

UNIVERSITY OF IDAHO  
AGRICULTURAL EXPERIMENT STATION  
Departments of Horticulture and Home Economics

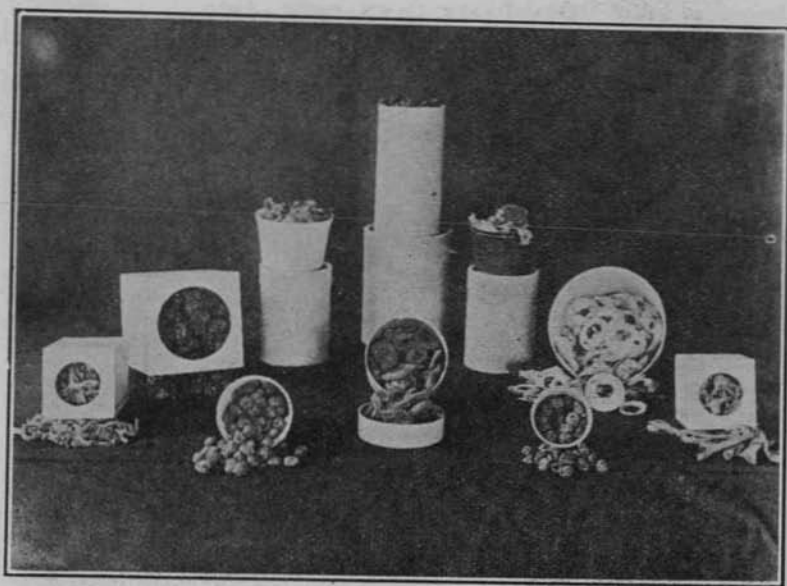
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## Drying and Serving Fruits and Vegetables in the Home

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C. C. VINCENT

JESSIE M. HOOVER

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## INTRODUCTION

Due to the well organized efforts for increased production of vegetables in the United States last year, there were over 1,150,000 acres of land utilized that had never before been under cultivation. As the production this year will be greater than last, the output will greatly exceed the immediate needs of the people. These surplus food products should be conserved for future use and their proper utilization will undoubtedly be one of the most important problems confronting our rural communities during the summer.

Many of the products can be stored in their fresh state, others may be canned, or preserved by salting. In view of the fact that containers, both glass and tin, will again be hard to secure, special effort should be made to save as many of the by-products as possible by evaporation. Small evaporators should, therefore, be installed on every farm, or in every community where the people do not have access to large commercial plants. There is no question but that these small plants will conserve the waste and add quite materially to the net profits of the farm. These smaller types of evaporators are unquestionably a success in the East. O. W. Seeley, of Sodus, New York, says that in the small unit-size drier the best grades of evaporated stock are made.

An evaporated, or dried product is one that has had the water removed without destroying the cells and at the same time retaining as much of the flavor, texture, and color of the original article as possible. The evaporation of fruits and vegetables is not a difficult operation, providing a few simple rules are observed. Experiments recently conducted at the University of Idaho by the Horticultural Department, the results of which will be shown in the following pages, have shown that a great many different kinds of fruits such as apples, pears, peaches, apricots, prunes, plums, cherries, blackberries, dewberries, raspberries, loganberries, currants, and vegetables, such as beets, carrots, beans, peas, potatoes, salsify, corn, cauliflower, pumpkins, and parsnips, can be successfully evaporated. The dried products make a very wholesome food, as shown by the many recipes tested by the Home Economics Department, given in Part II of this bulletin.

### PLAN OF WORK

Believing that there is a future for the small evaporator in the State of Idaho, as well as possibilities for sun-drying, and that commercial lines of work could be further developed, the Horticultural and Home Economics Departments have been gathering on the following problems:

- (1) Sun-drying of fruits and vegetables.
- (2) Relative merits of different types of evaporators, such as cook-stove, hot-air, and steam.
- (3) Time required to evaporate different products.
- (4) Temperature necessary in drying various materials.

- (5) Relative weights of fresh and dried material.
- (6) Moisture content of dried products.
- (7) Various ways of preparing dried products for the table.

### SUN-DRYING

In many sections of the State, certain fruits and vegetables can be utilized by sun-drying. This is particularly true in those districts where there is little rain during the period in which the products are maturing. It is very evident, as demonstrated by the experiments conducted at the University, that such fruits and vegetables as cherries, raspberries, dewberries, blackberries, loganberries, peas, beans, beets, turnips, corn, and carrots can be successfully dried. An attempt was made to dry the late-maturing varieties of fruits, but the results were unsatisfactory, hence in the humid districts, sun-drying of pears, peaches, and apples would not be practicable. On the other hand, in some of the drier districts, these products dry very nicely.

When fruits and vegetables are dried in the sun, every precaution should be taken to protect them from dew, dust, dirt, flies, and insects. A mosquito bar thrown over the fruit will furnish ample protection. In case of dew or rain at night, the material should be covered about sundown, or placed under cover, and again uncovered and placed in the sun in the morning. Unless these precautions are taken, the products will be discolored, unsanitary, and unfit for consumption. Sun-dried products are usually a little darker colored than those dried in the evaporator.

The equipment will depend largely upon the quantity of fruits and vegetables to be dried. If only a small amount is desired, pans, or boards may be used to advantage. On the other hand, if larger quantities are

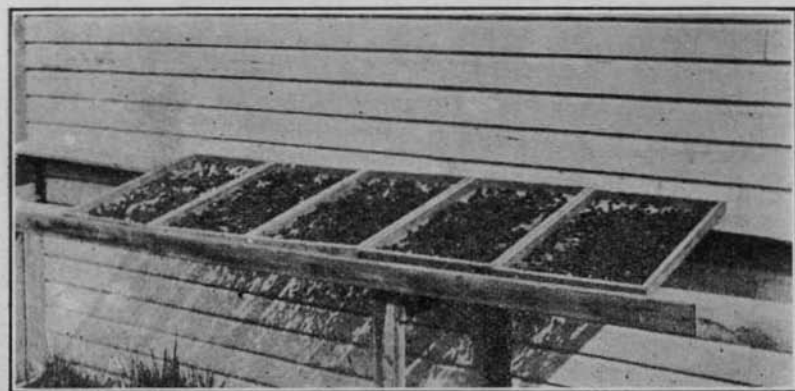


Fig. 1. Trays used at the University for sun-drying. Berries being dried.

to be handled, small galvanized wire trays with 1-8 to 1-4 inch mesh are better. Trays 1 1-2 x 2 1-2 feet, or 2 x 3 feet in size, are convenient to handle. The trays should be exposed to the direct rays of the sun and suspended three or four feet from the ground, so that the air can cir-

culate freely thru the fruit. Sun-drying is a very simple process. The products should be prepared properly according to the directions given on pages 4 to 5 and spread in thin layers on the trays.

Table I shows the different kinds of fruits and vegetables sun-dried at the University, the length of time required to dry, and the weight of dried products which a given quantity of fresh materials will make.

