A COST STUDY OF CERTAIN COLE CROPS AS SERVED IN A COLLEGE CAFETERIA

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Margaret Mary Childs

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This is to certify that the

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A Cost Study of Certain Cole Crops as Served in a College Cafeteria

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A COST STUDY OF CERTAIN COLE CROPS AS SERVED IN A COLLEGE CAFETERIA

By

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A THESIS

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CHAPTER I

INTRODUCTION

In the last two decades the American public has become more and more food conscious. Many changes have come about since the day that meat and potatoes were the standby of the American diet. This change has not been sudden. It has been brought about by a gradual accumulation of knowledge of the nutritive elements supplied by different foods, by better methods of preparation which retain food values as well as attractive appearance and by slowly but surely acquainting the public with the results of research in the food field. Better methods of transportation, improvements in packaging, conservation and storage have all increased the variety from which the menu planner may choose. With an abundance from which to choose it became more essential that the person responsible for planning the menu and purchasing the food be well informed as to relative food values and cost. Cabbage and its relatives represent vegetables that are generally well liked and frequently used. The present study was undertaken to provide information regarding certain members of the cabbage family.

The vegetables included in this study were cabbage, cauliflower, Brussels sprouts and kale. Broccoli was not used because it was felt that frozen broccoli# gave a more nearly standard

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#Not all food service units on campus agree, however, as some do use fresh broccoli.

product with no preparation involved. Kohl-rabi was not served because it was not available and because of lack of popularity. Several attempts were made to serve red cabbage but it was not popular. Very small amounts were sold and there was a high proportion of leftovers, since this vegetable had to be cooked in advance.

The purpose of the study was to determine the per cent of preparation waste, the cost per pound of edible material and the cost per portion of the four members of the cabbage family as served at the Union Cafeteria at Michigan State College, East Lansing, Michigan. Since there is little data available concerning waste and yield of these vegetables the study was undertaken to provide practical information for those in the food service business, especially since some of the cole crops are available the year around and are low in cost. Even the more expensive variaties such as cauliflower and broccoli have a definite place in the menu since they add variety.

The vegetables used in the study were prepared by the regular vegetable preparation women at the Union Cafeteria, were cooked by the vegetable cooks and served by the counter girls without any supervision other than that ordinarily given. In other words, it was desired to discover the waste, yield and servings that were being obtained normally on a large quantity basis rather than to set up a special procedure for the vegetables under scrutiny. The preparation women had been trained on the job in the

cleaning of vegetables as routinely carried out in this institution. The vegetable cooks had also been trained to cook vegetables to the degree most conductive to the retention of flavor and food value and the counter girls were usually students who were taught the standard portion of all vegetables served. It was with this organization as set up that the study was made to determine the waste, edible portion and number of servings. The cost per pound of edible portion and the cost per portion were then computed.

CHAPTER II

REVIEW OF LITERATURE

The literature available on the cole crops deals almost entirely with the horticultural or the nutritional aspects of the subject. There seems to be no good reason for reviewing literature on those aspects. Harris and Wood (11) give the following data:

Product	Average waste	Serving per lb. A.P.	Size per serving, buttered
Brussels sprouts	33%	4 to 6	2½ to 3 oz.
Cabbage	30%	4	2½ to 3 oz.
Cauliflower	56%	2	3 oz. or ½ cup

These authors did not list kale.

George L. Wenzel (17) lists the following data:

Product	Unit	Portions Number	Portions Size
Brussels sprouts	25# drum	120	2½ oz.
Cabbage	50# sack	150	4 oz.
Cauliflower	6 dz. crt.	85	2½ oz.
Kale	20# bu.	100	2 oz.

The Encyclopedic Cook Book (4) contains the following information:

	lb. A.P.	Servings
Brussels sprouts	1½	6
Cabbage	2	6
Cauliflower	3	6 to 8
Kale	4	6 to 8

West and Wood (18) give the following data:

	lb. A.P.	Servings
Brussels sprouts	12	50
Cabbage	12	50
Cauliflower	28 to 30	50

Halliday and Noble (10) give the following:

	A.P.	E.P. Raw	Servings
Brussels sprouts	10½ oz. - 300 gm.	240 gm.	4
Cabbage--			
Loose, green	27 oz. - 750 gm.	450 gm.	4
White, compact	9½ oz. - 270 gm.	240 gm.	4
Cauliflower	23 oz. - 650 gm.	325 gm.	4

These authors approach the subject from the standpoint of the cooking time for a given quantity of vegetable rather than on a waste and yield basis. However, it was possible to compute per cent of preparation waste from their figures, table V, page 35.

The New York State Restaurant Association publication "How to Cut Food Costs" (12) gives the following information:

Product	Size	Unit pack	Remarks
Brussels sprouts	Medium	40# drum	Hard, green, California. Approx. 50-60 small sprouts to a lb.; some places sold by the quart which holds $1\frac{1}{4}$ lb. Yield: 1 lb. cooked and trimmed about 3 cups. Serves 4 to 5.
Cabbage white-old white-new	Medium	50# bag	Hard white head Hard green head Yield: 1 lb. cabbage yields approx. $3\frac{1}{2}$ cups finely shredded cabbage for salad or $2\frac{1}{2}$ cups when cut and cooked. Makes 3 servings cooked.
Cauliflower	Large	Ctn.	White, hard. The outer leaves should be green and fresh. Yield: From a head weighing 2 lb. a reasonable yield is 3 cups cooked cauliflower. Serves 4 to 5.

CHAPTER III

THE BRASSICA FAMILY

A. History

The cole crops, cabbage, cauliflower, broccoli, Brussels sprouts, Kohl-rabi, kale, collards, the turnips and the mustards including Chinese cabbage,(2) belong to the genus Brassica, the largest vegetable family.(13) Cabbage has a tendency toward mutation which accounts for all the variants of this group. The Brassica family includes both annual and biennial plants. The wild parent, Brassica oleracea, is a biennial with a tough, woody root. It has large, thick lobed, glaucous leaves of green or reddish color. The members of the Brassica family are botanically confused especially in the cultivated species.(3) Some of the confusion has probably arisen because of the names in the different languages as illustrated below.(3)

French	English	American
Chou cabus	Cabbage	Cabbage
Chou de Milan	Savoy Cabbage	Savoy Cabbage
Chou de Bruxelles	Brussels sprouts	Brussels sprouts
Chou-vert	Borecole or kale	Borecole or kale
Chou-rave	Kohl-rabi	Kohl-rabi
Chou-nave	Swede or Swedish turnip	Rutabaga
	Turnip rooted cabbage	
Chou-fleur	Cauliflower	Cauliflower
Navet	Turnip	Turnip

From the original wild cabbage stock have apparently sprung all the forms of cabbage, cauliflower, Brussels sprouts and kales. The English language has no generic name for this family or group. The French include them all under the term Chou, the Germans Kohl. The Latin names, especially in the Brassica oleracea-campestris group, have been used so interchangeably that it is almost impossible to use them accurately.(3) The word cabbage which is the Anglicized form of the French word "caboche" meaning head has been used to refer to the loose heading or non-heading forms of Brassica oleracea as well as to the modern hard heading type, Brassica oleracea variety capitata.(5) The wild cabbage, Brassica oleracea, is now found growing in places on the seashore of Great Britian, on the coasts of Denmark and Northwestern France, in various other localities from Greece to Great Britian. It has been known for centuries and was probably in general use 2000 to 2500 B.C. It supposedly was worshiped by the Egyptians and was highly regarded by the ancient Greeks and Romans as a food and as a medicine. Phythagorous and Cato mention its good qualities.(15) Although it appears that cabbage originated on the eastern Mediterranean shores and in Asia Minor the Celts who invaded the territory repeatedly from 600 B.C. to the beginning of the Christian era probably had much to do with its introduction into Europe. The Latin word Brassica is apparently derived from the Celtic word "bresic" meaning cabbage.(5) The introduction of cabbage into Europe is

usually credited to the Romans but it was probably carried throughout Europe by the Celts who invaded Britian in the fourth century B. C. Cabbage was first known in European gardens in the 9th century and was brought to the United States by the early colonists. (16) All cole crops are hardy and grow best in cool weather. Since they are so closely related many of the same diseases and insects attack them.

In this study we are concerned only with those members of the cabbage family which are of commercial importance in the United States. The most important members from this standpoint are cabbage, cauliflower, kale, broccoli, and Brussels sprouts, all of which are Brassica oleracea. The early cabbage developed by the peoples along the Mediterranean was the non-heading type which thrives in warm climates while the hard-heading type was developed later by the northern Europeans in the cooler parts of the continent. White or hard-heading cabbage was not known until after the time of Charlemagne who died in 814 A.D.(5) Although references are found to hard-heading cabbage it is not until 1536 that clear descriptions are found. A loose-heading form called romanos and later chou d'Italie and chou de Savoys was grown in England in the 1500's. The round headed form is the oldest type; the flat-headed and egg-shaped varieties appeared in the 17th century, while the pointed or conical kinds did not appear until the 18th century. Jacques Cartier introduced cabbage into Canada in 1541-42 and it

was probably brought over by the early English colonists but the first written record mentioning it in the English colonies is in the year 1669. Most of the varieties grown in the United States originated in Germany and the Low Countries, the latter still supplying a great deal of seed for export to the United States. Some foreign seed is imported because cabbage tends to revert to an older type in the United States and hence needs renewal from time to time.

Cauliflower, Brassica oleracea, var. botrytis, and sprouting broccoli, Brassica oleracea var. italia, are two closely related members of the cabbage family, cauliflower being a descendent of broccoli. Broccoli has two distinct forms, Heading broccoli or cauliflower makes a dense white "curd" like that of cauliflower. The green form is known as sprouting broccoli. It grows as a branching cluster of green flowers on top of a green flower stalk. Smaller clusters form like sprouts from the stems at the attachment of the leaves. Cauliflower and cauliflower broccoli appear alike. The winter cauliflower on the market is cauliflower broccoli, which is hardier and slower growing than cauliflower.(5) Although both broccoli and cauliflower have been known for about 2000 years they have only recently become popular in the United States. Both of these plants, which are the aristocrats of the cabbage family, are milder in flavor than cabbage. They are difficult to raise, requiring a long, cool growing season and therefore command a higher price on the market.

Brussels sprouts, Brassica oleracea, var. gemmifers and Kohl-rabi, Brassica oleracea var. caule-rapa, are both descendents of the wild cabbage of ancient times but they are comparative newcomers since they have been known for only 400 or 500 years.(5) Brussels sprouts which have been known in America since about 1800 are not of great commercial value but they are becoming more popular. Kohl-rabi is easily grown in a cool climate but is of comparatively little commercial value because of lack of demand.

