantly greater in the Wiregrass area among growers although initial planned acreage was significantly less, about 20 acres per farm which was about half that initially planned in the Baldwin area.

Total southern pea requirements for the plant could easily be met in the Wiregrass area alone according to initial interest. About half of those interested expressed a preference for peas, Table 10, and the amount of acreage planned in the area was more than one and a half times as much as planned processing requirements. Leafy green and butterbean requirements of the plan could also be met in the Wiregrass. Interest in green beans, however, was very slight, only about one-third of the required acreage was planned by farmers. Thus, the Baldwin County and Wiregrass areas were very compatible in the two major crops proposed for the plan with green beans preferred in Baldwin County and southern peas preferred in Houston County.

Attitudes did not score as good in the Wiregrass area as in Baldwin, Mobile and Escambia. Excellent and good attitudes ranged as low as 43 per cent of those surveyed but at as high as 85 per cent among those expressing

Table 10. Growers Interest in Specific Crops and Acreage for Producing Vegetables for Processing in Geneva, Houston, Henry, Coffee, and Dale Counties a/

Crops	Geneva		Houston		Henry		Coffee		Dale		Totals	
	Grs. No.	Acres No.	Grs. No.	Acres No.	Grs. No.	Acres No.	Grs. No.	Acres No.	Grs. No.	Acres No.	Grs. No.	Acres No.
Green beans	7	46	72	378	2	12	10	70			91	406
Collards			2	20							2	20
Turnip greens			8	186	1	3	5	200			14	389
Southern peas	91	1,302	324	3,476	8	133	60	810	10	154	493	5,875
Other greens	6	75	14	350							20	425
Butterbeans	25	135	134	882	3	29	35	390	6	65	203	1,501
Other vegetables	192	2,312	308	2,844	16	195	140	1,470	17	438	673	7,259
Totals	NA	3,870	NA	8,136	NA	372	NA	2,940	NA	657	NA	15,975

a/ An estimated 646 farmers are interested in processing; column totals do not add to 646 because farmers were interested in more than one crop.

interest in processing, Tables 11-13. Attitudes were best in Houston County where 38 per cent of the total interested growers in the Wiregrass were located.

Previous research has indicated that there are discrepancies between interest and action. Initial reactions as given in Tables 6 and 10 may be regarded as, perhaps, the most optimistic estimates of supply response.

A conservative estimate was tabulated by choosing only those farmers less than 45 years of age, whose attitude rated good or excellent, and who had indicated an interest in growing vegetables. The results are given in Table 14 which shows that only 38 per cent, 47 of 124, of those interested in Baldwin, Escambia and Mobile Counties met these select qualifications. Assuming, however, that farmers in the select group in the Baldwin area had plans at least as optimistic as the area average, the Baldwin area would still be able to supply more than planned processing needs for leafy greens and two-thirds of the requirement for green beans, Table 15. Butterbeans and southern peas would be in short supply, Table 15.

Similar restrictive assumptions were made about the Wiregrass area and here only 24 per cent of those interested met the select qualifications, Table 16. This most select segment of Wiregrass growers could, however, supply half of the plan requirements for southern peas and two-thirds of the requirement for butterbeans, Table 17.

The Wiregrass and Baldwin areas under these select qualifications would be just over a thousand acres short of total plant requirements, Table 18.

A still more conservative estimate would be the application of previous research results indicating that the select qualifications group

Table 11. Growers Interest and Attitudes in Geneva County for Producing Vegetables for Processing

Attitudes	INTEREST IN PRODUCING			
	Large growers		Small growers	
	Yes	No	Yes	No
	(No.)	(No.)	(No.)	(No.)
No information	0	0		0
Excellent	0	0		0
Good	70	5	8	0
Fair	60	5	0	2
Poor	15	5		0
Not interested	0	20		0
Totals	145	35	8	2

Table 12. Small Growers Interest and Attitudes in Henry, Dale[a/] and Coffee[a/] Counties for Producing Vegetables for Processing

Attitudes	INTEREST IN PRODUCING					
	Henry		Dale		Coffee	
	Yes	No	Yes	No	Yes	No
	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)
No information	0	0	0	0	0	0
Excellent	0	0	1	0	0	0
Good	6	0	7	1	55	0
Fair	7	0	5	0	35	5
Poor	0	0	3	2	15	10
Not interested	1	1	1	0	10	5
Totals	14	1	17	3	115	20

[a/]No large growers in this county.

Table 13. Growers Interest and Attitudes in Houston County Producing Vegetables for Processing[1/]

Attitudes	INTEREST IN PRODUCING			
	Large growers		Small growers	
	Yes	No	Yes	No
	(No.)	(No.)	(No.)	(No.)
No information	0	0	0	0
Excellent	35	20	26	8
Good	105	40	44	12
Fair	20	10	8	2
Poor	5	0	4	2
Totals	165	70	82	24

Table 14. Estimated Number of Growers of Specified Ages in Baldwin, Mobile, and Escambia Counties who were Interested in Producing for Processing and Whose Attitudes Rated Excellent and Good or Fair and Poor

	Age Under 45 and Attitude Excellent or Good		Age Over 45 and Attitude Fair to Poor		Total	Percent
	(No.)	(Pct.)	(No.)	(Pct.)		
Baldwin						
Large	24	44.4	30	55.6	54	100
Small	10	33.3	20	66.6	30	100
Aggregate	34	40.5	50		84	
Mobile	8	40.0	12	60.0	20	100
Escambia	5	25.0	15	75.0	20	100
Totals	47	37.9	77	62.1	124	100

Table 15. Estimated Crops and Acreage for Producing Vegetables in Baldwin, Mobile, and Escambia Counties Prorated by Percentage of Growers less than 45 Years of Age with Attitudes Excellent or Good Compared with Processing Plant Needs

	Baldwin initial interest	Mobile initial interest	Escambia initial interest	Area plant needs	Initial interest
	(A.)	(A.)	(A.)	(A.)	(A.)
Green beans	1,030	62	24	1,606	1,116
Leafy greens	857	120	0	650	977
Butterbeans	30	98	24	614	152
Southern peas	101	132	6	3,536	238
Totals				6,406	2,483

Table 16. Estimated Number of Growers of Specified Ages in Houston, Coffee, Dale, Henry and Geneva Counties Who Were Interested in Producing for Processing and Whose Attitudes Rated Excellent and Good or Fair and Poor

	Age Under 45 and attitude excellent or good		Age Over 45 and attitude fair or Poor			
	(No.)	(Pct.)	(No.)	(Pct.)	(No.)	(Pct.)
Houston						
Large	55	33.33	110	66.67	165	100.0
Small	26	31.71	56	68.29	82	100.0
Aggregate	81	32.79	166	67.21	247	100.0
Coffee						
Small	30	26.09	85	73.91	115	100.0
Dale						
Small	7	41.18	10	58.82	17	100.0
Henry						
Small	3	21.43	11	78.57	14	100.0
Geneva						
Large	30	20.69	115	79.31	145	100.0
Small	3	37.50	5	62.50	8	100.0
Aggregate	33	21.57	120	78.43	153	100.0

Table 17. Estimated Crops and Acreage for Producing Vegetables in Geneva, Houston, Henry, Coffee and Dale Counties Prorated by Percentages of Growers less than 45 Years of Age with Attitudes Excellent and Good Compared With Processing Plant Needs

Crops	Geneva Interest	Houston Interest	Henry Interest	Coffee Interest	Dale Interest	Area Needs	Area Interest
	(A.)	(A.)	(A.)	(A.)	(A.)	(A.)	(A.)
Green beans	10	124	3	18	0	1,606	156
Leafy greens	16	182	1	52	0	650	251
Southern peas	281	1,140	29	211	63	3,536	1,724
Butterbeans	29	289	6	102	27	614	453

Table 18. Estimated Crops and Acreages for Producing Vegetables in the Wiregrass and Baldwin Areas Prorated by Percentage of Growers less than 45 Years of Age with Attitudes Excellent and Good Compared With Processing Plant Needs

Crops	Baldwin area interest	Wiregrass area interest	Total area Need	Interest
	(A.)	(A.)	(A.)	(A.)
Green beans	1,116	155	1,271	1,606
Leafy greens	977	251	1,228	650
Southern peas	238	1,724	1,962	3,536
Butterbeans	152	453	605	614
Totals	2,483	2,583	5,066	6,406

might be expected to reduce its plans given more information. Brown's study indicated a later reduction of slightly more than half the acres initially planned. Thus, the select group of the Baldwin and Wiregrass areas might plan to supply just less than half of plant requirements after receiving full information. The select group, however, form a minor part of the total interest group. The remaining group, those over 45 or with attitudes fair to poor might also be expected to produce for processing. This remaining non-select group in the Baldwin-Wiregrass area had expressed an interest in approximately 10,000 acres of vegetables proposed for processing. Production on at least one-third of these acres combined with the select group would assure the acreage needed for the processing plant.

North Florida provides still another supply area where interest in processing has been high in recent years (18). A principal assumption, however, of this analysis of interest in processing is that net returns for producing vegetables for processing will be compatible with farmer expectations generating original interest.

Cost of Production for Producing Vegetables for Processing

A primary consideration in farmers' decisions relative to producing vegetables for processing is that the reasonable expectation of net returns from these crops is at least equal to net returns from other crops now being produced.

Farmers now producing vegetables for fresh market may initially react unfavorably to lower expected gross returns per acre for producing these same vegetables for processing. Producing for processing, however, offers several advantages: (1) Vegetables for processing are usually produced under contract, thus the grower is guaranteed a market and a price for his

crop before committing any new resources to growing it. (2) Practically all vegetables grown for processing may be mechanically harvested which significantly reduces labor requirements and allows producers to grow a greater volume of crops and perhaps generating more income from processing than from fresh market production.