Table No. 1. *Products Dried in the Sun*

Kind of product	Weight of fresh material	Weight When dry	Time to dry
Currants.....	100 lbs.	28 lbs.	4 hours
Cherries (sweet).....	100	25	9 days
Pie cherries.....	100	20	8 days
Apricots.....	100	20	46 hours
Raspberries.....	100	20	7 days
Beans.....	100	12	19 hours
Beets.....	100	11	4 hours
Carrots.....	100	15	11 hours
Corn*.....	100	28	30 days
Peas.....	100	25	37 hours
Turnips.....	100	8	7 hours

The length of time it takes to sun-dry fruits and vegetables depends largely upon climatic conditions, size of the pieces, and the locality. If the weather is unsettled, it will take much longer to dry the products. The fruits and vegetables indicated in the above table were dried under the most favorable conditions.

#### COOK STOVE EVAPORATOR

As sun-drying may not be practicable in the humid sections of the State, especially where there is more or less rain during the summer, the small home or cook-stove evaporator offers an important field for evaporation. These small evaporators are very simple, inexpensive, and easy to operate. For the family that wishes to dry only enough fruits

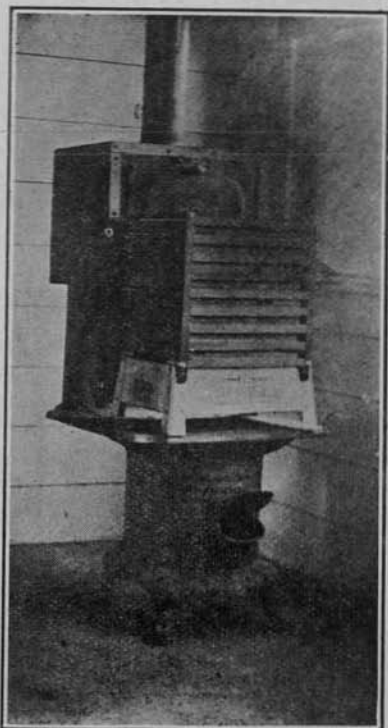


Fig. 2. A view of the cook-stove evaporator.

\* If the corn is cooked in boiling water long enough to set the milk (usually from four to five minutes), it will dry in approximately three days.

and vegetables for their winter's supply, the small cook-stove evaporator is recommended. As it is our duty at the present time to conserve the present food supply, every family in the Northwest should secure one of these outfits.

The United States Cook-Stove Evaporator manufactured by E. B. Fahrney, Waynesboro, Pennsylvania, was used in making the tests at the University. It can be used on any cook-stove. The dimensions are: base 22 x 16 inches, height, 26 inches. The base is made of galvanized sheet iron and the frame-work of wood. It has eight galvanized wire trays 12 x 17 1-2 inches, and contains 12 square feet of drying surface.

The trays are placed in the frame-work one above the other, thus forming a compartment thru which the heat arises. When drying fruits or vegetables in this evaporator, the trays should be spread with a single layer, and as the drying progresses, the upper trays should be moved to the lower part of the drier in order to insure uniform drying. The fresh products should never be piled up in the trays too thickly, as this obstructs the free circulation of air thru the evaporator and prolongs the time of drying. To secure a good finished product, the temperature should never be allowed to go above 150 degrees F. Mr. E. B. Fahrney gives the following directions concerning the operation of this evaporator:

"A moderately hot stove or range is all that is required as to heat. Keep all the plates, or covers in the stove, and set the drier on the top.



Fig. 3. Showing beets and turnips dried in the sun.

Each tray holds 1 1-2 to 2 quarts of berries, cherries, etc., without obstructing the hot air currents. Do not put more in a tray. Enter all trays with fresh fruit, next to the stove and change from lower to upper tracks, as you enter other trays, or as the drying progresses. When nearly done, the contents of a couple of trays may be put upon one, and fresh fruit entered and the operation continued indefinitely. Avoid putting the fruit on the trays so thick, either fresh or in doubling that

partially dried, so as not to obstruct the free circulation of the hot air currents thru the machine, as this checks rapid work. Avoid scorching by moderate firing and close attention to frequent changing of trays. If you wish to use sulphur to prevent oxidation and secure a bright, handsome color for apples, pears and peaches, simply drop a piece of brimstone, about the size of a medium bean, on the stove, close to or under the drier, and it will ignite and the fumes will be drawn upward thru the machine and do the work. If you are operating in a close room or kitchen, and the smell is objectionable, you can fill the trays and put them in a box or barrel, with a cover on, and burn a little sulphur under them out in the open air and then enter the trays in the machine. When drying sweet corn or small berries, spread pieces of coarse muslin or mosquito netting on the trays to prevent small particles from falling thru the mesh. When the article is dry, take the four corners of the cloth and lift out of tray. Procure a piece of mosquito netting to throw over the machine when set aside, to guard against flies and insects. This will not be in the way when on the stove. Do not cover top of machine with paper or close cloth when in use as it would stop the hot air currents going thru it and delay evaporator. The capacity of this cheap handy little machine under expert management is about two bushels of fresh apples in twelve hours, and its products is first-class. Capacity can be increased by using a couple of trays in the oven of the cook-stove in finishing off when nearly dry. When using gas-range or oil-stove, place a piece of sheet iron over the flame; this will spread the heat and keep the flame from contact with lower trays of Drier."

Table No. 2. Cook-Stove Evaporator

Kind of products	Wt. fresh material	Wt. When dry	Time to dry hrs.	Temperature degrees F.
Apples .....	100 lbs.	20 lbs.	6	130-150
Apricots .....	100	20	27	130-150
Cherries (sweet) .....	100	24	22	130-150
Cherries (pie) .....	100	19	22	130-150
Peaches .....	100	17	25-30	130-150
Pears .....	100	25	8	130-150
Plums .....	100	22	50-55	130-150
Prunes .....	100	33	60-70	130-150
Beans .....	100	11	10-15	130-140
Beets .....	100	18	7	130-140
Carrots .....	100	13	10	130-140
Corn .....	100	33	9	130-140
Potatoes .....	100	35	6	130-140
Pumpkins .....	100	6	4	130-140
Salsify .....	100	33	2	130-140
Turnips .....	100	8	10	130-140

#### HOT-AIR EVAPORATOR

There has also been an increasing demand for information on evaporators somewhat larger than the cook-stove evaporator; those that have

been designed for family use, but have a capacity sufficient to dry for market. To supply this information, the Zimmerman type of evaporator manufactured by The Blymyer Iron Works Company, Cincinnati, Ohio, was selected for experimentation. This portable furnace or hot-air evaporator is 24 in. deep, 26 in. wide, and 5½ ft. high. It has fourteen galvanized-wire trays 20x20 in., making 38 sq. ft. of drying surface. The evaporator is substantially made of galvanized iron. The furnace-front and back is made of heavy cast-iron, and the body of the furnace of heavy sheet-iron, and the machine is so constructed that the currents of heated air which arise from the furnace, pass through and around the fresh products, not only from the bottom, but from the sides also.

To secure a well finished product it is necessary to have a good distribution of air throughout the evaporator. This evaporator is so constructed that there is an even distribution of hot air over each tray of fruit, which insures uniform drying of the products. The fruits and vegetables evaporated in it were exceptionally fine in every respect. The results secured are shown in Table No. 3.