Kale and collards, Brassica oleracea var. achephals are two "greens" which differ in little more than the shape of their leaves. They are primitive forms of the wild cabbage plant and have been retained down through the years because of their value as garden vegetables. Kale is so well liked that it is one of the cabbage family much grown for commercial purposes. Collards is chiefly used in the south but can be found in markets in negro areas in northern cities.

B. Production in the United States

Cabbage is the most important member of the genus Brassica grown in the United States. It is, in fact, one of the most popular vegetables, ranking first in tonnage among the twenty-five most important truck crops, exclusive of potatoes, produced in 1948.(8) In that year there were 179,500 acres planted to cabbage for use on the commercial fresh market, with a production of 1,334,100 tons having a value of $38,806,000. It is grown by market gardeners, by

special vegetable growers, by general farmers and by home gardeners in all sections of the country. Cabbage grows best in a relatively cool, moist climate. This crop is grown in the South and in California during the winter and early spring. The main or late crop is grown almost entirely in the northern states, where the summer temperatures average relatively low. Cabbage grown between the northern and the southern regions is not of commercial importance, being largely grown in home gardens and used locally. The moisture supply during the growing season seems to be the most important factor in governing the yield. Cabbage will grow on all types of soils but while early cabbage is usually grown on sandy soil, heavy soils are preferred for the late crop where heavy yields are expected, since they retain moisture and are richer.

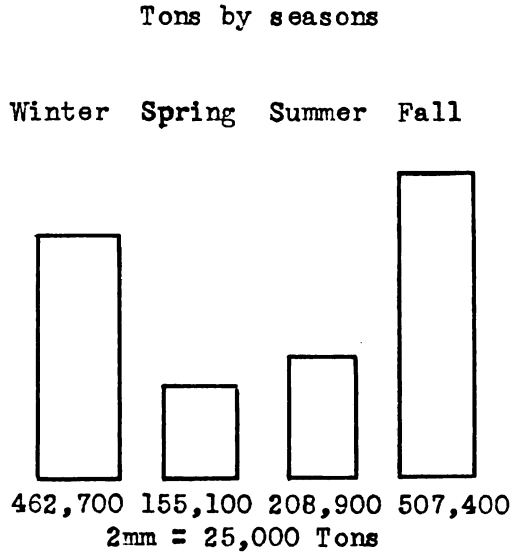


Figure 1. Cabbage Production in the United States, 1948.

As shown by figure 1, cabbage is on the market at all seasons of the year.(8) The heavy winter and fall production provides a cheap fresh vegetable at a time when the supply of other fresh vegetables is less abundant and therefore high in price.

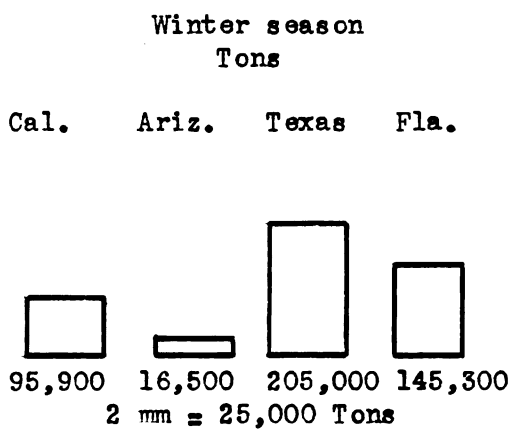


Figure 2. States Leading in Cabbage Production, 1948.

The winter producing states are shown in figure 2.(8) The period of most active harvest starts in December in Arizona, Alabama and Texas, table I, page 20. Florida produces heavily through January to the middle of April. The California harvest lasts from February through April. It can be seen from table I, page 20, that the supply is fairly constant through this season of the year.

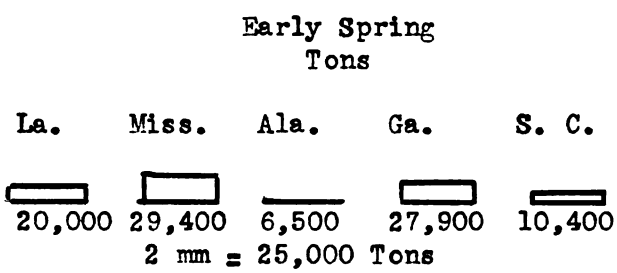


Figure 3. States Leading in Cabbage Production, 1948.

The total production for the early spring season in 1948 was only 94,200 tons, figure 3, page 13. However, during this period storage cabbage from the fall crop was still available and usually cheaper than the new cabbage. Some consumers prefer the storage cabbage since it is blanched, sweeter in flavor, finer in texture and cheaper. The new cabbage is stronger in flavor, coarser in texture, greener in color, richer in vitamins and more expensive. Some of the states producing the winter crop continue to harvest during these months, table I, page 20, so that there was more cabbage available than the chart indicates. Louisiana leads the early spring season by beginning the most active harvest period about the middle of March and continuing through May 10th, table I, page 20.

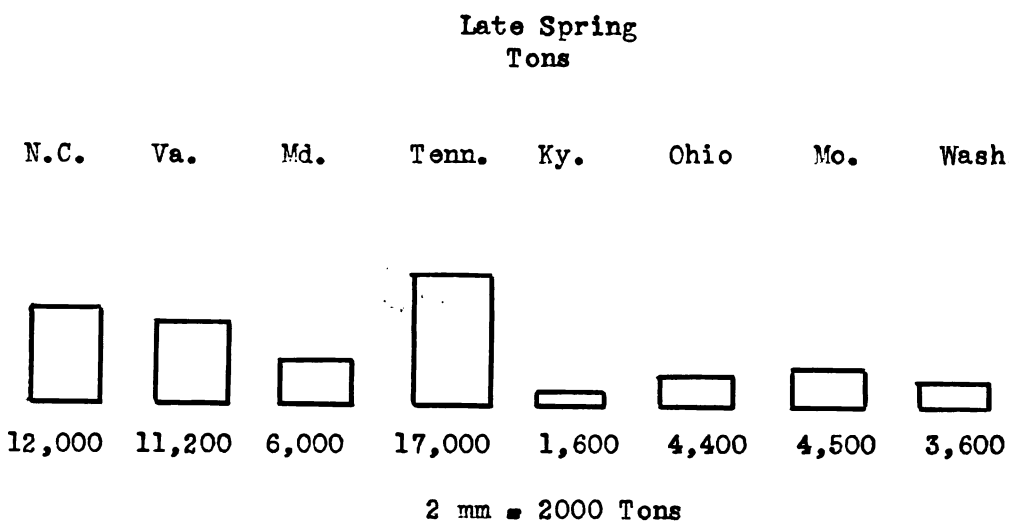


Figure 4. States Leading in Cabbage Production, 1948.

The total production for the late spring season in 1948 was only 60,900 tons, figure 4, page 14. Virginia and Tennessee come into heavy production in May and continue through June but the other states yield heavily only during the month of June.(8) During this period cabbage is in short supply and the price rises accordingly.

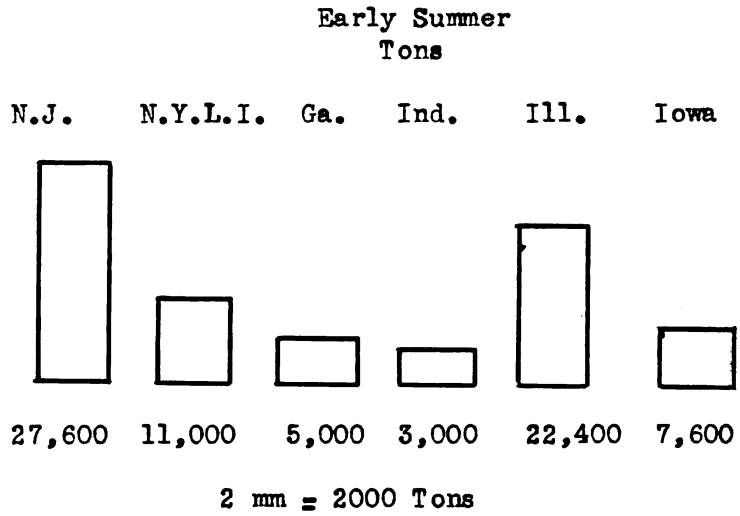


Figure 5. States Leading in Cabbage Production, 1948.

The early summer production begins in New Jersey in June and continues through July.(8) The other states in this group reach the peak of production during July and August, table I, page 20. The total production for this season in 1948 was 78,600 tons, figure 5, with a continuing rise in price due to a short supply.

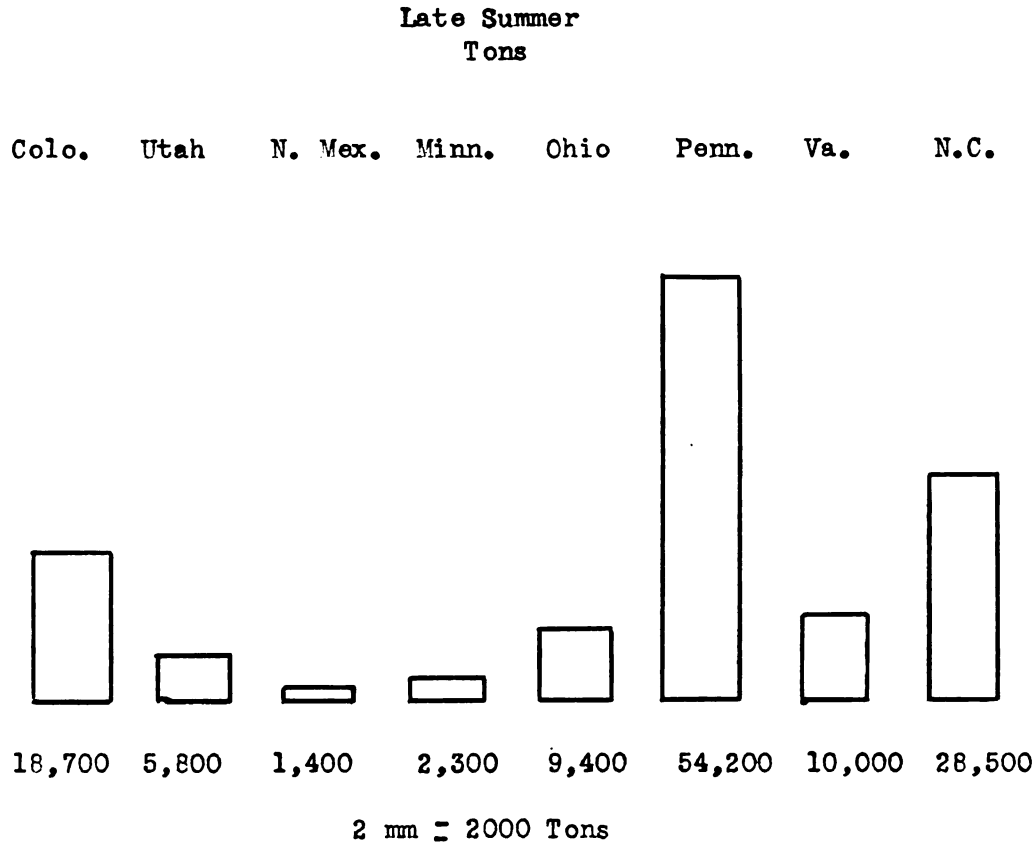


Figure 6. States Leading in Cabbage Production, 1948.

