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NATIONAL COOPERATIVE PROJECT CONSERVATION
OF NUTRITIVE VALUE OF FOODS

PROGRESS NOTES*

FACTORS INFLUENCING THE ASCORBIC ACID, CAROTENE, AND QUALITY OF VEGETABLE PRODUCTS

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The study was undertaken to determine (a) the ascorbic acid and carotene content of some freshly harvested vegetables as compared with the amount retained when the same vegetables were blanched and blanched and frozen, (b) the physical rating of certain characteristics or palatability of different vegetables.

In order to obtain a freshly harvested supply of products when needed they were furnished by the Horticultural Division of the Experiment Station and the ascorbic acid, carotene and moisture determinations were carred out in Experiment Station Chemistry.

The vegetables were harvested, then prepared for the locker as soon as received. Tap water was used for the washing, blanching and in cooling the vegetables after blanching. Samples were weighed out after washing and before blanching for all the determinations. Determinations of ascorbic acid and carotene were made on the freshly harvested and blanched vegetables also samples were blanched and quick frozen and kept in the freezer locker at about 2° F. for nine months when determinations of the ascorbic acid and carotene were then made on the frozen product.

Results of these determinations are given in Tables I and II.

TABLE I

Ascorbic Acid Content of Fresh, Blanched and Frozen Vegetables

Product-- Condition	Moisture Content Per cent	ASCORBIC ACID Fresh Basis Mgm/100 gm.	ASCORBIC ACID Dry basis Mgm/100 gm.	ASCORBIC ACID Retained Dry basis Per cent
Peas				
Fresh	79.15	20.43	97.9	
Blanched	80.22	14.42	72.8	74.3
Blanched & Frozen	81.28	10.74	54.2	57.6
Beans				
Fresh	92.20	10.73	138.	
Blanched	92.67	9.80	133.	96.3
Blanched & Frozen	91.77	8.81	74.2	77.5
Califlower				
Fresh	93.31	40.58	606.	
Blanched	93.48	40.33	618.	101.0
Blanched & Frozen	91.71	28.72	346.	57.0
Broccoli				
Fresh	88.83	83.52	747.	
Blanched	91.89	78.33	965.	129.0
Blanched & Frozen	92.17	39.10	499.	66.8
Peppers				
Fresh	94.22	81.90	1417.	
Blanched	94.76	62.40	1190.	83.9
Blanched & Frozen	92.96	35.62	505.	35.6

TABLE II

Carotene Content of Some Fresch, Blanched, and Frozen Vegetables

Product-- Condition	Moisture Content Per Cent	CAROTENE Fresh basis Microg/gm	CAROTENE Dry basis microg/gm	CAROTENE Retained Dry Basis Per Cent
Peas				
Fresh	79.15	5.0	23.9	
Blanched	80.22	4.8	24.2	101.0
Blanched & Frozen	81.23	5.7	30.4	127.1
Beans				
Fresh	29.20	1.1	14.1	
Blanched	92.67	1.0	13.6	96.4
Blanched & Frozen	91.77	1.06	12.0	90.7
Broccoli				
Fresh	88.83	12.50	111.9	
Blanched	91.89	16.15	199.1	177.8
Blanched & Frozen	92.17	10.06	128.4	113.8
Peppers				
Fresh	94.22	3.24	56.1	
Blanched	94.76	3.26	62.4	111.3
Blanched & Frozen	92.96	3.75	53.2	94.9

Palatability of the different products was based on five factors; color, shape, texture quality or moisture and flavor with a rating of 20 as high. These scores are given in Table III.

TABLE III

Palatability Scores of Some South Dakota Vegetables

PRODUCTS	SCORE	PRODUCTS	SCORE
Peas	15.91	Asparagus	16.3
Beans	17.62	Carrots	16.8
Cauliflower	15.02	Corn	18.2
Broccoli	17.78	Chard	16.18
		Spinach	15.6

There was a difference in the various kinds of vegetables some being more acceptable and palatable than others. This is shown in the different varieties of peas, the higher carbohydrate peas rating lower in palatability than the lower carbohydrate peas. Table IV.

TABLE IV

Palatability Scores of Different Varieites of Peas

Varieties: Peas	Scores 1945-44	1941-2-3
Litte Marvel & Others	17.08	16.3
Lower Carbo	14.4	

Palatability Scores of Asparagus Frozen Under Different Methods

Asparagus	
Dry Pack	15.9
Brine Pack	16.65

In quick freezing other products, different methods were used as in asparagus. Dry or brine pack was used. The brine pack rated slightly higher than the dry pack although this was not true of the other vegetables.

Figures for the carotene content are given, but is is not known whether they will be of any value.

The retention of ascorbic acid varied with the kind of vegetable, when scalded and frozen, it being highest with beans.

Moisture determinations were made of each sample fresh, scalded and scalded and frozen and that figure was used in calculation of the vitamin on the dry basis. A 200 gram sample was quick frozen and when taken from the locker this was ground and a 25 gr sample was used for a determination.

No explanation can be given for the apparent increase of ascorbic acid in broccoli in scalding nor for the increase of carotene in the scalded peas, broccoli and peppers and the quick frozen peas and broccoli.

More work needs to be done with all these vegetables. The loss of ascorbic acid in blanching with the exception of broccoli varied from cauliflower with a negligible loss to 25.7% loss in peas, based on the dry weight.

The samples taken from the same lot blanched, frozen and stored, with the exception of peas, showed a greater loss than when blanched only.

M.C. Smith, Arizona, found in their work as reported in memographed report #57, on dehydration of vegetables that, "during the drying process a relatively small percentage of carotene was destryoed. In some cases a greater amount of carotene was recorded for the dehydrated product than for the fresh, raw samples of the same lot of vegetables and offers the explanation that it may be caused by the difficulty of sampling, or to incomplete extraction of carotene, both factors which would limit the accuracy of the method of assay, or it may be a true increase". During the freezing process, we find the same is true, approximately the greater amount of carotene is retained, and in some cases (in blanching of peas, broccoli, peppers and in the freezing of peas and broccoli) more carotene is recorded than for the fresh raw product of the same harvesting of vegetables.

In the freezing process a relatively larger percentage of carotene is retained than of ascorbic acid.