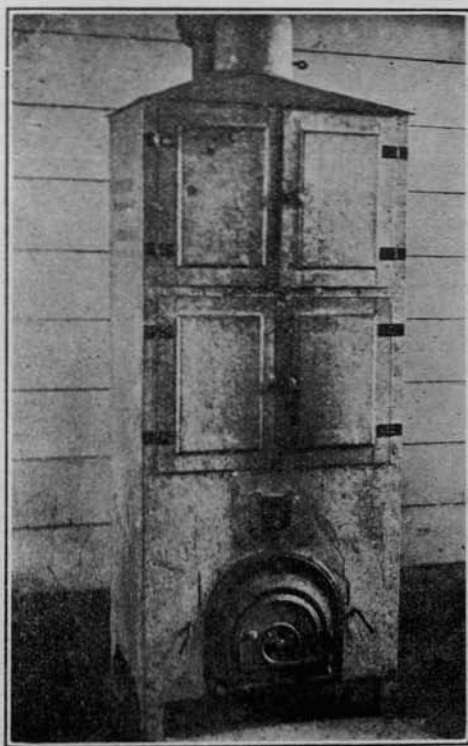


Fig. 4. The portable evaporator used in making tests tabulated in Table No. 3.



Table No. 3. Hot-Air Evaporator

Kind of products	Wt. fresh material	Wt. when dry	Time to dry hrs.	Temperature degrees F.
Apples .....	100 lbs.	17 lbs.	7	130-150
Apricots .....	100	20	13	130-150
Cherries (pie) .....	100	25	8-13	130-150
Peaches .....	100	17	30-35	130-150
Pears .....	100	23	13	130-150
Plums .....	100	23	56	130-150
Prunes .....	100	35	47	130-150
Beans .....	100	13	6-12	130-140
Beets .....	100	18	6	130-140
Carrots .....	100	13	8	130-140
Corn .....	100	33	20	130-140
Potatoes .....	100	29	5	130-140
Pumpkins .....	100	6	4	130-140
Salsify .....	100	33	2	130-140
Turnips .....	100	9	6	130-140

## STEAM EVAPORATOR

In communities where there are not sufficient products grown to justify the construction of a large commercial evaporator, the smaller steam cabinet evaporator could be used to advantage. This is particu-

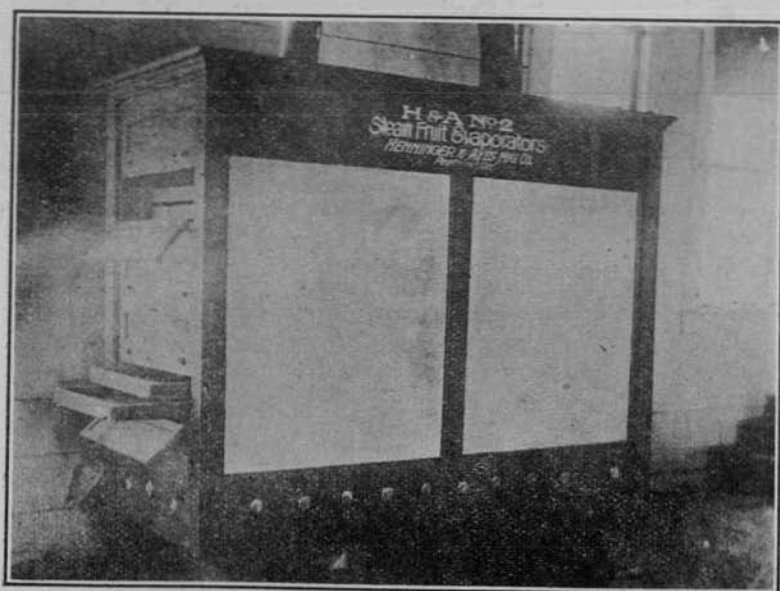


Fig. 5. A view of the steam evaporator.

larly true in a locality where there is already a small cannery in operation, for the boiler can then be used for both purposes. These steam cabinet evaporators are very popular at the present time in parts of New York

and Canada. When properly constructed, they give entire satisfaction.

The type installed at Moscow was secured from the Henninger & Ayes Company, Portland, Oregon. This cabinet is 84 in. long, 36 in. wide and 72 in. high. It has twenty-four galvanized wire trays 22x36 in., with 132 sq. ft. of drying surface. There are fourteen pipes under each tier of trays. The steam enters the cabinet thru the top row of pipes and circulates back and forth thru the evaporator, finally returning to the boiler thru a return pipe at the bottom of the cabinet. A 5 H. P. boiler furnishes ample steam.

The following table shows the different products evaporated, the weight after evaporation, the length of time to evaporate and the temperature maintained:

*Table No. 4. Steam Evaporator*

Kind of products	Wt. fresh material	Wt. when dry	Time to dry hrs.	Temperature degrees F.
Apples .....	100 lbs.	16 lbs.	6	130-160
Apricots .....	100	15	15	130-160
Cherries (pie) .....	100	20	6-10	130-160
Cherries (sweet) .....	100	21	12	130-160
Currants .....	100	27	7	130-160
Dewberries .....	100	20	14	130-160
Loganberries .....	100	15	13	130-160
Peaches .....	100	17	21	130-160
Pears .....	100	23	13	130-160
Plums .....	100	22	27	130-160
Prunes .....	100	30	38	130-160
Raspberries .....	100	13	10	130-160
Beans .....	100	14	5-10	130-160
Beets .....	100	16	5	130-160
Carrots .....	100	12	6	130-160
Cauliflower .....	100	14	8	130-160
Corn .....	100	29	13	130-160
Peas .....	100	23	7	130-160
Potatoes .....	100	33	5	130-160
Pumpkins .....	100	6	4	130-160
Salsify .....	100	31	2	130-160
Turnips .....	100	9	6	130-160

Small evaporators, simple in construction, convenient to handle, and which do not require expert supervision, may be secured from the following firms:

B. H. Fahrney, Waynesboro, Penn.

Blymyer Iron Works, Cincinnati, O.

Henninger & Ayes Company, Portland, Ore.

Blanche Manufacturing and Supply Company, St. Louis, Mo.

A. A. A. Evaporation Manufacturing Company, San Francisco, Cal.

The Grange Sales Association, Philadelphia, Penn.

Stutzman Manufacturing Company, Ligonier, Ind.

Southern Evaporator Company, Chattanooga, Tenn.

The following table shows the capacity of these different types of evaporators at one charge when the trays have been uniformly spread with one layer of fruits or vegetables.

Table No. 5. Showing Capacity at One Charge

Product	Steam	Hot air	Cook stove
Apples .....	288 lbs.	84 lbs.	24 lbs.
Apricots .....	264	80	25
Cherries (sweet) .....	350	98	40
Dewberries .....	220	60	22
Loganberries .....	240	70	25
Peaches .....	450	124	36
Plums and prunes.....	600	150	60
Pears .....	288	84	24
Pie cherries .....	300	80	25
Beans .....	200	50	20
Beets .....	144	45	10
Carrots .....	96	30	8
Cauliflower .....	144	42	14
Corn .....	200	56	24
Potatoes .....	100	30	14
Pumpkins .....	110	28	10
Turnips .....	100	30	10
Salsify .....	80	25	8