The total production rises in the late summer and in 1948 was 130,300 tons, figure 6. At this time of year there is a pronounced decline in price because of the abundant supply. Production for this season is greatest during August and September, table I, page 20.

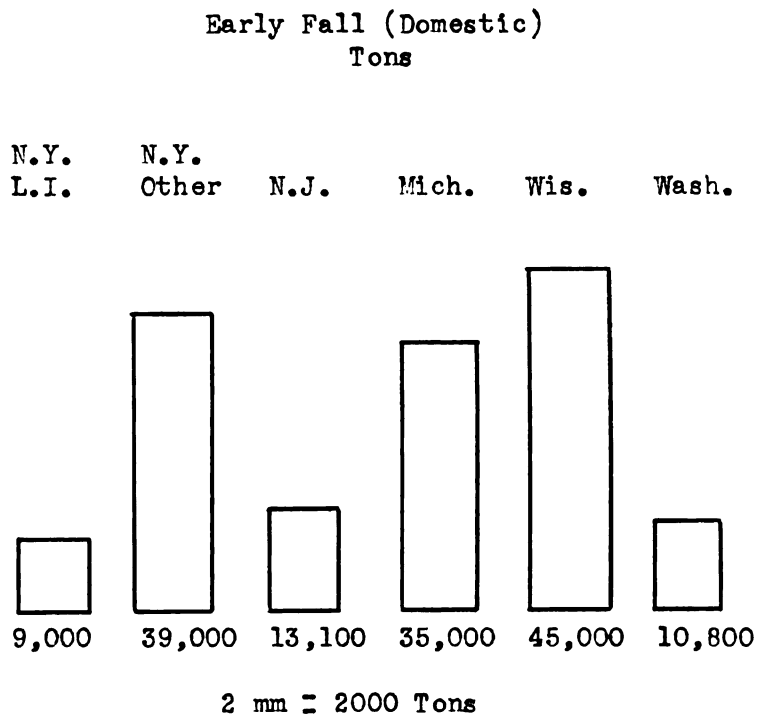


Figure 7. States Leading in Cabbage Production, 1948.

The total production for the early fall season was 157,900 tons, figure 7, with a slight fall in price. Michigan which is the first state to come into production for this season begins active harvesting in August and continues into September, table I, page 20. The other states in the group yield heavily in September and October.(8)

The total production of Danish cabbage for the early fall market in 1948 was 307,700, figure 8, with a sharp decline in price.(8) The period of heavy harvest runs from September to October for most of the states in the group but continues through November in New York, table I, page 20.

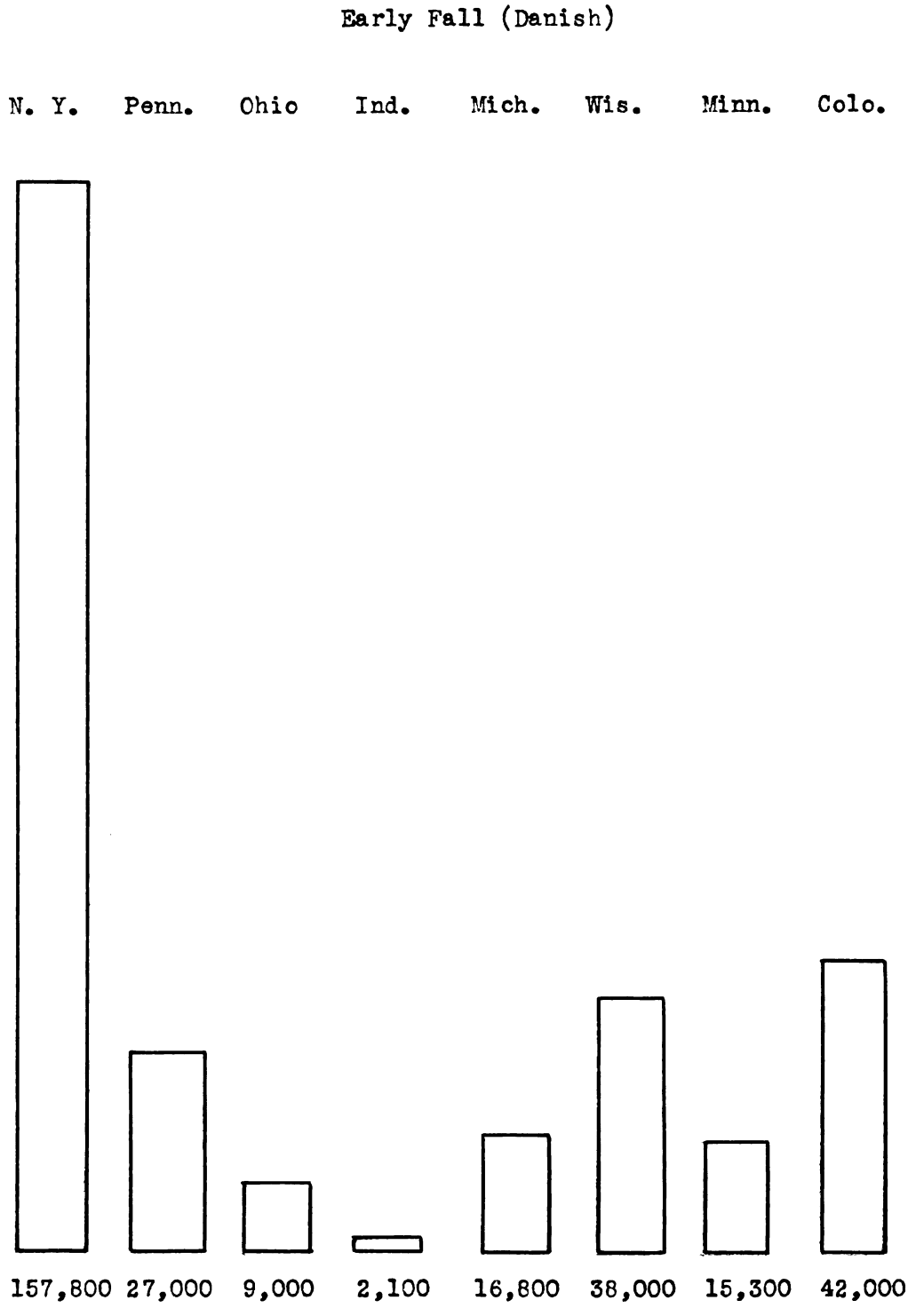


Figure 8. States Leading in Cabbage Production, 1948.

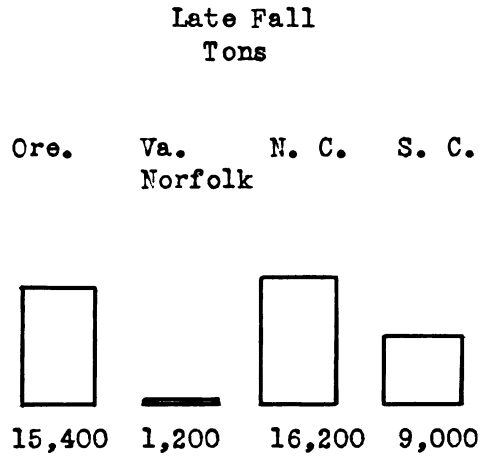
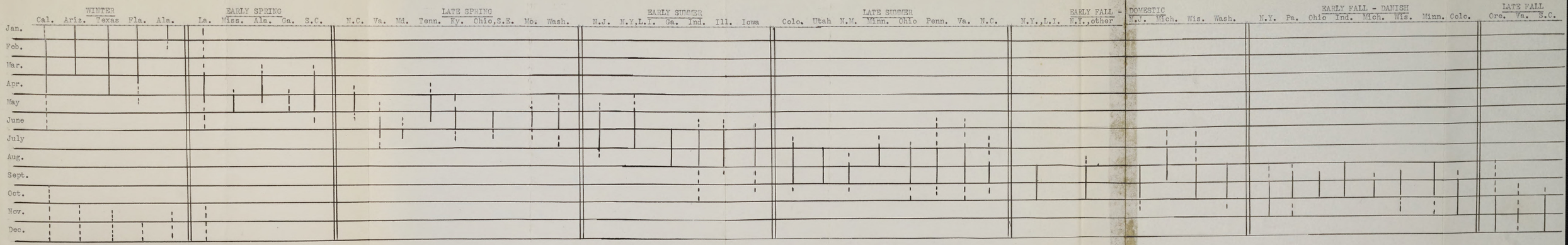


Figure 9. States Leading in Cabbage Production, 1948.

The total production for the late fall was 41,800 tons, figure 9, with a noticeable rise in price.(8) All the states in this group yield heavily during November and December, table I, page 20.

As shown by the seasonal production chart, figure 1, cabbage is produced at all seasons of the year with the heaviest production occuring during the fall and winter months at a time when other fresh vegetables are in short supply and high in price.(8) There is an overlapping of production from season to season. As one season's crop wanes the states producing in the following season are beginning to harvest, table I, page 20.