The budgets presented in this section were designed to reflect production techniques used by better vegetable producers in the Baldwin County area. Budgets are presented for each of the crops considered in this report and for soybeans, corn, and potatoes for purposes of comparison.

In using the information contained in these budgets, Tables 19-27, it will be necessary to adjust the information to suit individual situations. Since average data were used in their preparation they will not be completely adapted to a specific farm without some modification.

The yield information presented in this section represents yields expected by plant managers of processing plants in Georgia, Tennessee and Mississippi. Most plant scientists consider them to be low. Prices are those that were prevailing in fall, 1967. Cash expenses shown in the budget are for inputs to production recommended for use by Auburn University. Although conservative estimates of yield were used and harvest costs were custom estimates in most cases, the data indicate the potential for vegetables to compete favorably with soybeans, potatoes and corn. Mechanical harvest is feasible for all except okra which is included only because many plant managers in the South feel that some okra may be needed in the product mix.

Competitive return is not enough to guarantee that an enterprise can be successfully included in the farm plan. There are important problems

Table 19. Budget for Green Beans, Based on Good Management Practices and Mechanical Harvest, Alabama

Item	Description	Unit	Quantity	Rate	Amount
Receipts					
Beans	Yield	Ton	2	$90	$180.00
Cash expenses					
Soil Fumigant	Nemagon	Gal.	1	$9.00	9.00
Seed	Recommended variety	Lbs.	60	0.30	18.00
Fertilizer (broadcoast)	4-12-12	Cwt.	8.0	2.04	16.32
	8-8-8	Cwt.	5.0	2.04	10.20
Lime	Custom application (1 ton/4 yr. @ $7.75/ton)				1.94
Insecticide	Sevin (80% wetable)	Lbs.	2.4	0.70	1.75
Tractor operating expense	Gas, oil, grease, repairs	Hr.	6.1	0.65	3.97
Equipment operating expense	Gas, oil, grease, repairs				.94
Herbicide	Eptam	Lbs.	1	3.35	3.35
Total pre-harvest cash expenses					$ 65.53
Harvest & Haul	Custom	Ton	2	22.00	44.00
Net Returns to land, operator labor, and capital					70.47

Table 20. Turnip Greens for Processing Based on Good Management and Mechanical Harvest, Alabama[a]

Item	Description	Unit	Quantity	Rate	Amount
Receipts					
Turnip greens	Yield/acre	Ton	5	$30.00	$150.00
Cash expenses					
Seed	Recommended variety	Lb.	3	.75	2.25
Fertilizer	8-8-8	Cwt.	16	2.04	32.64
Lime	Custom application (1 T./4 yrs. @ $7.75/T.)				1.94
Insecticide	Malathion (1 qt. of 5 lbs./gal. E.C.)				2.00
Herbicide	Dacthal	Lb.	3	1.25	3.75
Tractor operating expense	Gas, oil, grease, repairs	Hrs.	5	.65	3.25
Equipment operating expense	Gas, oil, grease, repairs				.75
Total pre-harvest cash expenses					$ 46.58
Harvest & Haul	Custom	Ton	5	7.00	35.00
Net returns to land, operator labor, and capital					68.42

a/The turnip green budget is representative of southern greens.

Table 21. Budget for Southern (Blackeye and Crowder types) Peas, Based on Good Management Practices and Hand Harvest, Alabama[a]

Item	Description	Unit	Quantity	Rate	Amount
Receipts					
Peas	Yield/acre	In the hull, ton[b]	1½	$100	$150.00
Cash expenses					
Seed	Recommended variety	Lbs.	30	.35	10.50
Fertilizer	4-12-12	Cwt.	7	2.04	14.28
Lime	Custom application (1 ton/4 yr. @ $7.75/ton)				1.94
Tractor	Grease, oil, gas, repairs	Hr.	5.25	.65	3.41
Equipment	Grease, oil, gas, repairs				.79
Insecticide	Toxaphene (20%)	Lbs.	60	.07	4.20
Herbicide	Treflan	Qt.	3/4	8.50	6.38
Total pre-harvest cash expenses					$ 41.50
Harvest, cash expenses	Labor	Hr.	50	.90	45.00
Hauling	1½ truck	Hr.	3	1.53	4.59
Total cash expenses					$ 91.09
Net Returns to land, operator labor, and capital					58.91

a/At least one processor pays $120 a ton for cream type peas delivered to the plant.

b/920 pounds of shelled peas per ton of peas in hull gives a price of $145/ton of shelled when peas in hull sell for $100/ton.

Table 22. Budget for Southern Peas (Pinkeye Purple Hull and Texas Cream 40), Based on Good Management Practices and Mechanical Harvest, Alabama

Item	Description	Unit	Quantity	Rate[a]	Amount
Receipts					
Peas	Yield/acre	Shelled Lb.	1,200	$.06	$ 72.00
Cash expenses					
Seed	Furnished by processor	Lbs.	30(furnished)		
Fertilizer	4-12-12	Cwt.	7	2.04	14.28
Lime	Custom application (1 ton/4 yr. @ $7.75/ton)				1.94
Tractor	Grease, oil, gas, repairs	Hr.	4.75	.65	3.09
Equipment	Grease, oil, gas, repairs				.79
Insecticide	Toxaphene (20%)	Lbs.	60(furnished)		
Herbicide	Treflan	Qt.	3/4	8.50	6.38
Total pre-harvest cash expenses					$ 26.48
Harvest, cash expenses (harvested and hauled) by processor					
Net returns to land, operator labor, and capital					45.52

a/Rate paid by processor when harvesting and hauling is done with processor's equipment.

Table 23. Budget for Speckled Butterbeans Based on Good Management Practices and Mechanical Harvest, Alabama

Item	Description	Unit	Quantity	Rate	Amount
Receipts					
Beans	Yield/acre	Shelled Lb.	2,200	$.065[a]	$143.00
Cash expenses					
Seed	Jackson's Wonder or other recommended variety	Lb.	50	.35	17.50
Lime	Custom application (1 ton/4 yr. @ $7.75 ton)				1.94
Fertilizer (broadcast)	8-8-8	Cwt.	15	2.04	30.60
Insecticide	Sevin (8%)	Lbs.	2.4	.70	1.68
Tractor operating expenses	Grease, oil, gas, repairs	Hr.	6.7	.65	4.35
Fungicide	Maneb	Lbs.	8	.70	5.60
Equipment operating expenses	Grease, oil, gas, repairs				.95
Herbicide	Treflan	Qt.	.75	8.50	6.38
Total pre-harvest cash expenses					$ 69.00
Harvest, cash expense harvested by processor					
Net returns to land, operator labor and capital					$ 74.00

a/$.065/lb. is equivalent to $130/ton of shelled beans and reflects the rate when harvesting and hauling are done by processor.

Table 24. Budget for Okra, Based on Good Management Practices, Alabama

Item	Description	Unit	Quantity	Rate	Amount
Receipts					
Okra	Yield/acre	Ton	3	$80.00	$240.00
Cash expenses					
Seed	Recommended variety	Lbs.	10	.35	3.50
Fertilizer	4-12-12	Cwt.	10	2.04	20.20
	Amonium nitrate	Cwt.	2	3.65	7.30
Lime	Custom application (1 ton/4 yrs. @ $8.00/ton)				2.00
Tractor	Grease, oil, gas, repairs	Hr.	6	1.00	6.00
Equipment	Grease, oil, gas, repairs				1.00
Herbicide	Treflan	Qt.	3/4	8.50	6.38
Nematocide	Nemagon (30% granule)	Lbs.	30	.30	9.00
Total pre-harvest cash expenses					$ 55.38
Harvest & Haul	Custom[a]	Ton	3	42.00	126.00
Net returns to operator labor, land, and capital					58.62

a/Harvest Labor: Estimated 40 hours of adult labor per ton at $1.00/hour.

Table 25. Budget for Soybeans, Based on Good Management Practices and Mechanical Harvest, Alabama

Item	Description	Unit	Quantity	Rate	Amount
Receipts					
Soybeans		Bu.	28.0	$2.50	$ 70.00
Pre-harvest and harvest					
Cash expenses					
Seed	Recommended variety	Bu.	1.0	4.50	4.50
Fertilizer	0-20-20	Cwt.	2.5	2.35	5.88
Liming[a]	Custom application				1.94
Insecticide	5% Sevin	Cwt.	.2	7.25	1.45
Tractor operating expense	Gas, oil, grease, repairs	Hr.	4.6	.65	2.99
Equipment operating expense	Gas, oil, grease, repairs				.50
Truck	Hauling soybeans	Bu.	28.0	.025	.70
Seasonal labor		Hr.	.7	1.00	.70
Total pre-harvest cash expenses					$ 18.68
Harvest	Custom	Acre	1.0	8.00	8.00
Returns over cash expenses to land, operator labor and capital					$ 43.34

[a]/Since 1 ton of lime is applied every 4 years, one-fourth of the $7.74 cost is charged off each year.

Table 26. Budget for Corn Based on Good Management Practices and Mechanical Harvest, Alabama

Item	Description	Unit	Quantity	Rate	Amount
Receipts					
Corn		Bu.	60.0	$1.20	$ 72.00
Pre-harvest and harvest					
Cash expenses					
Seed	Recommended hybrid	Lb.	8.0	.20	1.60
Fertilizer	4-12-12	Cwt.	3.5	1.90	6.65
	Ammonium nitrate	Cwt.	2.5	3.80	9.50
Liming[a]	Custom application				1.94
Tractor operating expense	Gas, oil, grease, repairs	Hr.	8.1	.65	5.26
Equipment operating expense	Gas, oil, grease, repairs				1.78
Seasonal labor		Hr.	2.9	1.00	2.90
Total pre-harvest cash expenses					$ 29.63
Harvest	Reflected in tractor and equipment operating expense and in labor expense				
Returns over cash expenses to land, operator labor and capital					$ 42.37

[a]/Since 1 ton of lime is required every 4 years, one-fourth of the $7.75 cost is charged off each year.