## A HOME-MADE DRYER

The home-made sun drier, illustrated below, was seen in one of

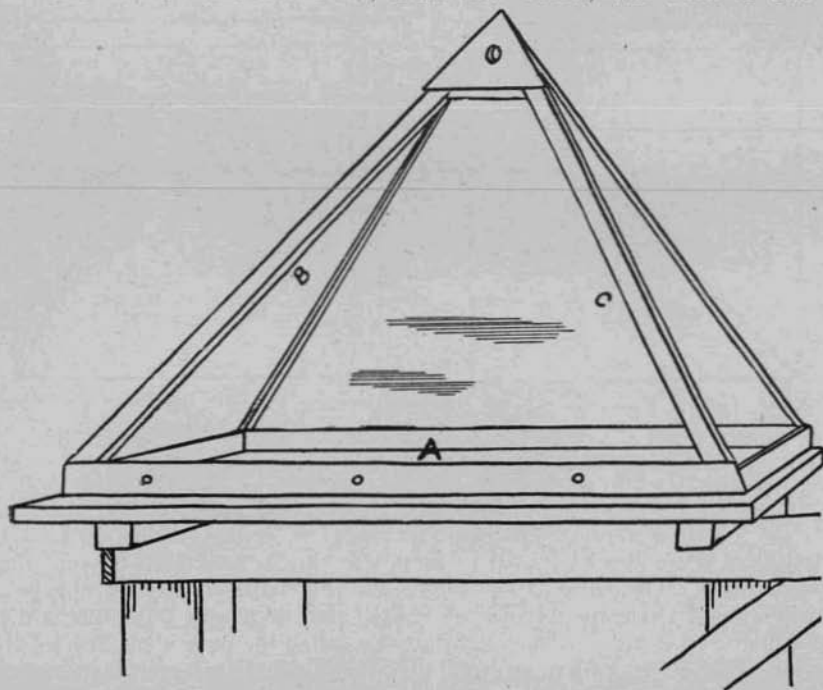


Fig. XI. A general view of the home-made drier

the farm homes of south Idaho, by Miss Jessie M. Hoover, Professor of Home Economics, while making a home survey in 1916. A device of

this kind acts as a trap for heat, especially when the sun is shining upon the glass and the temperature within the drier can be maintained at a higher degree than on the outside. By increasing the intensity of the sun's rays, products of various kinds will dry in a shorter time than when exposed to the direct rays of the sun. This drier is described by Miss Hoover as follows:

"Fig. 11 shows the completed drier with ventilating holes at the base and apex."

"Two panes of glass 36 by 36 in. each are required. Fig. 12 shows one of these glasses cut diagonally so as to form two right angled triangles with two equal sides. In Fig. 13, there is a waste of the two upper corners of the glass.

"These three triangles are cased with wood in much the same way as a window sash.

"For the base of the drier build a square wooden platform of the same dimensions as the base of the cased glass. This should be placed on a table or substantial frame in the door yard where it will have a good exposure to the sun, i. e., place the triangle ABC on the south side of the base as shown in Fig. XI. On the east and west sides of the wooden base

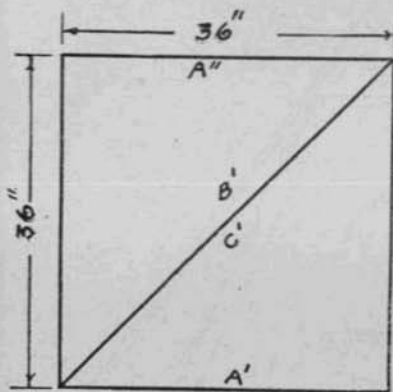


Fig. XII.

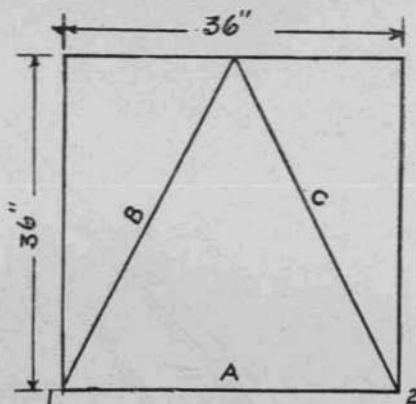


Fig. XIII.

place the two triangles shown in Fig. XII, A' and A'' in each case being placed on the wooden base. The edge C' is joined to the edge C. The edge B' is joined to the edge B. The edges B' and C' will be slightly longer than the edges of B and C, but these can be extended up into the wooden apex. The back of this drier may be made of tightly matched boards, hinged along the north side of the base; or it may be made of the wire gauze screening. Where dust storms or sudden showers are likely to occur the wooden back is preferable. The door is fastened to the apex of the drier with a suitable catch. A removable frame of wooden slats or heavy wire elevated an inch or two above the base will furnish a free circulation of air from beneath, and the food spread on it will dry more quickly. The air enters the small holes at the base, and, accompanied by

the moisture from the evaporating fruit, passes out at the inch hole in the apex.

"To save steps the drier might be placed against a south window and could thus be filled and emptied without going outside. For protection in winter the drier can be set under a shed. The owner of this drier reports that it cost her \$6.00 complete. The position of the glass aids in concentrating the sun's rays and increasing the heat. The enclosure prevents the entrance of dust and insects.

"The Bing cherries offered as samples were delicious and could be substituted for raisins, currants, and other similar fruits in puddings, cakes, and confectionery. Since the price of sugar is so high, the drying of fruits should be of interest to all."

#### MOISTURE CONTENTS OF DRIED PRODUCTS

Just when the various products have been sufficiently evaporated

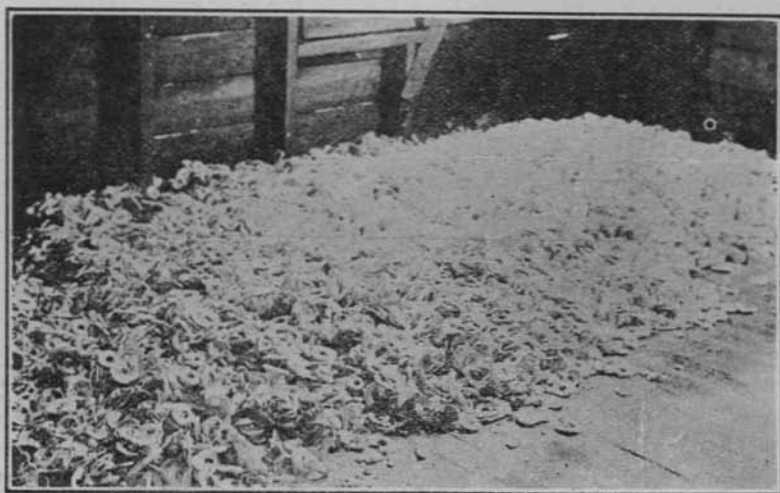


Fig. 6. Apples going through the sweating process. Dayton Evaporating and Packing Co., Dayton, Ore.

to keep in perfect condition can be determined only by experience. A simple test, however, is to take a handful of slices and press them firmly together and if they separate readily upon being released, they are in a proper condition to be removed from the trays. It is a safe plan to leave the fruits or vegetables on the trays until they become spongy and elastic or slightly brittle, than to remove them before sufficient moisture has been driven off. These data were secured after the dried products had become uniform throughout with regard to moisture.

Table No. 6. Showing Moisture Content of Different Evaporated Products

Kind of product	Per cent of moisture
Apples .....	24.0
Apricots .....	25.8
Currants .....	24.3
Cherries (pie) .....	29.0
Cherries (sweet) .....	23.3
Dewberries .....	23.7
Loganberries .....	28.4
Peaches .....	20.5
Pears .....	20.11
Plums .....	25.9
Prunes .....	28.1
Raspberries .....	25.6
Beans .....	21.0
Beets .....	18.0
Carrots .....	23.9
Corn .....	9.2
Peas .....	8.58
Potatoes .....	13.4
Pumpkins .....	22.1
Salsify .....	11.0
Turnips .....	22.8

The above mentioned products when placed in storage, kept in perfect condition during the season.