TABLE I. PRODUCTION SEASON FOR CABBAGE (13)



BROKEN LINES LIGHT PRODUCTION
SOLID LINES HEAVY PRODUCTION

The only other cole crops listed among the twenty-five vegetables of commercial importance are cauliflower and kale.(8)

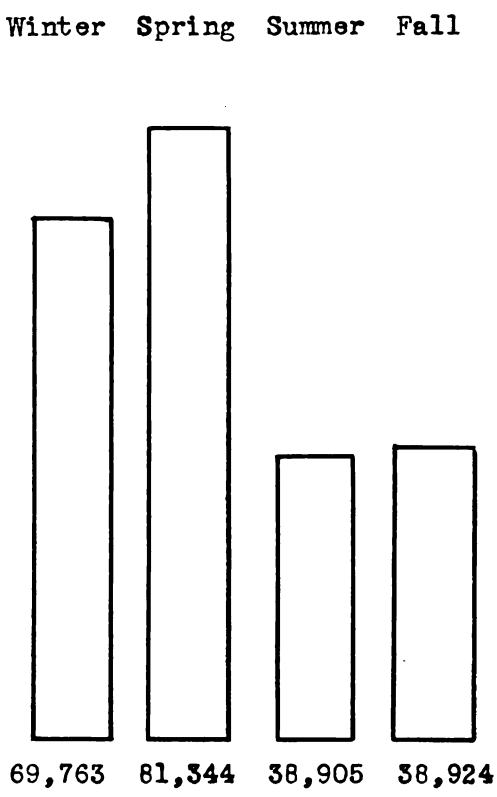
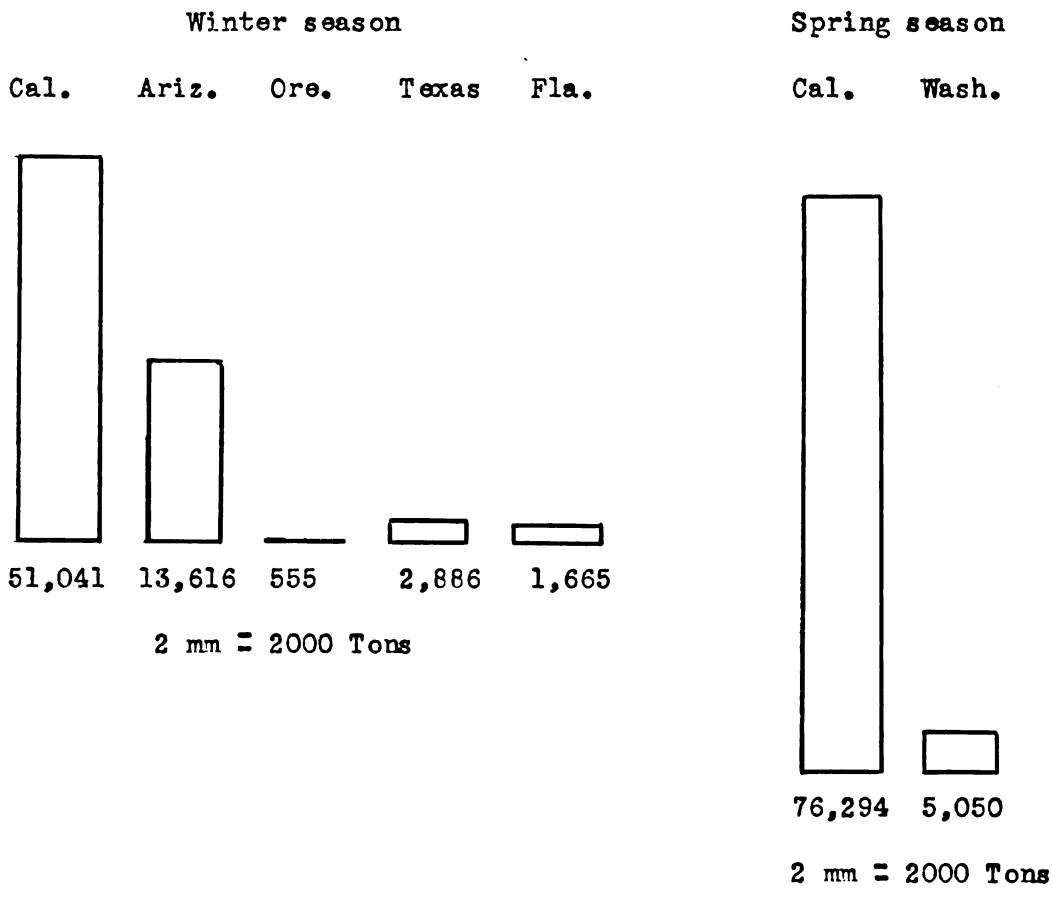


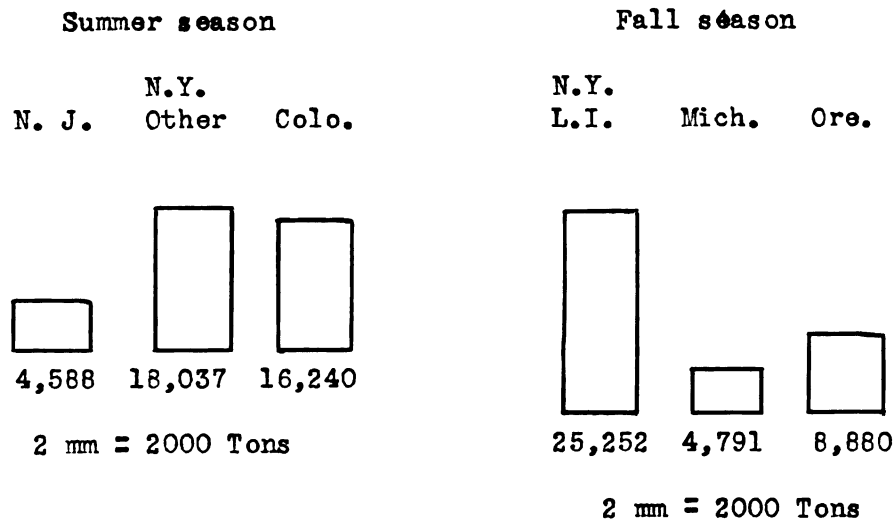
Figure 10. Cauliflower Production in the United States, 1948.

The 1948 acreage of cauliflower was 38,300 which produced 228,900 tons, valued at $17,277.(8) For the ten year period from 1937 to 1946 inclusive, cauliflower was cheapest during the winter season and gradually increased in price each succeeding season, reaching a peak in the fall. It would seem that the increased

production during the spring, figure 10, would lower the price. However, this is the season when other fresh vegetables are scarce and when jaded appetites demand a change from the storage vegetables, which are diminishing in quantity and in quality.



Figures 11 and 12. Cauliflower production by States, 1948.

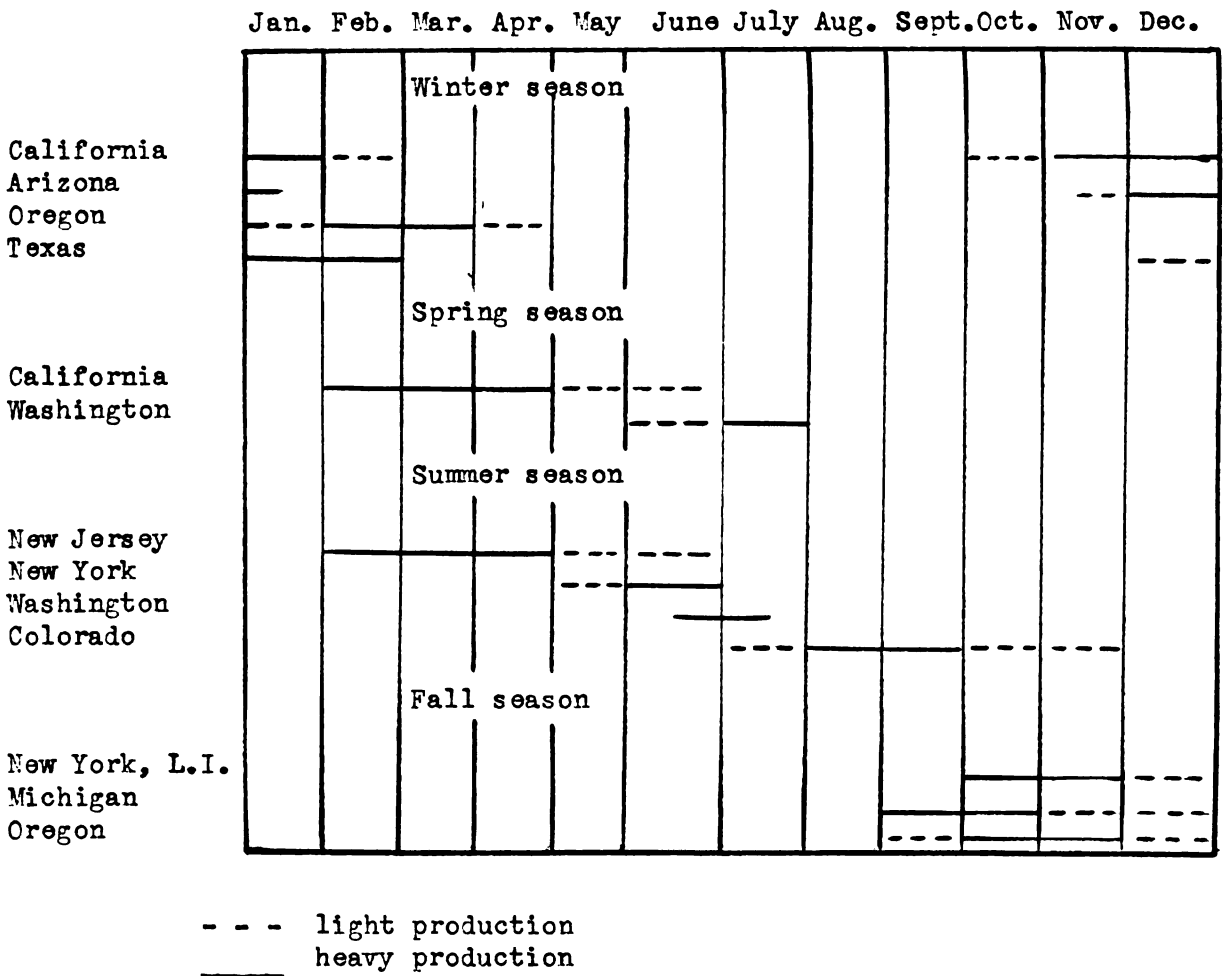


Figures 13 and 14. Cauliflower Production in the United States, 1948.

As shown in figure 11 and figure 12, California is the largest producer of cauliflower. The fact that cauliflower requires a cool temperature and moist air limits its production almost entirely to those states lying near large bodies of water, either coastal or inland, or those having a cool climate because of elevation. This coupled with its difficulty of culture makes it one of the higher priced vegetables.

The production of cauliflower continues throughout the year, figures 13 and 14. California, the leading state, produces heavily for six months, from November through April. New York, the second in yield, is in heavy production for the five month period from June through November. The other states in the group produce a comparatively small part of the total over a heavy production period of from one to two months each, table II, page 24.