Table 27. Budget for Irish Potatoes, Based on Good Management Practices, Alabama

Item	Description	Unit	Quantity	Rate	Amount
Receipts					
Potatoes	Yield/acre	Cwt.	145.0	$2.00	$290.00
Cash expenses					
Seed	Sebago, La Chipper	Cwt.	15.0	4.50 b/	67.50
Seed treatment	Captan	Lb.	4#/25 ac.	4.00	.16
Fertilizer	4-12-12	Cwt.	12.0	2.00	24.00
	8-8-8	Cwt.	8.0	2.05	16.40
Lime a/		Ton			2.00
Insecticides	Diazinon (25% EC)	Pt.	2.0	2.50	5.00
	DDT (5% dust)	Lb.	25.0	.04	1.00
Herbicide	EPTC (Eptam)	Gal.	.25	20.00	5.00
Defoliant	Paraquat (42% EC)	Lb.	.25	8.08	2.02
Tractor	Operating	Hr.	7.0	1.49	10.43
Other machinery					8.46
Hired labor (not including harvest)		Hr.	5.0	1.00	5.00
Total pre-harvest cash expenses					$146.97
Harvest & Haul	Custom	Cwt.	145.0	.50	72.50
Returns to land, operator labor, and capital					70.53

a/One ton is applied every 4 years.

b/Average price. Sebago seed cost approximately $4.00 per cwt. and La Chipper seed cost approximately $5.00 per cwt. For February 1968 delivery.

of timeliness of labor use, farm equity, and scheduled planting for needs of the processing plant. Detailed farm planning was not made a part of this study but is a suggestion for further feasibility research. Farm planning done in other areas using similar type budget material as presented here has shown that southern peas, green beans and southern greens for processing are competitive within many cropping systems (9).

Processing Costs and Returns

Selection of product mix and container sizes is an area of important concern for plant management, but from the standpoint of development these are problems that can be best handled after having experience in plant operation. In any specified set of buildings and equipment the optimum product mix will be determined by the selling prices of the products, by container size and variable costs of packing each. The effect of labor efficiency on costs can be shown to have considerable effect on product mix. If market shares and raw material supply were assured then product mix relative to container size of institutional and retail packs would be the principal focus of a feasibility study. Exactly opposite conditions prevail in Alabama. Market shares and raw product supplies are the principle items of concern and assumption of this study is that if feasibility can be shown for any one product mix, future study may also indicate an economical combination. Costs and returns on only the popular 10 oz. package are presented although other sizes can and should be considered for use of plant equipment. Implied in continued development is the ability of farmers and processors to work together towards the best product mix. Both parties should recognize that they are producing for a market whose specifications will continue to change.

Costs of freezing vegetables are also highly dependent on: (1) volume of plant output as determined by rate of output per hour and hours of annual operation and (2) costs of raw material. The assumptions about these important variables are spelled out in the tables that follow.

Volume of plant output presented here, 16 million pounds per year, would be relatively small in comparison with some existing facilities in the South that were known to process as much as 75 million pounds in 1967. The facilities called for, however, in Tables 28-37 and Figures 1-4 provide for expansion of annual output. Storage space as shown in Table 28 will accommodate about nine million pounds of frozen food and is about twice as much as needed for the average monthly inventory of the proposed plant on the assumption that average monthly inventory is 27 per cent of annual output. Additional space may be needed, however, if the green bean and southern pea lines are operated more than 440 hours per year as specified in this plan. A change in the product mix brought about by increasing the hours of operation on beans and peas would also greatly expand annual volume into the range of larger plants now in operation.

Investment costs of building, product preparation and packaging and casing have been itemized in Tables 28-37 as a basis for further consideration of product mix and as a basis of projecting a single point estimate of costs and returns.

Three basic processing lines are presented in Tables 28-35 for green beans, peas, and greens. All costs and raw material requirements presented elsewhere were based on these lines. Requirements for a potato processing line are given in Tables 36-37 for inclusion in further planning for the area, but costs of potato processing and are included in the estimate of

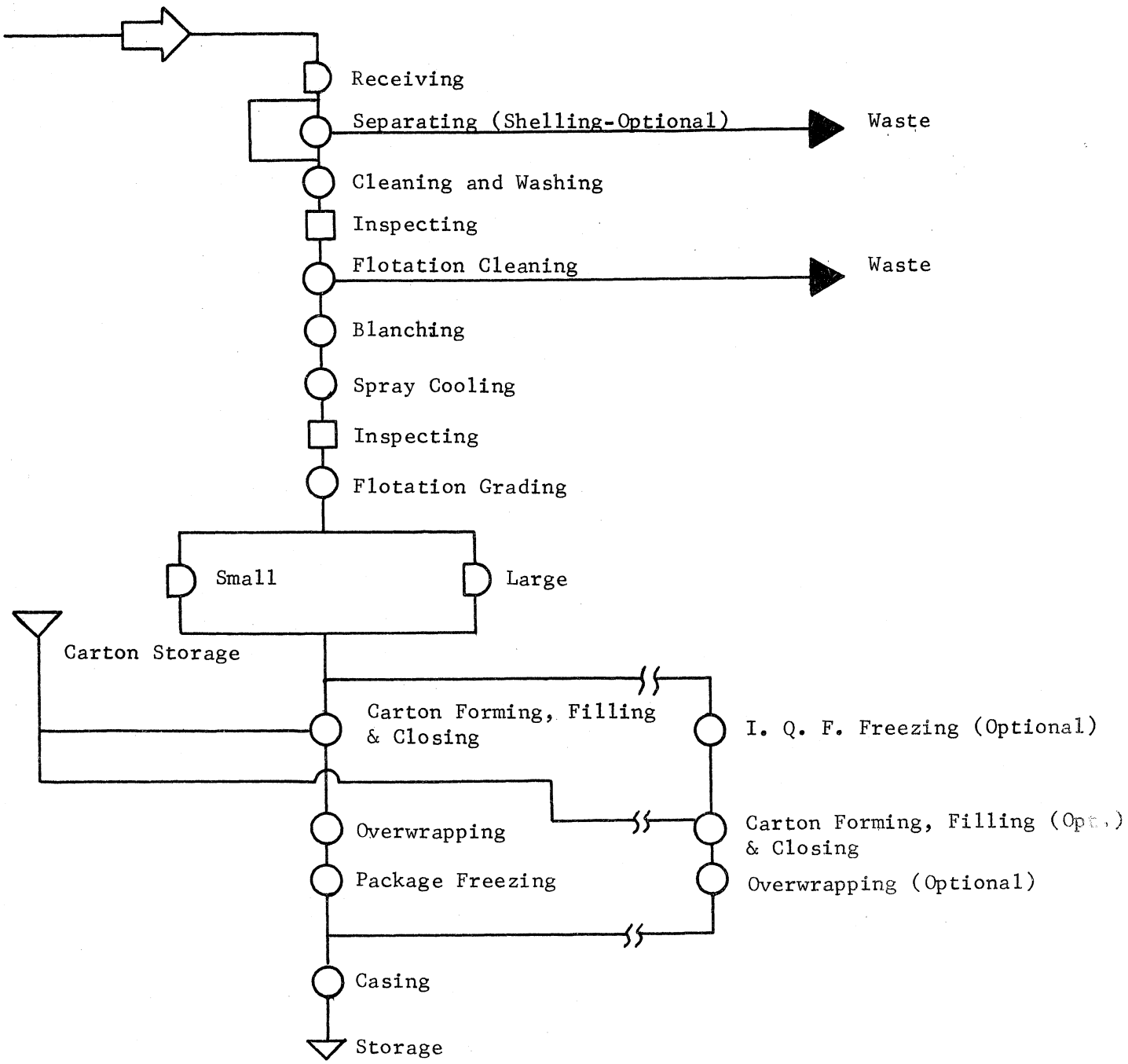

Figure 1. Processing Line for Southern Peas or Speckled Butterbeans (800 Cases per Hour, 24/10 Ounce Packages per Case)