### CURING AND STORING

As the products are removed from the trays, they should be placed in boxes, or in piles 6 to 18 in. deep, in an airy, well ventilated place, and stirred frequently for a period of a week or ten days. After the products have gone thru the sweating process and have attained a uniform degree of moisture, they may be put away in air-tight receptacles of various kinds. Paper bags, boxes, muslin bags dipped in paraffin, jars, cans, or cartons, may be used for this purpose. Every precaution should be taken in storing, as moths and insects are liable to get into the dried products. The following firms handle cartons of various kinds:

- The Weis Fibre Container Corporation, Monroe, Mich.
- Mono-Service Company, Newark, N. J.
- Laage Farms Company, St. Louis, Mo.
- Doane Carton Company, St. Louis, Mo.
- Sefton Manufacturing Company, Chicago, Ill.

### PREPARING FRUITS AND VEGETABLES FOR DRYING

In order to secure a high grade product it is essential to use fruits and vegetables that are fully mature and of uniform ripeness. This is particularly true of berries. Green berries mixed with the ripe ones will dry unevenly and will make a very poor product. Some of the fruits should be bleached with sulfur before drying, or while drying. Sulfuring whitens the products and makes them more attractive. It prevents such



Fig. 7. A view of different types of receptacles for storing dried products.

fruits as apples, pears, peaches and apricots from turning dark on exposure to the air. From 8 to 12 ozs. of sulfur for each 100 lbs. of fruit should be used. The sulfur may be burned under the trays at the time of drying, or in an air-tight box having an outlet at the top.

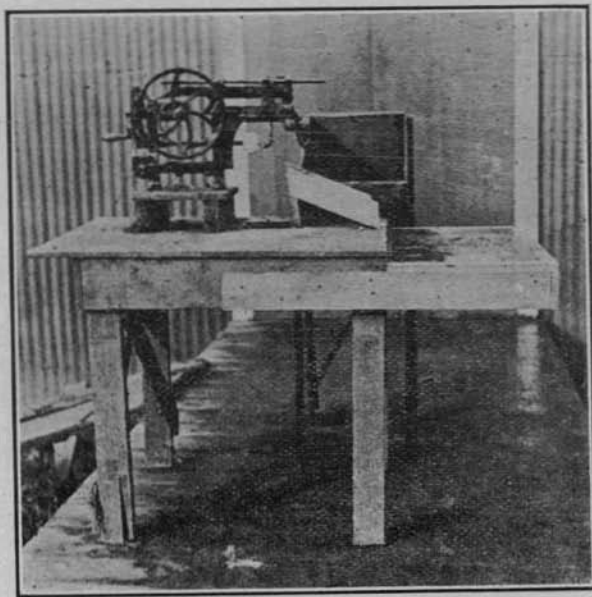


Fig. 8. A good type of apple-paring machine—Dayton Evaporating & Packing Co., Dayton, Ore.

Most vegetables should be blanched before being evaporated. This process is accomplished by placing the products in wire baskets and boil-

ing for one to five minutes. The object is to set the color, especially of beets, to remove the dirt, to eliminate objectionable odors and flavors and the bitter taste that usually accompanies fresh vegetables.

Knives and peelers should be provided, as well as slicers. An ordinary kraut slicer may be used to good advantage. A more expensive one is the rotary slicer.

### FRUITS

*Apples.*—Almost any variety may be used. Peel, core, remove all decayed parts, slice in rings  $\frac{1}{4}$  inch thick. Dip immediately in cold salt solution, an ounce to a gallon of water, to prevent discoloration. Spread single layers on trays and dry. In case the salt solution is not used, bleach with sulfur for 30 min. and dry.

*Apricots.*—Sort over the fruit for even ripeness, size and quality. Wash, cut in halves and remove pits. Place single layer on trays, cups up, and sulfur from two to three hours, or until the cups or depressions are full of juice.

*Peaches.*—Prepare in a similar manner to apricots. Sulfur for about one hour.

*Cherries.*—Stem, pick out leaves, and decayed specimens, wash, pit, place in trays and dry. No sulfur required.

\*For length of time to dry and temperature maintained while drying, see tables.

*Prunes and plums.*—Gather when fully ripe, dip in boiling lye for

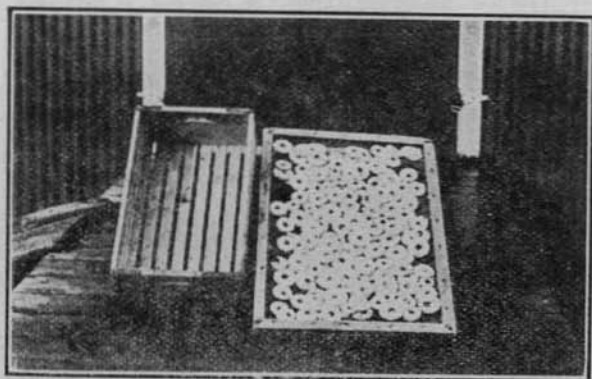


Fig. 9. Apples spread on the tray and ready for drying. Note lug box at left. Dayton Evaporating & Packing Co., Dayton, Ore.

10 to 15 secs., using one pound of concentrated lye to 10 gals. of water. Wash in warm water for a minute or two to remove the lye. Spread on trays and dry. Certain varieties are sometimes pitted. Plums and prunes not dipped in lye take a little longer to dry. No sulfuring is required.

\*For length of time to dry and temperature maintained while drying, see tables.



*Pears.*—Peel, core, cut out worm-holes and bruised spots, quarter, spread on trays and sulfur for 30 minutes. Do not over-sulfur, as the fruits will become flavored with the sulfur fumes.

*Berries.*—Pick out leaves, stems, imperfect berries, spread evenly on the trays and dry. No sulfuring required.

*Currants.*—Pick over carefully, spread thinly on trays and dry. The stems may be removed after drying. Stir frequently. Dry until they rattle. No sulfuring required.

#### VEGETABLES\*

*Cauliflower.*—Pick at the proper stage of ripeness. To prepare, remove the outer leaves, clean, break in small bunches. Blanch for three to four minutes in salt bath containing 1½ lbs. salt to 12½ gals. of water and spread on trays and dry.

*Corn.*—Gather the corn when it is in good canning condition and prepare immediately. Husk, remove silks, trim and cut out all worm-eaten places and discolored spots; then cook in boiling water just long enough to set the milk, usually from three to five minutes. Cut from cob, spread thinly on trays and dry. Stir occasionally.

*String beans.*—The New Stringless is one of the best varieties to grow for drying. Pick when young and tender, break in small lengths, blanch in boiling water for five minutes, to which a little salt has been added, spread on trays and dry.

*Peas.*—In order to turn out a dried product of excellent quality, peas should be picked when young and tender. Shell, spread on trays and dry. No blanching necessary.

*Beets.*—Young, tender beets should be used for drying. Wash, remove tops and roots, blanch from 10 to 15 min. in boiling water, dip in cold water, peel, cut into quarter-inch slices, spread in single layers on trays and dry.

*Carrots.*—Wash, peel and cut in strips one-eighth inch in thickness, spread on trays and dry. No blanching necessary.

*Turnips.*—Prepare as you would carrots or beets.