TABLE II PRODUCTION SEASON FOR CAULIFLOWER



In 1948 there were 1,300 acres of kale which yielded 4,700 tons, figure 15, valued at $375,000. All the kale produced for commercial purposes is grown during the winter season.(8)

Winter season

4,700

2 mm = 2000 Tons

Figure 15. Kale Production in the United States, 1948.

Although Brussels sprouts and broccoli are also produced for the commercial fresh market they are not of great enough importance to be listed by the Bureau of Agricultural Economics bulletin "Commercial Truck Crops for Fresh Market--1948 Annual Summary".(8)

CHAPTER IV

PROCEDURE

The vegetables in this study were purchased by the Food Stores of Michigan State College and used in the Union Cafeteria. The samples were chosen at random. On the whole, the quality was good. There was no spoilage due to storage or careless handling.

The vegetable was weighed in the container in which it was purchased, the container was weighed and the weight of the vegetable as purchased was found by difference. After the vegetable was prepared for cooking the waste and the prepared vegetable were weighed, the latter being weighed before it was washed to prevent error because of moisture absorbed or adhering to the material. The per cent of waste was computed. The number of servings was counted as sold by the counter girls dishing the vegetable to the customers in the Union Cafeteria. These girls always used the same size spoon but because of inexperience some of the girls served a larger portion than was intended. Since student help was used regularly there was always the chance of variation in the size of the servings. After the number of servings was obtained the cost per serving was computed.

The vegetables were cooked as needed for service on the cafeteria counter, care being taken to stagger the cooking so that the vegetables were ready when needed. This method avoided the necessity of holding the cooked vegetables for any length of time before

serving them. It also avoided the loss of servings through left overs. The number of servings was so planned that the entire unit prepared was used at a meal if possible. Whenever the entire lot was not used at the first meal the remaining raw vegetable was kept under refrigeration until the next meal. The vegetables were cooked in water and served buttered. The cost of the butter was not taken into consideration since the purpose of this study was to determine the cost of the vegetable per se without regard to sauces or types of service which might add to the cost.

CHAPTER V

RESULTS AND DISCUSSION

A. Varieties and Amounts of Vegetables Used

For the study of cabbage four cases and three bags of the vegetable were used totaling 343¼ pounds as purchased, as shown in table III, page 29. Of this amount 142¾ pounds were lost through preparation waste, leaving 211¼ pounds of edible material. The average per cent of preparation waste was 41.51%. The total number of servings of cabbage was 863. The total cost of the cabbage was $15.50 which was an average of $0.0454 per pound as purchased, $0.0733 per pound of edible material or $0.0179 per serving. The average number of servings per pound was 2.5. The average size of a serving was 3½ ounces.

Seven crates of cauliflower were used in this study as shown in table III, page 29. Of the 218¾ pounds as purchased there were 156 pounds or 71.3% preparation waste leaving 63 5/8 pounds of edible material. The total number of servings was 338. The cauliflower cost $24.90 which was $0.1133 per pound as purchased, $0.377 per pound of edible material or $0.0739 per serving. The average number of servings per pound was 1.54. The average size of a serving was 3½ ounces.

Eight drums of Brussels sprouts were prepared and served as shown in table III, page 29. There were 220¾ pounds as purchased.

TABLE III DATA ON THE FOUR VEGETABLES STUDIED

Vegetable	Date	Type of Container	Weight of Vegetable and Container lbs.	Weight of Container lbs.	Weight of Vegetable A P - by lbs.	Weight of Waste lbs.	Amount of Waste Percent	Weight of Vegetable E P lbs.	Number of Servings	Cost per Unit Purchased Dollars	Cost per Serving Dollars	Cost per Pound A P Dollars	Cost per Pound E P Dollars	Servings Per Lb A P No.
Cabbage	5-4-49	Crate	51	6 1/4	44 3/4	14 1/2	32.40	30 1/2	143	1.75	.0122			
	5-6-49	Crate	61 3/4	8	53 3/4	19	35.34	44 1/2	148	1.75	.0118			
	5-10-49	Crate	53 1/2	5 1/2	48	24	50.00	24	103	2.65	.0257			
	5-10-49	Crate	56 1/2	6	50 1/2	20	39.60	30 1/2	103	3.00	.0291			
	6-8-49	Bag	50	1/4	49 3/4	25	50.25	24 3/4	116	2.15	.0185			
	6-9-49	Bag	46 3/4	1/4	46 1/2	16 3/4	36.02	29 1/4	130	2.10	.0161			
	6-9-49	Bag	50 1/4	1/4	50	23 1/2	47.00	26 1/2	120	2.10	.0175			
Average							41.51				.0179	.045	.073	2.5
									Est.	Actual				
Cauliflower	1-12-49	Crate	39	8 1/2	30 1/2	18 1/2	59.8	12# 4 oz.	62	62	4.15	.0653		
	1-12-49	Crate	41 1/4	8 3/4	32 1/2	19 3/4	60.7	12# 12 oz.	67	60	4.15	.0691		
	1-17-49	Crate	34 3/4	6 1/4	28	21	75	7# 6 oz.	40	36	2.90	.0805		
	1-29-49	Crate	36 1/2	8 1/2	28	21	75	7# 4 oz.	45	45	3.90	.0866		
	2-19-49	Crate	45 1/4	10	35 1/4	27	76.5	8# 4 oz.		45	3.45	.0766		
		Crate	41 3/4	8 1/2	33 1/4	24	72.1	9# 4 oz.	51	52	3.90	.0750		
	4-6-49	Crate	41 1/4	9 1/2	31 1/4	25	80	6# 8 oz.		38	2.45	.0644		
Average							71.3				.0739	.113	.377	1.54
Brussels Sprouts	1-12-49	Drum	32 1/2	6 1/2	26	8 1/2	31.7	17		106	8.10			
	1-15-49	Drum	32 1/2	6 3/4	25 3/4	8 3/4	33.7	17		120	8.25			
		Drum	33 1/2	6 1/2	27	9	33.3	16 3/4		126	6.75			
	2-4-49	Drum	36 1/4	6 1/2	29 3/4	9 1/4	31.0	18 3/4		129	8.40			
	2-9-49	Drum	33 1/4	7	26 1/4	9	33.6	17 1/2		77	4.95			
	2-11-49	Drum	32 3/4	6 1/4	26 1/2	9 1/2	31.1	16 3/4		82	4.95			
	2-25-49	Drum	35 1/2	6 1/2	29 1/2	8 3/4	29.9	18 3/4		118	7.10			
	3-15-49	Drum	36 1/4	6 1/2	29 3/4	8	26.9	21 3/4		119	8.00			
Average							31.4				.0645	.255	.3958	3.97
Kale	2-19-49	Bushel	25 3/4	6 3/4	19	10	52.5	11		100	2.25	.0225		
	2-24-49	Bushel	26	4	22	10	45.2	11 1/2		83	2.10	.0253		
	2-25-49	Bushel	30 1/2	5 3/4	24 3/4	10	41.03	15 3/4		123	2.00	.0154		
		Bushel	29 1/2	7	21 1/2	10 1/2	47.12	12 1/2		96	1.90	.0197		
	3-14-49	Bushel	21 3/4	6	15 3/4	6 1/2	41.26	7 3/4		57	1.75	.0302		
	3-16-49	Bushel	23	5 1/2	17 1/2	7 3/4	44.28	7 1/4		59	1.75	.0296		
	3-21-49	Bushel	28 1/4	4 1/2	23 3/4	9 1/4	39.67	14		140	1.75	.0125		
	3-1-49	Bushel	26 3/4	5 1/4	23 1/2	10	42.12	13 1/4		138	2.00	.0144		
Average							42.89				.022	.104	.188	4.69

Of this amount 31.4% or 70¼ pounds were lost through preparation waste, leaving 142¾ pounds of edible material. The total number of servings was 877. The total cost of the Brussels sprouts was $56.50. This averaged $0.2599 per pound as purchased, $0.3958 per pound of edible material, or $0.0645 per serving. The average number of servings per pound was 3.97 as shown in table III, page 29. The average size of a serving was 3½ ounces.

In this study eight bushels of kale were used, totaling 167½ pounds as purchased. There was 42.89% or 73¾ pounds of preparation waste and 92¾ pounds of edible material. The total number of servings was 786. The kale cost $17.50. The cost per pound as purchased was $0.104, per pound of edible portion, $0.188 or $0.022 per serving. The average number of servings per pound was 4.69 as shown in table III, page 29. The average size of a serving was 3½ ounces.

B. Variation of Waste Among Individual Samples

The crate waste in these samples was so small as to be insignificant so no data were obtained on such losses. The variation in the per cent of preparation waste is quite high in the different samples of the same vegetable, table III, page 29. For instance, for cabbage the lowest per cent of waste was 32.4% while the highest was 52.25%, figure 16, page 31.

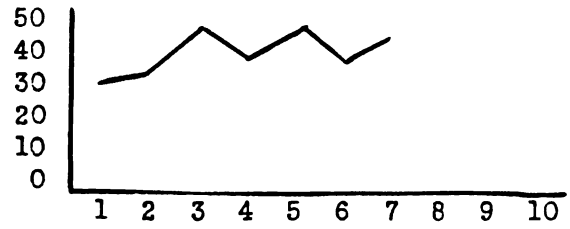


Figure 16. Variations in per cent of waste in Cabbage samples

There are several factors which could account for this variation; the quality of the vegetable, the skill of the workers, and the speed at which they worked. In general, the quality of the vegetables was good but occasionally a case would be less good. Another variable, the skill of the worker, could also result in greater or less waste depending on the carefulness of the worker, since different women prepared the various samples used. The time element could also have caused considerable variation since the vegetables for this study were prepared as part of the routine work regardless of whether there was much or little work to be done or whether the preparation crew was short handed or not. These variables were not controlled in this study because the purpose was to find the actual per cent of waste and the yield as obtained in this institution. Another important factor which could cause a great variation in the per cent of waste was the amount of trimming done by the packer when the vegetables were sacked or crated.

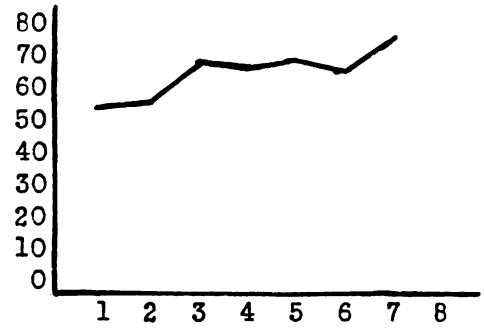


Figure 17. Variation in percent of waste in cauliflower samples

As shown in figure 17, the variation in per cent of waste in the cauliflower samples ranges from 59.8% to 80%. There were several crates of very small cauliflower used. This would be another factor in increasing the per cent of waste since the amount of foliage in comparison with curd would be greater.