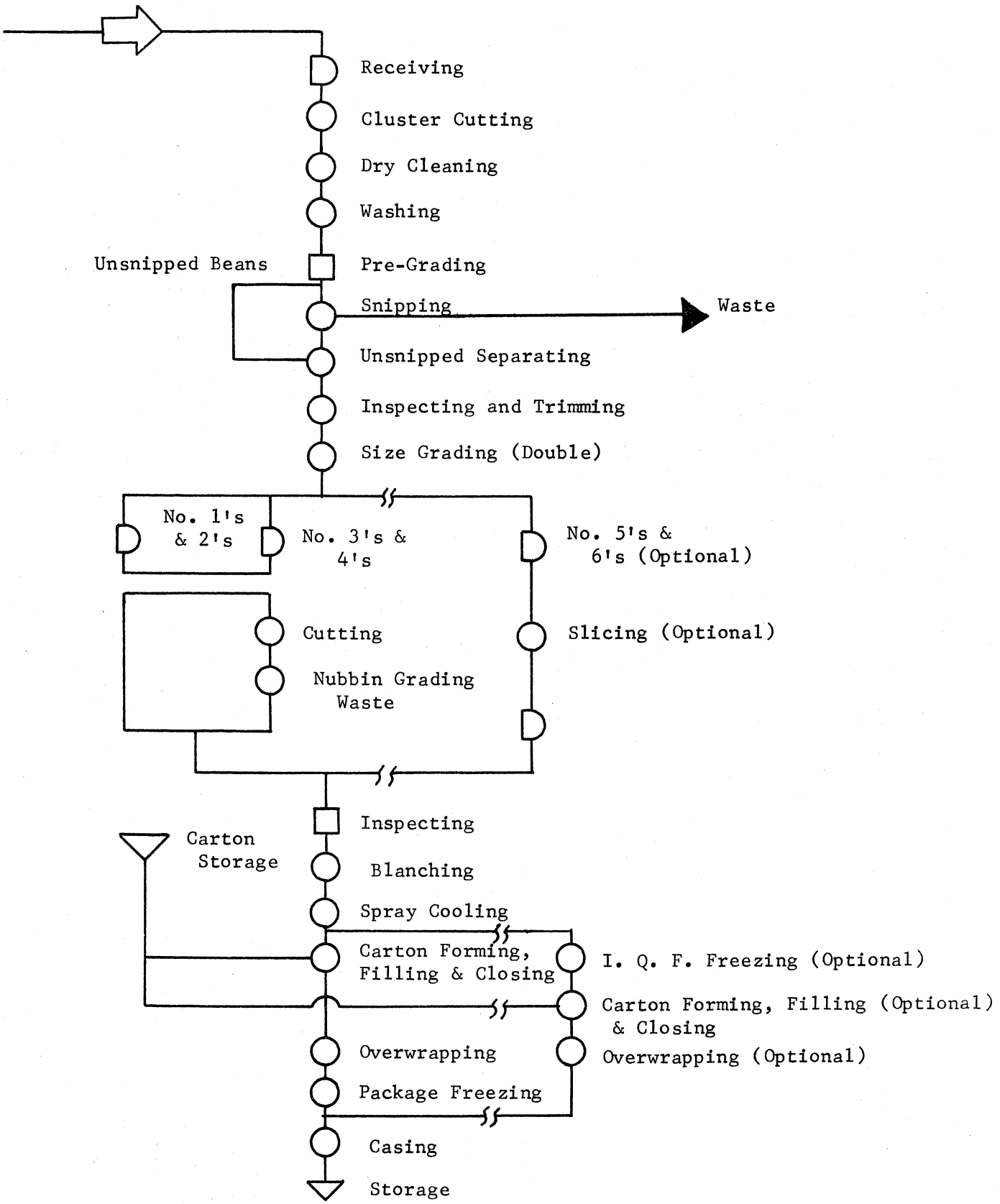

Figure 2. Processing Line for Green Beans (800 Cases per Hour, 24/10 Ounce Packages per Case)

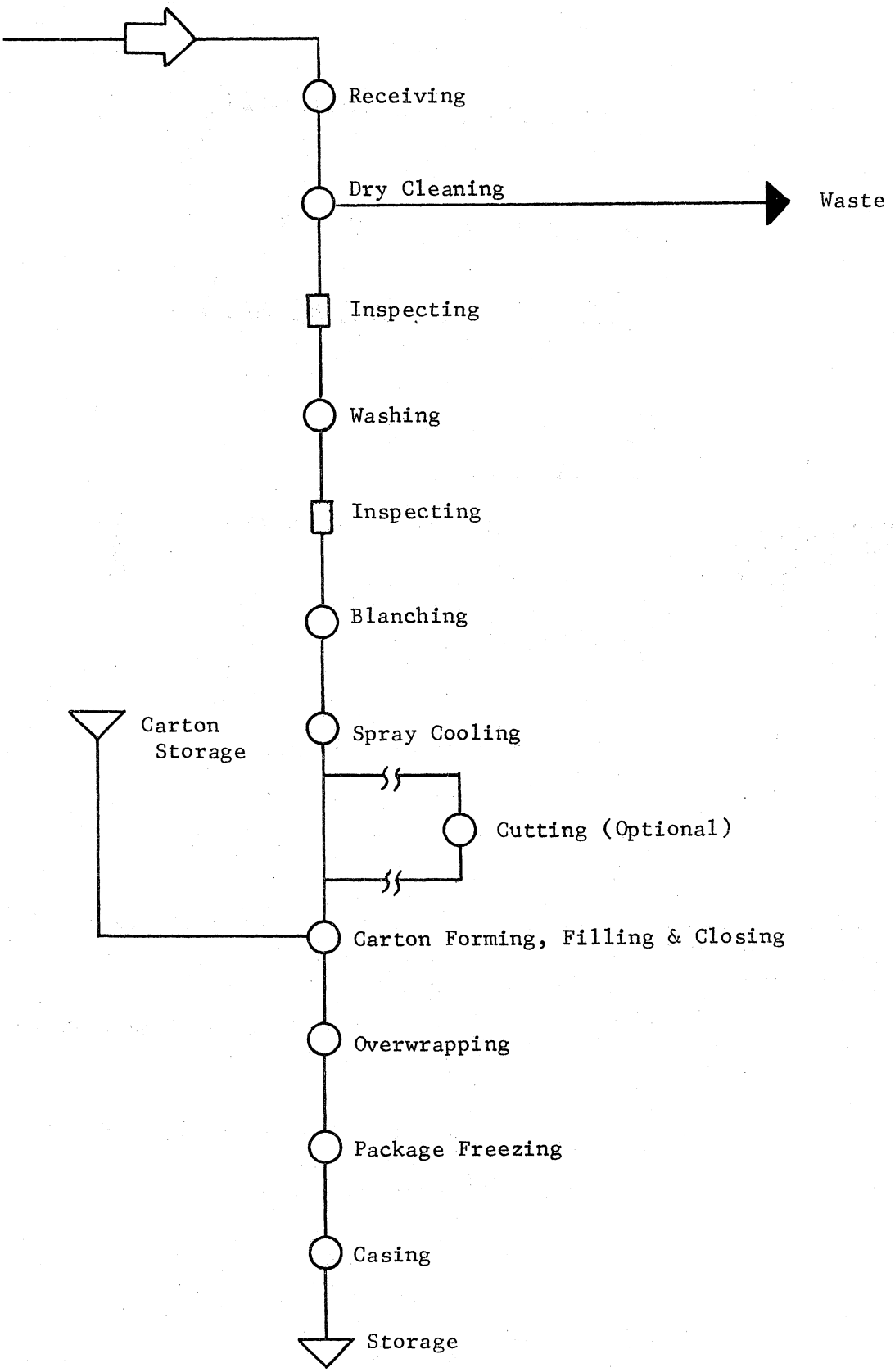

Figure 3. Processing Line for Leafy Greens (400 Cases per Hour, 24/10 Ounce Packages per Case)

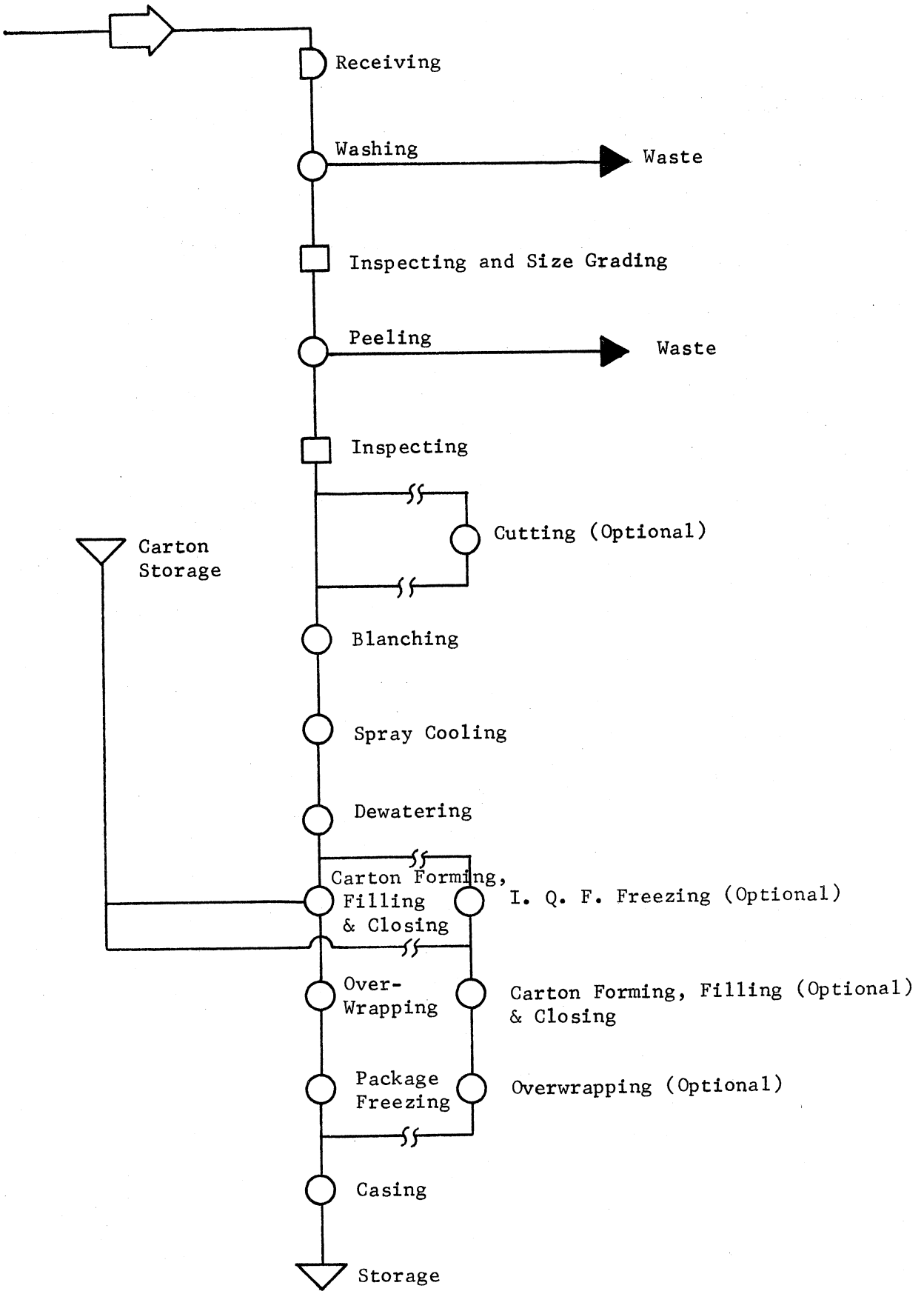

Figure 4. Processing Line for White Potatoes (400 Cases per Hour, 2/10 Ounce Packages per Case)