*Pumpkins.*—Cut in slices one-half to 1 in. wide, peel, remove seeds, slice or cut in small pieces, spread in single layers on trays and dry. No blanching necessary.

*Salsify.*—Wash, scrape, cut in small pieces, spread on trays and dry. No blanching necessary.

*Potatoes.*—Wash, steam for five mins., peel, cut in slices about one-eighth in. thick, spread on trays and dry. Instead of boiling, the potatoes may be sulfured for a few minutes when placed on the trays. This prevents them from turning brown. Care should be exercised in using the sulfur, as the product is liable to become flavored with the sulfur fumes.

#### BY-PRODUCTS PLANTS

Idaho has a number of by-product plants in operation at the present time. The necessity of utilizing the poorer grades of fruits has become evident in many sections of the State, especially in the larger specialized

\* For length of time to dry and temperature maintained while drying, see tables.

fruit districts. In many cases the expense of maintaining the orchard has been met by disposing of the surplus fruits and vegetables thru the canning factories and evaporation plants. In 1917 there were approximately

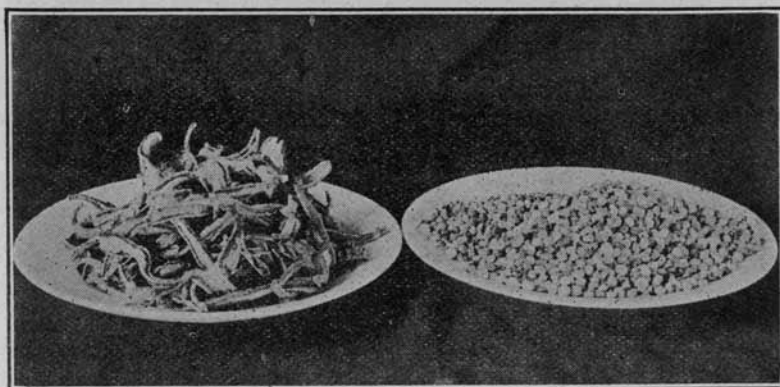


Fig. 10. Dried carrots and peas.

910 carloads of apples, 68 carloads of prunes, 18 carloads of cherries, and two carloads of pears, utilized by the following plants:

Table No. 7. *By-product Plants in Idaho.*

Name	Place	Products
Inland Empire Canning Co.....	Coeur d'Alene.....	vinegar—canned products
Leo. Bros. Vinegar Co.....	Moscow.....	vinegar
Julietta Cannery.....	Julietta.....	canned products
Oregon Packing Co.....	Lewiston.....	canned products
Weiser Food Products Co.....	Weiser.....	dried apples
Idaho Vinegar & Pickle Co.....	Payette.....	vinegar and pickles
Denney & Co.....	Payette.....	dried apples
Idaho Products Co.....	Payette.....	dried apples and prunes
Idaho Canning Co.....	Payette.....	canned products
Winn Brothers.....	Fruitland.....	dried apples
New Plymouth Evaporator.....	New Plymouth.....	prunes
South Idaho Fruit Co.....	Meridian.....	dried apples and prunes
Idaho Products Co.....	Meridian.....	dried apples and prunes
Middleton Fruit Products Co.....	Middleton.....	cider
John Steele.....	Parma.....	dried prunes and apples
Overland Beverage Co.....	Nampa.....	sweet cider
Twin Falls Vinegar & Cider Co.....	Twin Falls.....	vinegar

## DRIED FRUITS AND VEGETABLES

By JESSIE M. HOOVER, Professor of Home Economics.

Dried fruits and vegetables will keep indefinitely if in a dry place and secure from insect pests.

When they are prepared for use the water which has been evaporated from them should be replaced by soaking. It is usually desirable to soak such foods over night, or, at least, for several hours. Dried fruits and vegetables should be cooked in the water in which they were soaked. Occasionally they may be used without replacing the evaporated moisture. The recipes which follow have been tested and are recommended for your consideration by the Home Economics Department of the University of Idaho. The Products prepared by the Department of Horticulture were used as a basis for the experiment. Unmarketable apples were used for the dried apple experiment and recipes.

### Abbreviations and Equivalent Used in These Recipes:

c .....	cup	lb. ....	pound
t .....	teaspoon	oz. ....	ounce
T .....	tablespoon	qt. ....	quart

All measurements are level.

### DRIED APRICOT MARMALADE—NO. 1

(Very good.)

3 qts. stewed apricots	8 c sugar, or honey; or
1 can shredded pineapple	4 c honey and 4 cups corn sirup
3 oranges	7 cloves (to be taken out when
1 orange rind, grated	marmalade is done).
	Chopped walnuts

Soak apricots over night; cook till tender; put thru a sieve. Add sugar, pineapple, oranges, nuts, and cook to a jam.

### DRIED APRICOT MARMALADE—NO. 2

3 lbs. apricots	2 lbs. sugar or
1 lb. blanched almonds	2 lbs. honey or
	1 lb. honey and 1 lb. corn sirup

Soak apricots over night, stew, put pulp thru sieve, add sugar and cook to a jam. Add blanched almonds.

### APRICOT AND RAISIN PUFFS

1½ c stewed apricots	6 T cornstarch
½ c stewed raisins or dried sweet cherries	½ c sugar
1 egg white	1 T lemon juice

Cook fruit until tender, add sugar and lemon juice, and thicken with cornstarch. Pour into timbal cases or rosette rings or on crackers or

cookies. Whip egg white, adding one T powdered sugar; spread over fruit and put in oven to brown.

#### APRICOT ROLL

2 c flour or substitute	2 T butter, lard, or vegetable fat
4 t baking powder	$\frac{3}{4}$ c milk
1 t salt	

Mix dry ingredients; work in shortening; add liquid gradually until you have a soft dough. Toss on floured board and roll to about three-eighths inch in thickness. Spread with stewed apricot pulp and roll. Bake in (moderate) oven. Cut in slices.

#### APRICOT RICE CROQUETTES

$\frac{1}{2}$ c rice	$\frac{1}{2}$ t salt
2 c water	Grating of lemon rind
$\frac{1}{2}$ c sweetened dried apricot pulp	

Add the fruit when rice is almost done. Set aside to cool; shape into balls; brush over with milk, roll in fine, dry bread crumbs and fry in deep fat until golden brown. Garnish the top of each with marshmallow. Serve with a sauce made of extra stewed apricots thickened with a little cornstarch. Instead of frying in deep fat they may be browned in hot oven if desired.

NOTE.—Honey is a very satisfactory sweetening for apricots. Dried apricots may be satisfactorily combined with apples. Apricots may be substituted for peaches in practically all peach recipes.



Fig. 14. Dried apricot croquettes.

#### APRICOT FLUFF

$1\frac{1}{2}$ lbs. dried apricots	$\frac{3}{4}$ c whipping cream
1 egg white	

Wash apricots thoroly and put to soak in cold water sufficient to cover, and let stand 12 hours or until soft. Put thru colander and add sugar to sweeten. (There should be three cups of pulp.) Beat egg white until stiff and fold into the apricot pulp. Whip cream and put a spoonful on top of each serving.

**HYDRATED APRICOTS**

1 lb dried apricots 2½ c water

Discard any unsuitable parts. Wash and put to soak in water for 12 hours. When thoroly softened add sugar to taste and serve uncooked.