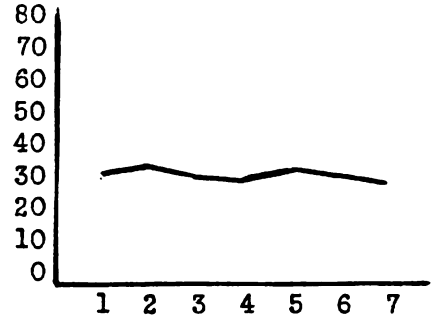


Figure 18. Variation in per cent of waste in Brussels Sprouts

The drums of Brussels sprouts used were all of very good quality and of practically the same size so that there was little variation found in the per cent of waste, the least being 26.9% and the greatest 33.7%, figure 18.

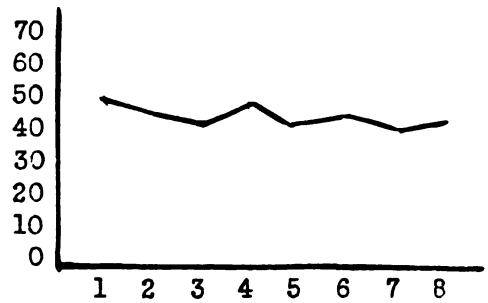


Figure 19. Variation in per cent of waste in kale

The range of per cent of waste in the samples of kale was from 39.67 to 52.5, figure 19. Stems were always removed and the percentage of stem to leaf varied considerably.

C. Comparison of Per Cent of Waste Found by Other Workers

TABLE IV COMPARISON OF PER CENT OF WASTE

Vegetable	Harris & Wood	Halliday & Noble	Cornell Aids to Marketing	This Study
Cabbage	30%	40% loose, green 11.1% white compact	8.3 to 331/3%	41.5%
Cauliflower	56%	50%	75%	71.3%
Brussels sprouts	33%	20%		31.4%
Kale	--	--		42.89

The average per cent of waste for cabbage was found to be 41.5% in this study as compared to 30% by Harris and Wood (11), 11.1% for

white compact heads and 40% for loose green heads by Halliday and Noble (10), and 8.3% to 33 1/3% by the Cornell study.(1) The Harris and Wood and the Cornell figures are on a large quantity basis while the Halliday and Noble figures are computed from data, table V, page 35, obtained regarding the length of time required to cook a four serving sample. The latter being a smaller sample was probably more carefully controlled than would be possible in large quantity preparation. Furthermore, the vegetables for the small quantity study were probably purchased on the retail market where much more trimming is done than on the wholesale market, which would result in less waste.

Both Halliday and Noble (10) and the Cornell study "Aids to Marketing",(1) give separate figures for early loose green cabbage and winter white compact heads. As would be expected the loose green cabbage has a greater preparation waste. The 40% preparation waste found by Halliday and Noble for loose green new cabbage is comparable to the 41.5% found by this study for the same type of cabbage.

D. Comparison of Servings Per Pound

As seen in table V, page 35, there is a great variation in the number of servings per pound as found by the different authorities cited. Halliday and Noble lead in the number of servings of cabbage per pound. Their number of 6 per pound for white compact cabbage seems high but their figure for loose green cabbage is only 2.3 servings per pound. The cabbage used in the present study was loose green new cabbage and the number of servings per pound of 2.5 compares well

TABLE V COMPARISON OF DATA

	Harris & Wood (11)	Wenzel (17)	New York Restaurant Assoc. (12)	Cornell U. Aids to Marketing (1)	Halliday & Noble (10)	West & Wood (18)	Encyclopedic Cook Book (4)	Dahl (9)	Bryan (6)	This Study
Cabbage										
Preparation waste	30%				11%-white, compact 40% loose, green			30%		41.5%
Size of serving - oz.	2 2/3 to 3	4						3 1/2	4	3 1/2
No. servings per lb. A.P.	4	3	3		6.6-white, compact 2.3 loose, green	4	3	4	4	2.5
Cauliflower										
Preparation waste	56%			33% if ribs used 75%	50%			60%		71.3%
Size of serving - oz.	3	2 1/3						3		3 1/2
No. servings per lb. A.P.	2	2.4	2 to 2 1/3	2	2.7	1.6 to 2	2 to 2.6	2.5		1.54
Brussels Sprouts										
Preparation waste	33%				20%			12%		31.4
Size of serving - oz.	2 1/2 to 3	2 1/2							5	3 1/2
No. servings per lb. A.P.	4 to 6	4.8	4 to 5	4 to 6	6	4	4	4	4	3.97
Kale										
Preparation waste										42.89%
Size of serving - oz.		2							3 1/2	3 1/2
No. servings per lb. A.P.		5		2 1/2 to 3			1.5 to 2		6	4.69

with the Halliday and Noble study. The other studies do not state the type of cabbage used but the number of servings per pound falls within the extremes listed by Halliday and Noble, the number most frequently given being 4 per pound. The size of a serving varies from $2\frac{1}{2}$ to 4 ounces which would partially account for the variation in number of servings per pound. The variation in per cent of preparation waste would be another factor which would influence the number of servings per pound.

The number of servings per pound of cauliflower ranges from 1.54 found by this study to 2.7 given by Halliday and Noble, the most frequent number being 2 servings to the pound. Again we find a variation in the size of serving, ranging from $2\frac{1}{2}$ to $3\frac{1}{2}$ ounces, table V, page 35.

The per cent of waste for cauliflower and Brussel sprouts follows the same trend as that for cabbage, Halliday and Noble showing the smallest, Harris and Wood somewhat greater and the results of this study being the largest of the three, but less than the figure found by the Cornell study, table V, page 35.

As shown in table V, page 35, the number of servings of Brussels Sprouts per pound varies from 3.97 to 6. The results found in this study was 3.97 which is approximately the same as the smallest number of servings shown in table V, page 35. The number of servings per pound of cauliflower listed the greatest number of times is 4, which is approximately the number found by the present study.

The number of servings of kale per pound as shown in table V, page 35, varies to such an extent that these figures lack significance. Wenzel (17) lists 5 servings per pound, Aids to Marketing by Cornell University (1) lists $2\frac{1}{2}$ to 3, and the Encyclopedic Cook Book (4) 1.5 to 2. The results obtained in this study was 4.69 which is reasonably close to Wenzel's 5 servings.

The workers mentioned give no information on the number of samples run, the supervision given the employees, whether the vegetables were random samples as in this study or especially selected for the purpose, or whether the vegetables were purchased on the retail or the wholesale market. Since there is much more trimming done on the retail market this factor alone could account for a wide range in per cent of waste. Over half of the studies listed do not give the size of the servings. Therefore, it is difficult to compare the results of this study with data given by the workers mentioned.

E. Comparison of Waste of Different Vegetables

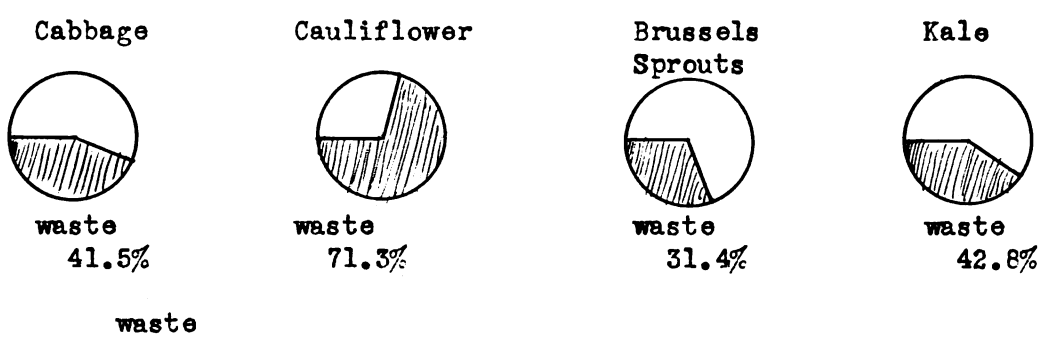


Figure 20. Comparison of Waste

According to the results obtained in this study figure 20, above Brussels sprouts had the smallest per cent of waste, 31.4, cabbage averaged 41.5%, kale, 42.8% and cauliflower 71.3%. The high per cent of waste in the latter is due to the fact that only the white "curd" was used. Some food service units serve some of the more tender wrapping leaves as "cauliflower greens" in a variety of ways. The per cent of waste can be cut to 33 1/3% by serving the ribs and green leaves.(1) This would, of course, cut down on the per cent of waste and also reduce the cost per serving.

F. Comparison of Servings Per Pound and Per Cent of Waste

TABLE VI SERVINGS PER POUND

	Servings	Per cent of Waste
Cabbage	2.5	41.5
Cauliflower	1.54	71.3
Brussels sprouts	3.97	31.4
Kale	4.67	42.89

The number of servings per pound as found by this study are given in table VI. We do not find a direct correlation between the per cent of waste and the number of servings per pound in all cases. The per cent of waste of cabbage was 41.5% with a yield of 2.5 servings per pound while the waste for kale was 42.89 with 4.67 servings per pound. The greater yield per pound in the case of kale might be due to the difference in the amount of shrinkage in cooking.

Brussels sprouts with 31.4% of waste averaged 3.97 servings per pound. In this vegetable a smaller per cent of waste yielded fewer servings per pound than was the case with kale where a higher waste was found. The difference between these two vegetables might be in size and shape since the Brussels sprouts were served whole and the kale in its natural leafy state. The small number of servings in the case of cauliflower can easily be accounted for by the high per cent of waste.

G. Comparison of Cost Per Pound and Per Serving

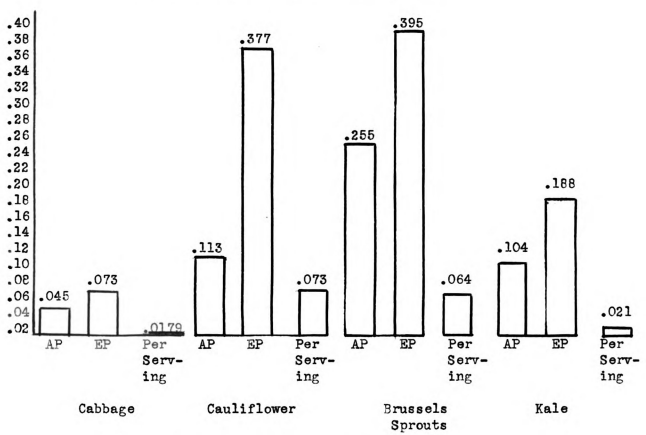


Figure 21. Cost per pound, as purchased, as edible portion and per serving.