Table 28. Building Requirements for Freezing Southern Peas, Green Beans, Speckled Butterbeans, and Leafy Greens at Rates of 800 Cases Per Hour for Green Beans and Southern Peas, 400 Cases Per Hour for Leafy Greens and Speckled Butterbeans, Output Container Size is 10 oz. (24 pkgs. per case)

Building Requirements and general equipment needs	Unit	Cost per unit (dollars)	Total cost (dollars)
Receiving			
Concrete slab - 4" thick	2,000 ft.^{2}	$ 0.80/ft.^{2}	$ 1,600
Refrigeration for dock		6.00/ft.^{2}	12,000
Zero degree storage	32,000 ft.^{2} (200' x 160' x 20')	20.00/ft.^{2}	640,000
Processing plant			
Totally enclosed and including utilities	17,800 ft.^{2}	10.00/ft.^{2}	178,000
Office	200 ft.^{2}	15.00/ft.^{2}	3,000
Rest rooms (6)	300 ft.^{2}	20.00/ft.^{2}	6,000
Shop			
Completely equipped	200 ft.^{2}	15.00/ft.^{2}	3,000
Laboratory	150 ft.^{2}	15.00/ft.^{2}	2,250
Equipment storage	2,200 ft.^{2}	10.00/ft.^{2}	22,000
Total for building			$867,850
Truck scale	50 ft.	$14,500.00	$ 14,500
Well, building, pump and tank	400 g.p.m.	30,300.00	30,300
Boiler	90 b.h.p.	13,620.00	13,620
Fork trucks	2	9,000.00	18,000
Pallets	3,200	5.00	16,000
Other			5,000
			$ 97,420
	TOTAL		$965,270

Source: See footnote at the end of Table 37.

Table 29. Utilities Requirements for Freezing Southern Peas, Green Beans, Speckled Butterbeans, and Leafy Greens at Rates of 800 Cases Per Hour for Green Beans and Southern Peas, 400 Cases Per Hour for Leafy Greens and Speckled Butterbeans, Output Container Size is 10 oz. (24 pkgs. per case)

Operation: Machine, equipment, supplies, etc.	Units per case	Annual total Use[a]
Steam (Miscellaneous uses)	11 lbs.	12,672,000 lb.
Water (Miscellaneous uses)[b]	150 gal.	172,800,000 gal.
Electric Energy	1.11 KWH	1,278,720 KWH
Waste (Solids and liquids)[b]	150 gal.	172,800,000 gal.

a/1,152,000 cases

b/Maximum use, minimum estimate is a source of water flowing at 24,000 gal./hr.

Source: See footnote at the end of Table 37.

Table 30. Product Preparation Requirements for Freezing Southern Peas at a Rate of 800 Cases Per Hour and Output Container Size is 10 oz. (24 pkgs. per case)[a]

Product preparation machine, equipment, supplies	Investment cost
	(dollars)
Conveying	
2 Robins gooseneck elevators - 12" x 6' complete with cross conveyor	$ 4,800.00
Cleaning and Washing	
1 Food machinery and chemical rotary Rod type washer (36" x 8')	4,300.00
Cleaning	
1 Commercial 4-purpose cleaner Model 4209-D (III, IV, X)	9,700.00
Conveying	
1 Robins gooseneck elevator (16" x 8')	2,200.00
Conveying and Inspecting	
2 Chisholm-Ryder sanitary picking Tables (30" x 12')	3,460.00
Flotation Cleaning	
2 Flotation cleaners	17,400.00
Blanching	
1 Chisholm-Ryder sanitary rotary blancher - 12' - complete with standard feed elevator	7,800.00
Washing, cooling and inspecting	
1 Chisholm-Ryder sanitary picking table 30" x 16') with spray attachment from above and recovery sump or disposal trough	2,300.00
Conveying	
2 Robins gooseneck elevators 12" x 6' high	4,200.00
Flotation grading	
2 Key quality graders	15,800.00
Holding	
20 Stainless steel holding tanks each 50 ft.^{3}	2,000.00
Conveying	
2 Robins gooseneck elevators (12" x 6') with spray attachment from above	4,500.00
Total	$78,460.00

[a]/Speckled butterbeans or lima beans are processed with this equipment.

Source: See footnote at the end of Table 37.

Table 31. Packaging and Casing Requirements for Freezing Southern Peas at a Rate of 800 Cases Per Hour and Output Container Size is 10 oz. (24 pkgs. per case).

Machine, equipment, supplies, etc. (other products for which used)	Investment cost
Filling and closing	
2 Food machinery and chemical Mara-Pak carton filters	$ 69,600.00
Conveying	
4 Glove No. B-3 white Hycar belts (12" x 50')	3,300.00
Overwrapping	
4 Hayssen series 5000 wrapping machines Motel 43 ML	121,600.00
Conveying	
4 Globe No. B-3 white Hycar belts (12" x 100')	6,200.00
Package Freezing	
4 Frick Spiro-Flex freezers (625-36)	300,000.00
Conveying	
4 Globe No. B-3 white Hycar belts (12" x 50')	3,300.00
Casing	
1 Food machinery and chemical sure way model E-41 full automatic caser	33,400.00
Case Printing	
1 Chisholm-Ryder New Way model CP	2,200.00
Conveying	
1 Food machinery and chemical heavy duty Accordion conveyor	160.00
Total	$539,760.00

Source: See footnote at the end of Table 37.

Table 32. Product Preparation Requirements for Freezing Green Beans at a Rate of 800 Cases Per Hour and Output Container Size is 10 oz. (24 pkgs. per case)

Operator preparation machine, equipment, supplies, etc.	Investment cost
Cluster cutting	
2 Chisholm-Ryder cluster cutters complete with standard feed elevator	$12,300.00
Cleaning	Common with Southern Peas
Washing	
2 Chisholm-Ryder twin screw washers complete with standard food elevator	18,600.00
Conveying	
2 Chisholm-Ryder sanitary picking table (30" x 12')	3,460.00
Conveying	
Flume with 12 discharges complete with pump and piping (70" long)	1,200.00
Snipping	
12 Chisholm-Ryder bean snippers model FHS (large) complete with sanitary picking table	64,200.00
Conveying	
2 30" x 32' Vibrating conveyors	5,600.00
Separating	
8 Chisholm-Ryder unsnipped snap bean separators complete with standard feed elevators	46,400.00
Conveying	
3 Robins belt conveyors (18" x 24' long) 1 Robins gooseneck elevator (16" x 8' long)	7,200.00
Inspecting	
8 Chisholm-Ryder sanitary picking table (24" x 10' long)	9,200.00
318" x 20' Vibrating conveyors	6,600.00
Grading	
12 Chisholm-Ryder adjustable bartype Snap bean graders (double)	61,200.00
Cutting	
8 Urschel model "30-C" green bean cutters	18,400.00

Table 32 Cont'd.

Operator preparation machine, equipment, supplies, etc.	Investment cost
Conveying	
4 18" x 20' Vibrating conveyors	$ 8,800.00
Grading	
2 Chisholm-Ryder model 'H' nubbin graders	5,000.00
Conveying	
1 Robins belt conveyor 18" x 12' long	2,000.00
Holding	
2- Stainless steel holding tanks each 50 ft.	Common with southern peas
Inspecting	
2 Chisholm-Ryder sanitary picking table (24" x 10' long)	Common with southern peas
Conveying	
1 Vibrating conveyor (18" x 20' long)	2,200.00
Blanching	
1 Chisholm-Ryder sanitary rotary blancher- 12' - complete with standard feed elevator	Common with southern peas
Conveying	
1 Vibrating conveyor	2,150.00
Conveying, Washing, Cooking	
2 Robins gooseneck elevators with spray attachment from above (8" x 6')	Common with southern peas
Total	$274,510.00

Source: See footnote at the end of table 37.

Table 33. Packaging and Casing Requirements for Freezing Green Beans at a Rate of 800 Cases Per Hour and Output Container Size is 10 oz. (24 pkgs. per case).

Operation machine, equipment, supplies, etc.	Investment cost
Processing	
Filling and closing	
2 Food machiney and chemical Mara-Pak carton fillers	Common equipment with southern peas
Conveying	
4 Globe No. B-3 white Hycar belts (12" x 50')	Common equipment with southern peas
Overwrapping	
4 Hayssen series 5000 wrapping machines model 43 ML	Common equipment with southern peas
Conveying	
4 Globe No. B-3 white Hycar belts (12" x 100')	Common equipment with southern peas
Package Freezing	
4 Frick Spiro-Flex freezers (625-36)	Common equipment with southern peas
Conveying	
4 Globe No. B-3 white Hycar belts (12"x 50')	Common equipment with southern peas
Casing	
1 Food machinery and chemical sure way model E-41 fully automatic caser	Common equipment with southern peas
Case Printing	
1 Chisholm-Ryder new way model CP	Common equipment with southern peas
Conveying	
1 Food machinery and chemical heavy duty accordion conveyor	Common equipment with southern peas

Source: See footnote at the end of Table 37.