**STEWED APRICOTS**

Cook hydrated apricots, adding sugar just before serving.

**BOHEMIAN ROLLS**

Use either baking powder or yeast biscuit dough; roll to about three-eighths of an inch in thickness. Cut in rounds and lay stewed prunes which have been seeded, sweetened and seasoned with cinnamon in center. Fold over, enclosing the filling. Bake as usual.

**PRUNE ROLL**

2 c flour 1 t salt  
4 t baking powder 2 T butter, lard, or vegetable fat  
¾ c milk

Mix dry ingredients; work in shortening; add liquid gradually until you have a soft dough. Toss on floured board and roll to about three-eighths of an inch in thickness. Spread with stewed prune pulp and roll. Bake in (moderate) oven. Cut in slices.

**PRUNE FLUFF**

1½ lbs. dried prunes 1 egg white  
¾ c whipping cream

Wash prunes thoroly and put to soak in cold water sufficient to cover and let stand 12 hours, or until soft. Put thru colander and add sugar. (There should be three cups of pulp.) Beat egg white until stiff and fold into prune pulp. Whip cream and put a spoonful on top of each serving.

**STUFFED PRUNES**

Soak prunes over night; steam until slightly tender, drain and remove pits. Fill centers with fondant and a few chopped nuts. Roll stuffed prunes in powdered sugar.

**FONDANT**

2 c sugar 1 c water  
½ t cream of tartar

Stir until dissolved. Cook slowly with cover on. Do not stir. When the soft ball stage is reached, pour on a marble slab or platter and stir with a wooden spoon until thick and creamy; then knead with the hands. Fondant is usually better if kept 24 hours before using.

**PRUNE SALAD**

Steam 1 lb. large prunes until soft. Remove pits and fill with nut meats or cream cheese. Serve on lettuce with mayonnaise or French dressing. Cottage cheese is especially good for filling.

**COTTAGE CHEESE**

To one gallon of skimmed milk add one cup of good buttermilk or clabber milk (be sure the flavor is pleasant). Heat to 75 degs. Fahr. Dissolve one-half junket tablet in one T of water and add to the milk. Stir thoroly and set aside for about 12 hours. Pour out in a moderately thick cloth, being careful not to break the curd. Drain and season. This cheese is very good for stuffing prunes as it is mild and of a creamy consistency. By combining the olive oil with the cheese and seasoning as for mayonnaise a vèry nice salad dressing can be made.

**PRUNE JELLY**

Wash and soak a pound of prunes over night. Next morning press thru colander. Add juice of two lemons and one cup of powdered sugar. Cover one-half box of gelatin with pint of water and soak 30 minutes. Add one pt. of boiling water and the prunes. Bring to boiling point; strain at once into a mold. Serve cold with whipped cream.

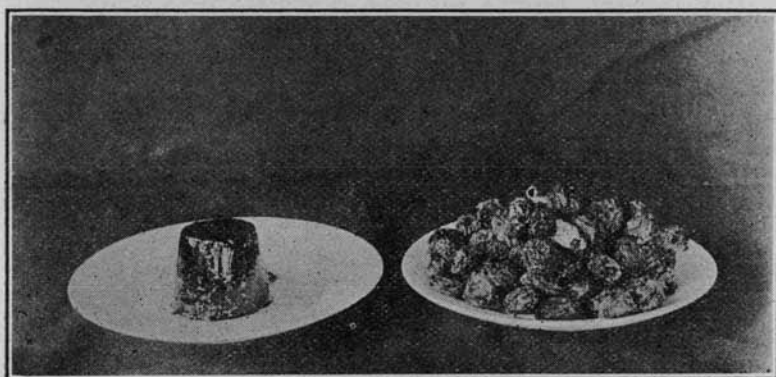


Fig. 15. Dried-prune jelly.

**STEWED PRUNES**

Cook soaked prunes in the water in which they were soaked, at moderate temperature until tender. Sweeten if desired.

**HYDRATED PRUNES**

1 lb. dried prunes 2½ c water

Discard any unsuitable parts. Wash and put to soak in water for 12 hours. When thoroly softened add sugar and serve uncooked.

**STEWED PEACHES**

Cook soaked peaches in the water in which they were soaked, at moderate temperature till tender. Sweeten if desired.

1 doz. peaches or stewed dried peaches	2 c sugar
	2 to 3 c water
3 oranges; rinds grated and pulp sliced	Boil about 25 minutes, or until thick and a jelly-like consistency
½ lb. chopped almonds	

**PEACH RICE CROQUETTES**

$\frac{1}{2}$ c rice	$\frac{1}{2}$ t salt
2 c water	Grating of lemon rind
$\frac{1}{2}$ c sweetened dried peach pulp	

Add the fruit when rice is almost done. Set aside to cool; shape into balls; brush over with milk, roll in fine, dry bread crumbs and fry in deep fat until golden brown. Garnish the top of each with marshmallow. Serve with a sauce made of extra stewed peaches thickened with a little cornstarch. Instead of frying in deep fat, they may be browned in hot oven if desired.

**DRIED LOGANBERRIES**

Soak dried loganberries over night; pour off water which may be seasoned and used as fruit punch. The loganberries are rather strong and hence by pouring off the water in which they have been soaked a delicious fruit juice drink may be obtained. The loganberries may then be used for pie or sauce.

**DRIED LOGANBERRY JELLY**

Soak berries over night. Cook in same water in which they were soaked and boil down. Combine with apple juice in equal proportions. To one cup juice add three-fourths cup sugar and cook until it jells.

**DRIED BERRIES**

Any dried berries should be soaked over night. They may then be used as sauce or for pies.

**DRIED CHERRIES**

Dried cherries, when soaked, may be used for pies. The sweet, dried cherries, such as Bings or Royal Anne's, are very good substitutes for raisins in puddings and cakes.

**STEAMED PUDDING**

1 c milk	1 c berries or cherries
2 eggs	1 t salt
Roller cracker or bread crumbs	$\frac{1}{2}$ c sugar
	2 T melted butter

Beat eggs; add milk with salt and sugar; add enough crumbs to make a drop batter (about a pound of bread crumbs); fill molds with batter, enclosing a generous spoonful of the berries. Steam one hr. Serve with a pudding sauce.

**DRIED FRUIT COBLER**

Put stewed and sweetened dried fruit in pan about an inch in depth. Cover with sweetened biscuit or shortcake dough. Bake in quick oven. When done, invert on platter and pile with whipped cream. Serve immediately.

**DRIED PEARS**

When pears are cut in narrow wedges and dried, they make a delicious confection for children.

**DRIED APPLES**

Dried Apple Rings

 $\frac{1}{2}$  c water $\frac{3}{4}$  c sugar

Make a syrup of the sugar and water and color with red coloring. (\*Burnett's Standard Colors, costing 75c for six-ounce bottles, are good.) A little lemon juice or mint would add to flavor.

Use evaporated apples which were soaked and partly cooked for the apple rings.