As shown in figure 21, the price per pound for the vegetables used in this study was least for cabbage followed by kale, cauliflower and Brussels sprouts in the order listed. Kale was $0.059 higher per pound as purchased than cabbage and $0.115 higher per pound of edible portion but since the number of servings per pound as purchased was only 2.5 for cabbage and 4.69, for kale, table III, page 29, it was found that the cost per serving was practically the same, being $0.0179 for cabbage and $0.021 for kale.

In the comparison of cabbage and cauliflower it was found that there was a difference of only $0.078 per pound as purchased but per pound of edible material the difference was $0.304, figure 21. The percentage of waste of cauliflower was high, 71.3% as against 41.5% for cabbage, table III, page 29. This accounts for the greater difference in the cost per pound of the edible material. The difference in cost per serving was only $0.055 or less than the difference in the cost per pound as purchased. This situation was brought about by the fact that the number of servings per pound of cauliflower was found to be only 1.54 as compared to 2.5 for cabbage, table III, page 29.

A similar comparison of cabbage with Brussels sprouts shows a difference of $0.21 per pound as purchased and $0.32 per pound of edible material, figure 21. The closer correlation in these two vegetables is due to the fact that the waste percentages of 41.5% for cabbage and 31.4% for Brussels sprouts, table III, are more nearly alike than those for cabbage and cauliflower. Since the number of

servings per pound as purchased was greater for Brussels sprouts, being 3.97, than the 2.5 servings per pound as purchased for cabbage it was found that the difference in cost per serving was only $0.047, figure 21, page 39.

The comparison of the cost per pound as purchased, per pound of edible material and cost per serving clearly shows that because of variation in per cent of waste and number of servings per pound a vegetable may or may not be a better buy than another vegetable. In this study cauliflower at $0.113 per pound as purchased cost more per serving than Brussels sprouts at $0.25 per pound as purchased, figure 21, page 39.

The data for this study were collected from January to June 1948. The prices for the vegetables studied are given for that period of the year 1949, table III, page 29. There would undoubtedly be some variation for different seasons of the year and for abnormal crop or weather conditions.

H. Possible Substitutions of the Vegetables in this Study

Wenzel (17) states that not more than 65 cents (65%) of the income dollar should be paid out for food cost and payroll, the two biggest items of expense to a food service unit. He recommends that a reasonable division of the two would be 40% spent for food and 25% for labor. If the food cost is higher the payroll should be less. In these days of high labor costs it is practically impossible to reduce the labor payroll percentage so it is essential that the food

cost be watched carefully. For the sake of variety an operator might decide to serve cauliflower instead of cabbage since they are similar in flavor. The following figures show what would happen to the food cost per cent if such a substitution were made in a specific meal. The costs of cabbage and cauliflower are the averages found in this study, table III, page 29.

The costs to the operator are as follows:

No. 1		No. 2	
Meat	$0.20	Meat	$0.20
Salad	.05	Salad	.05
Cabbage	.018	Cauliflower	.073
Potato	.03	Potato	.03
Bread & Butter	.03	Bread & Butter	.03
Dessert	.05	Dessert	.05
Beverage	.04	Beverage	.04
Total Cost	$0.418	Total Cost	$0.473
Mark up to allow 40% food cost	2½	Mark up to allow 40% food cost	2½
Selling Price	$1.05	Selling Price	$1.182

In this instance his loss would be $0.13 on each meal served, if he charged $1.05 for the meal and served cauliflower instead of cabbage. Looking at the situation from the food cost angle we see that when the operator sells a meal costing him $0.47 for $1.05 he is allowing himself a mark up of 2.22 instead of the 2½ which gives him a 40% food cost. The 2.22 mark up gives him a food cost of 45%. In other words, he has raised his food cost by 5%.

If a food service manager planned to operate on a 50% food cost he would price his meals by multiplying the cost of the food by two.

In the case of these particular meals the following figures illustrate the procedure.

	Meal No. 1	Meal No. 2
Cost	$0.418	$0.473
50% Mark up	2	2
Selling price	$0.836	$0.946

If cauliflower were substituted for cabbage as in Meal No. 2 without an increase in price the operator would be losing $0.11 per meal. Instead of a 50% food cost with a mark up of 2 he would be receiving a mark up of 1.76 which would mean that his food cost was 56%. These figures show that since the cost of a serving of cauliflower is $0.055 higher than a serving of cabbage the former vegetable cannot be substituted for the latter in a meal selling at a price originally including cabbage without substantially increasing the food cost per cent.

The operator has two alternatives in this situation; he can increase the price of his meals if he can do so without pricing them out of the range of his clientele or he can try to reduce his payroll or other expenses. If he succeeds in neither solution he must face a reduction in his per cent of profit.

It would be possible to use cabbage and kale interchangeably since the price per serving of both vegetables is about the same, as found in this study, table III, page 29. In the higher priced meals cauliflower and Brussels sprouts could be used interchangeably.

I. Availability and Wholesale Price of Vegetables Studied

According to table VII, domestic cabbage is available every month of the year on both the Chicago and the New York wholesale markets. Danish type cabbage is on the New York market from October through January and on the Chicago wholesale market from October through January. This type, which reverts easily must be renewed by imported seed. It is the northern grown winter storage cabbage. The states shipping Danish type cabbage to the New York market are New York, New Jersey, Pennsylvania and the Long Island section of New York state. Michigan and Wisconsin ship this type of cabbage to the Chicago market.

TABLE VII WHOLESALE PRICES AT NEW YORK AND CHICAGO - 1948

	Cabbage				Cauliflower		Brussels Sprouts		Kale	
	N.Y.		Chi.		N.Y.	Chi.	N.Y.	Chi.	N.Y.	Chi.
	*Da	Do	Da	Do						
Jan.		.043	.045	.041	.055	.053	.16	.167	.08	.09
Feb.		.034		.032	.08	.074	.24	.247	.118	
March		.03		.038	.07	.066	.16	.19	.07	
April		.057		.062	.068	.059		.22	.056	
May		.019		.034	.084	.069			.04	
June		.024		.038	.08	.06			.045	
July		.018		.026	.07	.056			.03	
Aug.		.011		.019	.07	.06	.13		.024	
Sept.		.018		.024	.07	.065	.13	.204	.018	
Oct.	.018	.019	.017	.019	.053	.069	.15	.186	.018	
Nov.	.014	.02	.016	.049	.05	.058	.12	.192	.015	
Dec.	.017	.033	.015	.023	.061	.058	.11	.195	.029	.077

*Da - Danish
Do - Domestic

The New York wholesale market is supplied with domestic cabbage by Arizona, Texas, California, Florida, Georgia, Virginia, New York, North and South Carolina and Pennsylvania (19). Domestic cabbage from the following states is found on the Chicago wholesale market: Arizona, California, Florida, Georgia, Illinois, Kentucky, Louisiana, Mississippi, Missouri, Ohio, South Carolina, Tennessee, Texas and Wisconsin.

The price of cabbage varies, being cheapest in the late summer and fall and gradually increasing as the stored fall crop is depleted and the new, green cabbage from the South comes on the market. In general the price of cabbage is about the same on the New York and the Chicago markets, table VII, page 44.

Cabbage is sold on the New York market in at least seven different types of containers, for most of which there is no legal weight established. Standards are set up for dimensions or volumes of certain containers but they are of little help in determining the number of pounds. For instance, legally a bushel contains 2150.42 cubic inches but a bushel of cabbage weighs from 40 to 50 pounds depending on the type of cabbage, the pack and the trim. A $1\frac{1}{2}$ bushel hamper weighs 50 pounds. The dimensions of a Los Angeles crate are 13'x18x21$\frac{3}{4}$. The poney crate 8$\frac{1}{2}$x18x21 5/8 inside measurement, the Long Island crate 13$\frac{1}{2}$x15$\frac{1}{2}$x23 inches (7). These are some of the containers in which cabbage is sold, as well as in 50# sacks. On the wholesale market cabbage is sold by the container rather than by the

pound. Large food service units profit by purchasing fruit and vegetables wholesale, but it is essential that the food service manager know something about types and sizes of containers since price per pound and number of servings per pound are of vital importance to successful operation.

Cauliflower is available on both the New York and the Chicago wholesale markets throughout the year, table VII, page 44, at similar prices. Cauliflower is priced by the container on the wholesale market. Crates from the western states and some of the crates from the eastern states contain a specified number of heads.(16) On the New York market there also appears a Long Island 1 3/5 bushel box and a New York Catskill section crate. Neither of these containers have a specified weight or number of heads. There are a variety of Catskill containers which have no definite standards. The western poney crate contains 12's or larger, 12 referring to the number of heads per crate. There is also a New York crate containing 6's while the Michigan crate contains 9's to 12's. When buying cauliflower a food service manager would need to decide the size of head which would give the particular food unit the kind and number of servings desired per head of cauliflower. For instance, some units serve broken up florets, others serve whole florets, while still others buy small heads and serve the whole head. After deciding on the size of head desired the manager would specify the size when ordering.

Brussels sprouts are not on the New York wholesale market from April through July. They are not available on the Chicago wholesale market from May through August, table VII, page 44. The prices are similar on these two markets during the early part of the year. However, sprouts are much cheaper on the New York market during the late summer and fall.(19)

This is true probably because Long Island and the Catskill section are in production at that time. At the same period all sprouts on the Chicago market are grown in California. There is less variation in the containers used for Brussels sprouts, the most common being the 25 lb. drum, the bushel and the quart.(7) The drum and the bushel contain approximately the same amount. A quart varies from 1 pound to $1\frac{1}{4}$ pounds.

Kale is on the New York market throughout the year but only during January and December on the Chicago market, table VII, page 44. Long Island produces this crop from May through December at a very reasonable price. Since it is produced locally it is much cheaper on the New York market than on the Chicago market, table VII, page 44.

The early crop from January to March comes from Virginia, (19) Indiana and Virginia are the only states shipping to Chicago.

Kale is sold on these markets in bushel baskets and 1 3/5 bushel boxes.(19) Here again there is no federal regulation on the weight of product in the container but by common usage a bushel is supposed to contain 18 pounds.