Table 34. Product Preparation Requirements for Freezing Leafy Green Vegetables (Spinach, Turnip Greens, Collards, Mustard and Kale) at a Rate of 400 Cases Per Hour and Output Container Size is 10 oz. (24 pkgs. per case).

Operation machine, equipment, supplies, etc.	Investment cost
Dry cleaning	
1 Robins rotary spinach sand tumbler (Sr. size)	$ 4,582,00 Inv.
Inspecting	
1 Chisholm-Ryder sanitary picking table (30" x 16')	Common with southern peas
Washing	
1 Robins spinach drum washer (Sr. size)	7,248.00 Inv.
1 Robins rotary spinach spray washer (Sr. size)	7,297.00 Inv.
Inspecting	
1 Chisholm-Ryder sanitary picking table (30" x 16')	Common with southern peas
Blanching	
1 Robins spinach blancher complete with feeder (Sr. size)	10,860.00 Inv.
Conveying and Cooling	
1 Robins gooseneck elevator (16" x 6') with spray attachment from above	Common with southern peas
Cutting (optional)	
1 Urschel dicer model J	7,730.00 Inv.
Total	$36,717.00

Source: See footnote at the end of Table 37.

Table 35. Packaging and Casing Requirements for Freezing Leafy Green Vegetables (Spinach, Turnip Greens, Collards, Mustard, and Kale) at a Rate of 400 Cases Per Hour and Output Container Size is 10 oz. (24 pkgs. per case).

Operation Machine, equipment, supplies, etc. (other products for which used)	Investment cost
Processing	
Filling and closing	
1 Food machinery and chemical straight line carton filler model 16-S with appropriate carton forming and closing attachments	$ 34,800
Conveying	
2 Globe No. B-3 white Hycar belts (12" x 50')	Common with southern peas
Overwrapping	
2 Hayssen series 5000 wrapping machines model 43 ML	Common with southern peas
Conveying	
2 Globe No. B-3 white Hycar belts (12" x 100')	Common with southern peas
Package Freezing	
2 Frick spiro flex automatic continuous freezers (625-36)	Common with southern peas
Conveying	
2 Globe No. B-3 white Hycar belts (12" x 100')	Common with southern peas
Casing	
1 Food machinery and chemical sure way fully automatic caser model E-41	Common with southern peas
Case printing	
1 Chisholm-Ryder new way model CP	Common with southern peas
Case conveying	
1 Food machinery and chemical heavy duty accordion conveyor	Common with southern peas
Total	$ 34,800

Source: See footnote at the end of Table 37.

Table 36. Product Preparation Requirements for Freezing White Potatoes at a Rate of 400 Cases Per Hour and Output Container Size is 10 oz. (24 pkgs. per case).

Operation preparation machine, equipment, supplies, etc.	Investment cost
Receiving and washing	
1 Robins soaker washer with extension discharge 60%	$ 2,400.00 Inv.
Inspecting and size grading	
1 Robins sanitary inspection conveyor (20' x 30")	2,400.00 Inv.
Conveying	
1 Robins gooseneck elevator (16" x 6')	Common with southern peas
Peeling	
1 Food machinery and chemical steam chemical peeler (complete with all controls and utility connections)	4,300.00 Inv.
Inspecting and conveying	
1 Robins sanitary inspection conveyor (20' x 30")	2,400.00 Inv.
Cutting (optional)	
1 Urschel model F. slicer	4,539.00 Inv.
Conveying	
1 Robins gooseneck elevator (16" x 6')	Common with southern peas
Blanching	
1 Chisholm-Ryder improved sanitary rotary blancher (8')	Common with southern peas
Conveying and cooling	
1 Robins sanitary inspection conveyor (20' x 30") with spray attachment from above	Common with southern peas
Dewatering	
1 Key water reclaim reel and tank	1,125.00 Inv.
Conveying	
1 Robins gooseneck elevator (16" x 6')	Common with southern peas
Total	$17,164.00

Source: See footnote at the end of Table 37.

Table 37. Packaging and Casing Requirements for Freezing White Potatoes at a Rate of 400 Cases Per Hour and Output Container Size is 10 oz. (24 pkgs. per case)[a]

Operation: machine, equipment, supplies, etc. (other products for which used)	Investment cost
Filling and closing	
1 Food machinery and chemical straight line carton filler model 16-S with appropriate carton forming and closing attachments (VI, VII, IX)	See leafy greens
Conveying	
2 Globe No. B-3 white Hycar belts (12" x 50') (A11)	Common with southern peas
Overwrapping	
2 Hayssen series 5000 wrapping machines model 43 ML (A11)	Common with southern peas
Conveying	
2 Globe No. B-3 white Hycar belts (12" x 100')	Common with southern peas
Package Freezing	
2 Frick spiro flex automatic continuous freezers (625-36) (A11)	Common with southern peas
Conveying	
2 Globe No. B-3 white Hycar belts (12" x 50')	Common with southern peas
Overwrapping	
2 Hayssen series 5000 wrapping machine model 43 ML (A11)	Common with southern peas
Conveying	Common with
2 Globe No. B-3 white Hycar belts (12" x 100')	southern peas
Casing	
1 Food machinery and chemical Sure Way fully automatic caser model E-41 (A11)	Common with southern peas
Case Printing	Common with
1 Chisholm-Ryder New Way Model CP	southern peas
Case Conveying	
1 Food machinery and chemical heavy duty accordion conveyor (A11)	Common with southern peas

a/Source: Unpublished research, ERS, U.S. Department of Agriculture, Washington, D.C., 1967.

net returns.

Equipment specifications as given in the tables represent only a fraction of the information now available for planning (16). See "unpublished research, ERS, U.S. Department of Agriculture, Washington, D.C., 1967." Specifications were not used in this report as a final recommendation for building and equipment but rather as the best basis currently available for estimating equipment costs. Much on-the-job study in the areas of food engineering and processing technologies will be needed in specifying equipment best adapted to the local situation. Due consideration should be given to latest research developments in processing techniques and to all sources of information on equipment and processes.

Building specifications can be described in general terms as being of concrete block construction with insulated metal roofing. Building costs include plumbing, electrical wiring, lighting, heating, and ventilation. Total building investment costs, Table 38, were 965,270 dollars and about two-thirds of this was for zero-degree storage. Total initial investment costs in buildings and equipment were estimated to be just less than two million dollars, Table 38.

The lines were assumed not to operate simultaneously and thus some common use of equipment is possible. The extent of common use is shown in Tables 30-37 and also in Figure 1-4 which show the flow of raw material through each line.

Total costs for one year of operation were approximately three million dollars, Table 39. Gross sales were estimated to be just less than three and one-half million dollars, Table 40, leaving a net revenue before taxes of 399,437 thousand dollars. Some common profit rates were calculated and

Table 38. Investment in Buildings and Equipment for Processing Selected Vegetables in Baldwin County

Item	Investment cost
	(dollars)
Building and general equipment needs	$ 965,270
Product preparation[a]	
Southern pea line	78,460
Green bean line	274,510
Leafy greens	36,717
Total	389,687
Packaging and Casing	
Southern Peas and Green Beans	539,760
Leafy Greens	34,800
Total	564,560
TOTAL	$1,929,517

a/Green bean and leafy green lines use some common equipment from the southern pea line. Butterbeans use the pea line only and require no additional equipment.

Table 39. Annual Fixed and Variable Costs for Proposed Freezing Plant for Processing Selected Vegetables

Cost category	Total
	Dollars
Fixed costs	
Buildings a/	57,885
Equipment a/	132,708
Interest b/	57,885
Taxes and insurance c/	44,175
Total fixed costs	292,623
Variable costs	
Processing:	
Supervisory and other labor d/	293,460
Seasonal labor d/	153,519
Packaging material e/	567,001
Utilities, fuel, and gasoline f/	32,400
Insurance, taxes, and inventory g/	17,280
Maintenance and repairs h/	31,065
Product damage i/	34,560
Interest on operating capital j/	80,640
Miscellaneous k/	34,560
Subtotal variable costs	1,261,765
Raw product	833,175
Transportation l/	324,000
Sales m/	345,600
Total variable costs	2,763,940
TOTAL	3,056,563

a/ Depreciation computed at 6.67 per cent of replacement costs for building and 12.5 per cent for equipment.

b/ Interest on investment computed at 6 per cent of one-half of replacement cost.

c/ Taxes computed at 0.74 per cent of replacement costs for buildings and 0.83 per cent of equipment replacement costs. Insurance computed at 1.5 per cent of building and equipment replacement costs.

d/ Includes fringe labor costs at 9.5 per cent of payroll.

e/ 3.5 cents per pound of output.

(Footnotes continued on next page.)

f/ .2 cents per pound of output.

g/ .5 per cent of Gross value of output with inventory averaging one-third of annual output.

h/ Maintenance costs estimated at 1.5 per cent of replacement cost of buildings and equipment. Repair costs estimated at 4 per cent of equipment replacement cost per 100 hours of annual operation.

i/ Estimated at 1 per cent of annual pack.

j/ Assumes 1/3 of annual gross value will be needed. Interest estimated at 7 per cent.

k/ Office supplies, telephone, janitorial supplies, and contingencies estimated at 1 per cent of annual gross revenue. Also includes inspection fees.

l/ Estimated at 2.0 cents per pound of annual pack.

m/ Estimated at 10 per cent of annual gross revenue for brokerage, advertising and promotion.

are shown in Table 41. Well above average returns were indicated. Returns as shown, however, were those resulting from a 100 per cent retail pack and will be correspondingly lower as the percentage of institutional pack increases. A recent study using different source materials from those shown here and including an institutional pack as 25 per cent of the total have shown profit rates as low as 6.5 per cent on initial investment and 3.9 per cent on gross sales (2).