CHAPTER VI

SUMMARY AND CONCLUSIONS

In a study of four members of the vegetable family, Brassica oleracea, the per cent of preparation waste, the cost per pound of edible portion, the number of servings per pound and the cost per portion were determined for cabbage, cauliflower, Brussels sprouts and kale. It was found that Brussels sprouts had the lowest per cent of waste and that cabbage, kale and cauliflower had increasingly greater waste in the order listed. The cost per pound of edible portion was lowest for cabbage, more than double for kale while both cauliflower and Brussels sprouts were slightly over five times more expensive than cabbage. The number of servings per pound was lowest for cauliflower and showed a gradual increase for cabbage, Brussels sprouts and kale. Although there was a direct correlation between the highest waste and the lowest number of servings per pound for cauliflower such correlation between waste and number of servings per pound did not appear to exist for the other three vegetables studied. Other factors such as size, shape, texture, and amount of shrinkage during cooking, as well as preparation waste apparently have a bearing on the number of servings per pound.

Cabbage was the cheapest per serving, followed by kale, Brussels sprouts and cauliflower, in the order given. Kale was 1.1 times higher than cabbage, Brussels sprouts 3.8 times and cauliflower 4 times more expensive than cabbage. Kale could be substituted for cabbage but the other two vegetables could not be used

economically as a cabbage substitute. Cauliflower and Brussels sprouts, although too expensive for low cost meals, do have a place in food service where the traffic will bear the extra cost. They add variety at a time of year when appetites are jaded and other fresh vegetables are scarce.

There are many factors affecting the price per serving of the vegetables studied. Some of these are crop conditions, source of supply whether local or otherwise, season of the year, kind and amount of trim, type of market whether retail or wholesale, condition of vegetables at time of purchase, care and facilities for storage of vegetables not used immediately, skill and training of workers preparing the vegetables, amount of supervision given the workers, the type of food service and the type of clientele to which it caters, the skill of the vegetable cook, the size of the serving and the training and carefulness of the employee serving the vegetables.

Some of these factors are beyond the control of the food service manager but by buying good quality produce in season at a price on which a reasonable mark up can be realized and by rigid control of the factors involved after the food arrives at the unit it is possible to serve good food to satisfied consumers.

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LITERATURE CITED

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APPENDIX

Taken from Planting and Harvesting Commercial Truck Crops for fresh market, U. S. D. A., B. A. E. (13)

DEFINITIONS AND EXPLANATIONS

The data as presented relate only to those truck crops and areas of production covered by the official estimates of the Bureau of Agricultural Economics under the caption "Commercial Truck Crops for Fresh Market".

The "Group and State" is the grouping used by the Bureau in preparing official estimates of acreage, yield, and production to show the seasonal sequence of supplies. The chart on the opposite page shows approximate periods covered by each seasonal group and subgrouping.

The "Usual Dates" are intended to indicate that period in which the main part of the crop is planted and harvested in most seasons, but may exclude exceptionally early or exceptionally late dates of light planting or harvesting. It is not intended to include unusual extremes in individual seasons.

The "Planting" period shown covers the time when crops usually are planted in the field. In the case of crops grown from seed without transplanting, it is the period in which the seed is planted. "Seed" is used in a broad sense and includes tubers, bulbs, etc. For transplanted crops, the planting period shown is the period when they are set in the fields.

The "Harvesting" period designated is the period when crops are picked, cut, pulled, dug, or otherwise harvested. For commodities

temporarily stored in the field following harvest, the period does not include field storage. In the case of most crops, the harvesting period coincides closely with the marketing period. For storage crops such as beets, cabbage, carrots, celery, and onions, the marketing season in some areas may extend several months past the harvesting period.

The "Most Active Harvesting" period has been set up to show when the bulk or the major part of the season's harvesting occurs. It is in substance the entire "harvesting" period less the usual periods of light harvestings at the beginning and at the end of the crop season.

C A B B A G E (For Market and For Kraut)

GROUP AND STATE	USUAL DATES			
	Planting	Harvesting		
		Begins	Most Active	Ends
WINTER:				
California	July 1 - Nov. 30	Oct. 1	Feb. - Apr.	June 30
Arizona	Aug. 25 - Dec. 31	Nov. 1	Dec. - Mar.	Apr. 30
Texas	Aug. 25 - Jan. 15	Nov. 10	Dec. 15 - Apr. 30	May 15
Florida	Sept.15 - Jan. 31	Dec. 1	Jan. 1 - Apr. 15	May 10
Alabama	Sept. 1 - Oct. 10	Nov. 20	Dec. and Jan.	Feb. 15
EARLY SPRING:				
Louisiana	Aug. 15 - Feb. 15	Nov. 1	Mar. 20 - May 10	June 30
Mississippi	Jan. 15 - Feb. 15	Apr. 25	May	May 31
Alabama	Dec. 1-31	Mar. 20	Apr. and May	May 10
Georgia, south	Dec. 15 - Jan. 15	Apr. 1	Apr. 15 - May 15	May 31
South Carolina	Dec. 1 - Jan. 15	Mar. 15	Apr. and May	June 15
LATE SPRING:				
North Caroline	Dec. 1 - Feb. 28	Apr. 15	May	June 15
Virginia	Nov. 20 - Feb. 28	Apr. 20	May 5 - June 15	June 30
Maryland	Mar. 1-31	May 25	June	June 25
Tennessee	Mar.	Apr. 25	May and June	June 25
Kentucky	Mar.	May 1	June	July 31
Ohio, S. E.	Mar. 15-30	June 10	June	July 15
Missouri	Mar. 25 - Apr. 10	May 25	June	July 31
Washington	Feb. - Apr.	May 1	June	July 31

C A B B A G E (For Market and For Kraut)

GROUP AND STATE	USUAL DATES			
	Planting	Harvesting		
		Begins	Most Active	Ends
EARLY SUMMER:				
New Jersey.....	Mar. 25 - Apr. 30	May 25	June and July	Aug. 20
New York, L.I. .	Apr. - May	June 1	July and Aug.	Aug. 31
Georgia, north..	May 1 - June 30	July 1	July and Aug.	Sept.30
Indiana.....	Mar. - May	June 15	July and Aug.	Oct. 31
Illinois.....	Apr. 15 - May 10	June 20	July and Aug.	Sept.15
Iowa.....	Apr. 15 - June 30	June 20	July and Aug.	Oct. 15
LATE SUMMER:				
Colorado.....	Apr. 15-30	July 15	Aug. and Sept.	Oct. 15
Utah.....	Apr. 20 - May 10	Aug. 1	Aug. and Sept.	Sept.30
New Mexico.....	May 1 - June 20	Aug. 15	Aug. 20 - Sept.30	Oct. 15
Minnesota.....	May 1 - June 10	July 15	Aug.	Aug. 31
Ohio.....	Apr. 1 - June 30	July 1	Aug. and Sept.	Oct. 31
Pennsylvania....	Apr. 15 - June 15	June 25	Aug. and Sept.	Oct. 15
Virginia, S.W. .	Apr. 15 - July 25	June 25	Aug. 1 - Sept. 15	Oct. 31
North Carolina..	May 15 - July 15	July 15	Sept.	Oct. 10
EARLY FALL (Domestic)				
New York, L.I..	June 1 - Aug. 10	Sept. 1	Sept. and Oct.	Oct. 31
New York, other.	May 15 - June 30	Aug. 15	Sept. and Oct.	Oct. 31
New Jersey.....	July 1 - Aug. 10	Sept. 1	Sept. and Oct.	Nov. 5
Michigan.....	Apr. 1 - June 15	July 1	Aug. and Sept.	Sept.30
Wisconsin.....	May 1 - June 20	July 1	Sept. and Oct.	Oct. 31
Washington.....	May 1 - July 31	Sept. 1	Sept. and Oct.	Nov. 15
EARLY FALL (Danish)				
New York.....	May 15 - July 31	Sept. 1	Oct. and Nov.	Nov. 30
Pennsylvania....	June 1 - Aug. 15	Sept. 15	Sept. and Oct.	Nov. 30
Ohio.....	June	Sept. 15	Sept. and Oct.	Nov. 10
Indiana.....	May 1 - June 30	Sept. 1	Sept. and Oct.	Oct. 31
Michigan.....	June 10 - July 10	Sept. 25	Oct.	Oct. 31
Wisconsin.....	June 10-30	Sept. 20	Sept. and Oct.	Oct. 31
Minnesota.....	May 20 - June 20	Sept. 1	Sept. and Oct.	Oct. 31
Colorado.....	May 1-15	Aug. 15	Sept. and Oct.	Oct. 31
LATE FALL:				
Oregon.....	June 15 - July 31	Sept. 1	Nov. and Dec.	Jan. 31
Virginia.....	July	Oct. 15	Nov. 15 - Dec. 15	Jan. 10
North Carolina..	July 15- Aug. 31	Nov. 1	Nov. 10 - Dec. 15	Dec. 31
South Carolina..	Aug. 1 - Sept.15	Oct. 25	Nov. and Dec.	Feb. 28

C A U L I F L O W E R

GROUP AND STATE	USUAL DATES			
	Planting	Harvesting		
		Begins	Most Active	Ends
WINTER:				
California	July - Sept.	Oct. 1	Nov. - Jan.	Feb. 28
Arizona	Aug. 15 - Sept. 30	Nov. 15	Dec. and Jan.	Jan. 15
Oregon	Aug. 1-31	Jan. 1	Feb. and Mar.	Apr. 30
Texas	Sept. 1-30	Dec. 1	Jan. and Feb.	Feb. 28
SPRING:				
California	Oct. - Dec.	Feb. 1	Feb. - Apr.	June 30
Washington	Feb. - Mar.	May 1	June	June 30
SUMMER:				
New Jersey	Apr. 1 - May 1	June 10	June and July	July 25
New York	Mar. - June	June 1	June - Oct.	Nov. 30
Washington	Apr. - May	July 1	July	Aug. 31
Colorado	Apr. - June	July 1	Aug. and Sept.	Nov. 30
FALL:				
New York, L. I.	July 1 - Aug. 10	Oct. 1	Oct. and Nov.	Dec. 31
Michigan	June - July	Sept. 1	Sept. and Oct.	Dec. 31
Oregon	May 15 - July 31	Sept. 1	Oct. and Nov.	Dec. 31
New Jersey	July 1 - Aug. 10	Sept. 15	Oct.	Nov. 15
Washington	June - July	Sept. 1	Oct.	Oct. 31

K A L E

WINTER:				
Virginia	July 20 - Sept. 10	Oct. 15	Dec. - Mar.	Apr. 30

COMMERCIAL TRUCK CROPS FOR FRESH MARKET (7)

SEASONAL GROUPS
(On basis of most active harvesting period)