Total labor requirements include twenty-nine people on full-time salary, Table 42. Seasonal requirements go as high as 59 employees during processing of southern peas and as low as 22 during the leafy green season, Table 43.

The leafy green season was assumed to be approximately half of the year from October through the middle of March. The green bean season was assumed to be from mid-May to mid-June and from the first of October to mid-November. Southern peas were assumed to be in season from mid-May until mid-November. Speckled butterbeans and limas were expected to have a similar season. Seasonality expectations were based on southern Alabama conditions.

The output mix and corresponding days of processing shown in Table 45 are, thus, only one combination from which a decision must be made. Two-shift operation which is likely in some seasons further increases the range of possible outputs from the plant. Seasonality of production is a recognized problem in the food processing industry; and other products, product mixes, and repacking from bulk purchases from other processors should be considered.

Table 40. Prices, Gross Revenue, Total Cost and Net Returns from Processing Selected Southern Vegetables, Baldwin County, Alabama

Product	Total Pack 10 oz. boxes	Price/lb. in 10 oz. boxes a/	Total
	(1,000 pounds)	(dollars)	(dollars)
Speckled butterbeans	1,296	.24	311,040
Southern peas	4,752	.24	1,140,480
Green beans	4,752	.24	1,140,480
Leafy greens	5,400	.16	864,000
Total	16,200		3,456,000
Total costs			3,056,563
Net return b/			399,437

a/ Delivered prices, representative broker in Alabama, January, 1968.

b/ Return to risk, interest on investment has been deducted, Table 39.

Table 41. Profit Rates Relative to a Proposed Processing Plant in Baldwin County, Alabama

Net income before corporate income taxes	$399,437
Corporate income taxes a/	$187,735
Net income (profit)	$211,702
Profit as a per cent of initial investment	11.0
Profit as a per cent of gross sales	6.1

a/ Estimated to be 47 per cent of net income.

Table 42. Annual Labor Requirements, Management, Supervisory and Others.

Title	(Dollars)
President	25,000
Vice-president of sales	20,000
Vice-president of production	20,000
Plant manager	15,000
Assistant plant manager	10,000
Procurement and receiving managers (2)	24,000
Comptroller	14,000
Sales representative	12,000
Office and personnel manager	8,000
Warehouse manager	8,000
Electrician	8,000
Mechanic	8,000
Mechanic helpers and maintenance (2)	10,000
Boiler room engineer	8,000
Warehouse men (2)	9,000
Janitors, cleanup and grounds (4)	16,000
Foreman for product preparation crew	7,000
Secretaries (2)	9,000
Clerk-typists (3)	12,000
Quality-control technician	5,000
Travel allowance for procurement	10,000
Travel allowance for sales	10,000
Total	268,000

Table 43. Seasonal Labor Requirements for Preparation, Packaging and Casing

Hours of Description	Southern peas	Green beans	Speckled butter-beans	Leafy greens	White pota-toes	Wage Rate/ hr.
			Number			Dollars
Receiving	4	4	4	2	8	1.60
Inspecting	35	24	35	6	16	1.60
Blanching	2	2	2			2.50
Filling and closing	2	2	2	1	1	2.25
Fork lift operator	2	2	2	1	1	2.25
Carton handling	2	2	2			2.25
Freezer operator	2	2	2	1	1	3.00
Overwrap operator	4	4	4	2	2	2.25
Casing and final inspection	1	1	1	4	1	1.60
Case labeling	1	1	1	2	1	2.25
Equipment (convey & wash)				1		1.60
Case sealing						2.50
Peeling and cutting						2.25
Janitor	4	4	4			1.60
Total employees	49	48	59	22	32	
Total wages/yr. a/	$46,700	$38,962	$12,738	$41,800	NA	

a/ Depends on total hours each line is operated, see Table 45.

Table 44. Proposed Processing Plant: Raw Product Requirements, Acreage Required, and Gross Revenue to Growers, Baldwin County

Product	Product requirements	Yield per acre	Acreage needed a/	Price per ton	Gross revenue to growers
	Tons	Tons	Acres	Dollars	Dollars
Speckled butterbeans b/	675	1.1	614	130	87,750
Southern peas b/	2,475	.7	3,536	145	358,875
Green beans	3,211	2.0	1,606	90	288,990
Leafy greens	3,252	5.0	650	30	97,560
Total	9,613	---	6,406	--	833,175

a/ Annual land requirements are less because of durable cropping.

b/ Shelled basis.

Table 45. Proposed Freezing Plant: Annual Operating Time, Raw Product, Requirements, Finished Product Yield, and Output for Processing Selected Vegetables, Baldwin County, Alabama

Product	Days per year	Hours per day	Hours per year	Raw product requirements a/: Hourly	Raw product requirements a/: Annual	Finished product yield (as percentage of raw product)	Expected output rates of finished product: Hourly	Expected output rates of finished product: Annual
				Tons	Tons	Per cent	Pounds	1,000 pounds
Speckled butterbeans	15	8	120b/	5.62	675	96	10,800	1,296
Southern peas	55	8	440b/	5.62	2,475	96	10,800	4,752
Green beans	55	8	440	7.29	3,211	74	10,800	4,752
Leafy greens	125	8	1,000	3.25	3,252	83	5,400	5,400
Total	250	-	2,000	- -	9,613	--	---	16,200

a/ 90 per cent of rated capacity. Loss of 10 per cent assumed because of delays and abnormal product quality.

b/ Shelled basis.

About 9,613 tons of raw material would be supplied to a plant of the type under discussion, Table 44. Gross revenue to farmers under price and yield conditions shown in Table 44 would be 833,175 dollars. Prices and yields data are those gathered from a telephone survey of a sample of processing plants in the South. Yields reported by plant managers were very near those that have been reported in other studies. Prices to farmers, however, were as much as twenty per cent less than quoted in other sources.

Raw material requirements could be satisfied for the proposed plant with about 6,406 acres of land which as noted previously in an adjustment in land use acres that is well within the capability of Baldwin County alone. Anticipated double-cropping will reduce this figure considerably.

Variability in Planning Costs

In addition to the point estimates of costs developed for a specific plant the effect on cost of product mix, length of season and rate of output were examined by the use of estimating equations. Reed and Sammet in a study of processing plants in California have provided a file of basic information that has been used in numerous studies of processing feasibility (12). This basic file may be used to calculate numerous point estimates of investment and operating costs covering a wide range of product mixes, season hours of operation and rates of output. Application of linear regression methods to these basic data simplified the task of examining several alternative levels of investment but with a loss of detail contained in the single point budget estimates.

Total investment depends for the most part on rate of hourly output desired from the plant. Because of this the following aggregate estimate

of investment costs has been made:

$$\text{Total investment cost in Southern peas and Southern green limas} = \$229,925 + \$8,496R_1 + \$17,265\ R_2 + \$81,616\ (R_1 + R_2$$

R_1 = Rate of hourly output of peas, speckled butterbeans or limas in thousand pounds per hour.

R_2 = Rate of hourly output of southern greens in thousand pounds per hour.

Rates of output used in making the point estimates of costs were substituted into this equation as a means of comparison. Eight hundred cases of peas or snap beans per hour are equivalent to 12,000 pounds. Estimated investment cost was 2,057,483 dollars which is just slightly above the estimate given in Table 44 of 1,929,517 dollars. Additional preparation costs of green beans included in the green bean lima were not included in the estimating equation. One principal result of using the estimating equation was to show that increasing rate of output by 1,000 pounds per hour or by 66 cases will require an additional 100,000 dollars investment cost. Estimating equations for annual in-plant costs of processing are shown in more detail in Table 46.

Advantages and Disadvantages

Relative to Labor and Transportation Costs

Costs of processing as shown by the estimating equations developed from the California data will be higher than expected for Alabama because of differences in labor cost. An analysis was made of the California study for the purpose of partitioning out labor costs from all others. Using basic tabular data from the study it was possible to calculate total annual processing costs as labor plus other costs. Total labor and other costs were calculated for several rates of output and hours of operation

for processing green beans, lima or speckled butterbeans and greens. Assuming that each product would be processed at the same rate of output and season hours of operation the following total annual labor costs, total annual other costs and total annual plant costs were estimated.

1) Total annual plant costs = $49,827 + 12,206R + $57H + $133 RH.

2) Total annual labor costs = 8,592 + 3,037R + $53H + $29RH.

3) Total annual other costs = $42,202 + $9,099R + $104RH.

R = Rate of output in (1000) lb/hr.

H = Hours of operation per season.

Costs in equations two and three were not expected to sum exactly to those of equation one as all three are separate estimates from a similar source of data. The close agreement of the sum of two and three:

4) 50,794 + 12,136R + 53H + 133H

with equation one supports the assumption that this was a valid method of partitioning out labor costs. Labor costs for several rates of output and hours of operation averaged about 25 per cent of total annual costs. This estimate provides a basis for the assertion of one type of locational advantage. Average hourly earnings of production workers in Alabama have in recent years averaged about 75 per cent of those in California (14). Total processing costs would thus be reduced by about six per cent in Alabama versus California, the major processing area.

Alabama is also located near the population centers of the U. S. giving rise to a locational advantage of another type. Sixteen locations in the South were examined with respect to costs of frozen food transportation to 42 major Southern cities. A transportation cost analysis was made by calculating the total transportation bill from each of the 16 locations to the

42 cities. Each city was weighed in the analysis by its population. Minimum cost locations in Alabama are listed in the following order: Talladega, Clanton, Oneonta, Fort Payne, Guntersville, Dothan, Cullman, and Brewton. Albany, Georgia was about as good as either of the best two locations in Alabama. Nashville, Tennessee was ranked after the Alabama and Albany locations. With the exception of Brewton, the Alabama and Albany locations had transportation costs of not more than five per cent greater than the Talladega location, Table 47.

Baldwin County, Alabama was not included in this transportation cost and analysis, but the cost disadvantage would be similar to that of Brewton. Total annual distribution costs to the southeastern area can be expected to be about eight per cent or about 27,000 dollars more in Baldwin County than in a location nearer the center of the State, Table 47. This aspect of location is thus not as significant within Alabama as local factors relating to farm yields and internal plant management.

Summary

Farms in Baldwin County with over 260 acres of land and 20,000 dollars or more gross sales annually appear to be on the increase. Part of this increase in commercial agriculture can be attributed to the ability of farmers of the area to adjust rapidly to new farm plans. Net increase in cropland use in the county during the 1960-65 period was 14,000 acres with some crops, soybeans and wheat, showing this much increase or more. Change in commercial vegetable acreage has also been pronounced. Green bean acreage has increased from 22 acres in 1959, to 825 acres in 1964, to 2,800 acres in 1966, and to 4,500 acres in 1967. Southern peas have also been planted in large acreages increasing from 83 acres in 1964, to

Table 46. Estimated Annual Total Plant Costs of Southern Peas, Greens, and Speckled Butterbeans a/

Item	Cost
	(Dollars)
Processing:	
Variable costs	
Greens	$47.015 R_2H_2 + 14,861 H_2$
Beans and peas	$44.885 R_1H_1 + 26.408 H_1$
Fixed costs	
Beans, peas, & greens	$33,276 + 4,977 R_1 + 6,424 R_2$

a/ R_1 = Rate of output in thousands of pounds per hour of southern peas.
H_1 = Hours of seasonal operation of southern pea line.
R_2 = Rate of output in thousands of pounds per hour of southern peas.
H_2 = Hours of seasonal operation of southern green line.

Source: Multiple Product Processing of California Frozen Vegetables, Reed, Robert H., and Sammet, L. L., Gianni Foundation Research Report No. 264, University of California, Division of Agricultural Sciences, 1963.

Table 47. Relationship of Transportation Costs at the Best of Sixteen Locations to the Remaining Locations.

Location Ranking	Per cent relative to Talladega	Increased Transportation costs relative to Talladega
	(Per cent)	(dollars) a/
Talladega	100.0	
Clanton	101.4	4,536
Albany, Ga.	102.0	6,480
Oneonta	102.2	6,480
Fort Payne	102.2	7,128
Guntersville	103.3	10,692
Dothan	103.8	12,312
Cullman	104.6	14,904
Brewton	108.4	27,216
Nashville, Tenn.	117.9	57,996
Charlotte, N. C.	122.9	74,196
Charleston, S. C.	123.3	75,492
Jackson, Tenn.	125.6	82,944
Memphis, Tenn.	130.7	99,468
Winston-Salem, N. C.	134.2	110,888
Baton Rouge, La.	140.8	132,192

a/ "See footnote next page."

a/ Dollars greater than transportation cost shown in Table 39. Costs of transportation from each location was calculated to 42 cities and amount transported was weighted by 1960 population. The 42 cities were:

Albany, Georgia
Asheville, North Carolina
Atlanta, Georgia
Augusta, Georgia
Baton Rouge, Louisiana
Birmingham, Alabama
Charleston, South Carolina
Charlotte, North Carolina
Chattanooga, Tennessee
Columbia, South Carolina
Columbus, Georgia
Durham, North Carolina
Ft. Lauderdale - Hollywood, Florida
Ft. Smith, Arkansas
Gadsden, Alabama
Greensboro - H. Point, North Carolina
Greenville, South Carolina
Huntsville, Alabama
Jackson, Mississippi
Jacksonville, Florida
Knoxville, Tennessee
Lake Charles, Louisiana
Lexington, Kentucky
Little Rock - N. Little Rock, Arkansas
Louisville, Kentucky
Macon, Georgia
Memphis, Tennessee
Miami, Florida
Mobile, Alabama
Monroe, Louisiana
Montgomery, Alabama
Nashville, Tennessee
New Orleans, Louisiana
Orlanda, Florida
Pensacola, Florida
Raleigh, North Carolina
Savannah, Georgia
Shreveport, Louisiana
Tampa - St. Petersburg, Florida
Tuscaloosa, Alabama
West Palm Beach, Florida
Winston-Salem, North Carolina

1300 acres in 1966 and 2,000 acres in 1967. Baldwin County alone appears to have the potential to supply the basic 6,406 acres of commercial vegetables needed to support a freezing plant in the area.

Demand for frozen food including southern vegetables appears to be increasing. Frozen vegetable consumption in total was up 29 per cent in 1967 over 1959 while canned consumption was up three per cent and fresh consumption down four per cent. As frozen consumption occupies only six per cent of the total market there is ample room for continued growth. Other indicators of continued growth in consumption of frozen food are: (1) Fresh vegetable prices have been rising faster than frozen vegetable prices; (2) Increases in income have been correlated with increased consumption of frozen vegetables at a faster rate than for fresh vegetables; and (3) Increases in population are substantial.

New freezing plants in the food industry have been feasible in recent years. Numbers have increased 34 per cent. Freezer output of vegetables in the South has increased rapidly to the point that, if frozen potatoes and potato products are omitted, the South, East and Midwest were estimated to have had about the same output, 188-220 million pounds in 1965. Output in the South was estimated to have more than doubled since 1959. Per cent increases in outputs of green beans, southern peas, and turnip greens have rivaled the percentage increases that have been seen recently in corn, carrots, and potatoes. Green bean output increased 56 per cent in 1959-65 period; southern peas output increased 100 per cent; and turnip greens output increased 70 per cent.

Growers initial interest in producing vegetables for processing in the southern Alabama area has been high. According to survey results farmers

expressed an initial interest in 27,000 acres. Introduction of mechanical harvesting after the survey appears to have enhanced this interest. A select group of farmers were defined from the study as being those under 45 years of age and having attitudes graded excellent or good. The initial production interest of this group was further reduced according to previous research results showing plans for production are likely to decrease as more information is received. On this most select basis, the select group in the Baldwin and Wiregrass areas would plan to supply just less than half of plant requirements after receiving full information. The select group, however, formed a minor part of the total interest group. The remaining group, those over 45 or with attitudes fair to poor might also be expected to produce for processing. This remaining non-select group in the Baldwin-Wiregrass area had expressed an interest in approximately 10,000 acres of vegetables proposed for processing. Production on at least one-third of these acres combined with the select group would assure the acreage needed for the processing plant. Northern Florida provides still another supply area where interest in processing has been high in recent years.

Net returns for growing selected vegetable crops were compiled based on a survey of processor's expected yields from the area and the prices processors were willing to pay. Net returns per acre to land, operator labor and capital were budgeted to be $70.47 for green beans; $68.42 for turnip greens, $60.45 for hand harvested southern peas, $47.40 for mechanically harvested southern peas, and $78.36 for speckled butterbeans. These were compared with net returns after harvest of soybeans at $43.34, corn at $42.37, and potatoes at $70.53. Costs of mechanical harvesting other

than custom estimates were not included in this report and additional study is needed to determine the effect of mechanized harvest on net returns as they affect both farm and plant feasibility. Total gross return to farmers, however, from the proposed plant would be $833,175 for 9,613 tons of raw material.

Total investment costs of a plant having a green bean line, a southern pea line and a southern greens line would be $1,929,517 dollars. Annual total costs of the plant would be $3,056,563 and annual gross returns, $3,456,000, leaving a net income of $399,437 before corporate income taxes. Profit after taxes would be 11.0 per cent of initial investment. Annual output of the plant would be approximately 16 million pounds which in recent years would have been about eight per cent of total production in the South.

Labor requirements of the plant would include 29 persons on full-time salaries with a payroll of $293,460 and up to 59 seasonal employees with a payroll of $153,519.

There should be a labor cost advantage relative to California of about six per cent of total costs per year. Baldwin County has a slight disadvantage in relation to Southern markets when compared to other locations in Alabama, but this was found to be of minor importance.

Based on projected net returns to farmers and the history of the area to produce there seems to be little doubt that the area can support a vegetable processing plant of a commercial size. Key elements in the success of the plant will be its ability to capture at least eight per cent of a market which shows possibility of continued growth and the way in which costs of mechanical harvesting will be shared by the processor and the farmer.

Appendix Table . Number of Growers and Acres of Commercial Vegetables by Sales to Processors, Wiregrass and Gulf Coast Counties, 1967.

County	Growers	Acres	Sales
Coffee			
Southern peas	20	100	$ 10,000
Geneva			
Tomatoes	50	250	10,000
Cucumbers	30	40	10,000
Southern peas	30	400	100,000
Dale			
Field peas	40	200	20,000
Houston			
Cucumbers	60	100	20,000
Southern peas	50	200	40,000
Henry			
Cucumbers	8	12	1,000
Southern peas	40	75	4,500
Subtotal	328	1,377	$215,500
Mobile			
Irish potatoes	12	1,200	225,000
Baldwin			
Snap beans	70	4,500	360,000
Southern peas	30	2,000	216,000
Irish potatoes	250	2,500	506,000
Escambia			
Tomatoes	1	20	3,000
Cucumbers	680	825	240,000
Subtotal	1,043	11,045	$1,550,000
Total	1,371	12,422	$1,765,500

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