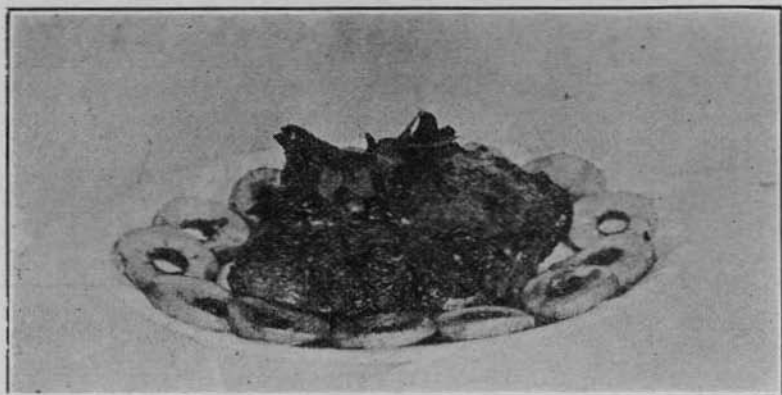


Fig. 16. Dried-apple rings used for garnishing meat roasts

**DRIED APPLE FRUIT CAKE**

Boil two cups of dried apples in two cups of molasses. Cream one cup of butter with two cups of brown sugar; add four beaten eggs and two cups of sour milk; sift together five cups of flour or substitute, two teaspoons of soda, two teaspoons of baking powder, one teaspoon of cinnamon and one-half teaspoon of cloves. Stir into the dry ingredients; add two pounds of raisins and one pound of currants, well floured, and two pounds of English walnuts, meats broken into small pieces. Bake for three hours in a moderate oven.

**DRIED APPLE JELLY**

Cook the soaked fruit until tender, then strain thru a cheese-cloth bag over night. Use three-fourth cup sugar to 1 cup of this apple juice and boil until it reaches 217 degs. F., then it has reached the jelling point and should be poured into the sterilized jelly glasses. Several variations can easily be made.

Variation I. Mint Jelly.

Boil a few mint leaves in the jelly and color with green coloring.

Variation II. Spiced Jelly.

Color with red. Tie small pieces of cinnamon and four or five cloves in a bag and boil in the fruit juice. One teaspoon of vinegar to a glass of jelly should also be added.



## Variation III. Geranium Jelly.

Boil a rose geranium leaf with the apple juice and color the jelly rose red.

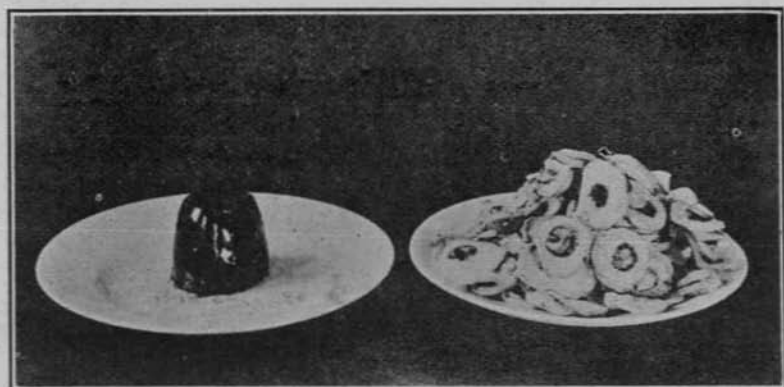


Fig. 17. Dried-apple jelly

#### Jelly Hints.

To get perfectly clear jelly, strain the juice thru a flannel bag. The constituent which makes jelly "jell," is called pectin; acid is also necessary in jelly making.

To test for pectin in fruit juice: One-half teaspoonful of boiled fruit juice and one-half teaspoonful alcohol. If pectin is present, it will give a ropy gelatinous mass. After testing the sample, it should be put in the stove at once, thus avoiding danger of children eating it. You should always use this test before adding sugar to your fruit juice, thus avoiding waste. The pulp from the jelly bag may be used to make marmalade.

#### APPLE MARMALADE

- |                          |  |
|--------------------------|--|
| 3 qts. stewed apples     | 8 c sugar  |
| 1 can shredded pineapple | 7 cloves (to be removed when marmalade is done), |
| 3 oranges                | chopped walnuts                                  |
| 1 orange rind grated     |  |

Put cooked apple pulp thru a sieve. Add sugar, pineapple, oranges, nuts and cook to a jam. If pineapples, oranges and nuts are not available, season with spices.

#### EXPERIMENTS IN THE COOKING OF DRIED APPLES

Experiments on the cooking qualities of dried apples were carried on to determine the best varieties for evaporating.

In the experiments making plain apple sauce, one cup or 50 grams of the evaporated apples were used, two T or 30 grams sugar and two cups or 500 cc of water. Samples were taken out at 20, 30 and 40 minutes in each case. Those cooked for 40 minutes were found to be the best in every case except the Rome Culls. Note results in Table I:

Table No. 1. *Cooking Qualities of Dried Apples*

Name of variety	Quantity (g)	Sugar (g)	Water added (cc)	Time soaked (hrs.)	Time cooked (mins.)	Flavor	Texture	Color	Total
Ark. Black...	50	30	500	20	20	underdone	underdone	good	84
					30	underdone	underdone	good	
					40	44	20	good	
Ark. Black...	50	30	500	0	20	underdone	underdone	good	84
					30	underdone	underdone	good	
					40	44	20	good	
Ark. Black...	50	30	500	6	20	underdone	underdone	good	84
					30	underdone	underdone	good	
					40	44	20	good	
Ben Davis...	50	30	500	20	20	underdone	underdone	good	84
					30	underdone	underdone	good	
					40	42	23	19	
Ben Davis...	50	30	500	0	20	underdone	underdone	good	82
					30	underdone	underdone	good	
					40	40	23	19	
Ben Davis...	50	30	500	6	20	underdone	underdone	good	84
					30	underdone	underdone	good	
					40	42	23	19	
Rome Beauty.	50	30	500	20	20	underdone	underdone	good	92½
					30	46	24	22½	
					40	cooked up	cooked up	.....	
Rome Beauty.	50	30	500	0	20	underdone	underdone	.....	90½
					30	44	24	22½	
					40	cooked up	cooked up	good	
Rome Beauty.	50	30	500	6	20	underdone	underdone	good	92½
					30	46	24	22½	
					40	cooked up	cooked up	good	
Winesap ....	50	30	500	20	20	underdone	underdone	good	90
					30	underdone	underdone	good	
					40	47	20	23	
Winesap ....	50	30	500	0	20	underdone	underdone	good	88
					30	underdone	underdone	good	
					40	45	20	23	
Winesap ....	50	30	500	6	20	underdone	underdone	good	90
					30	underdone	underdone	good	
					40	47	20	23	

The samples experimented on were C and Cull grades of Arkansas Black, Rome Beauty, Winesap, and Ben Davis. The apples which were not soaked were not as sweet and palatable as the other apples.

Table No. 2 Shows the Effect on the Resulting Product

	Exp. I			Exp. II			Exp. III		
	Flavor	Texture	Color	Flavor	Texture	Color	Flavor	Texture	Color
Arkansas Black...	44	20	20	44	20	20	44	20	20
Ben Davis.....	42	23	19	40	23	19	42	23	19
Rome Beauty.....	46	24	22½	44	24	22½	46	24	22½
Winesap .....	47	20	23	45	20	23	47	20	23

In Experiment I the apples were soaked 20 hours.  
 In Experiment II the apples were not soaked.  
 In Experiment III the apples were soaked six hours.  
 They were judged on the following scale:

Flavor .....	50 points
Texture .....	25 points
Color .....	25 points

Dried apples were tested as to their jelling properties. The basis for the pulp being one part dried apples to 10 parts of water. The results secured are shown in Table No. 3.

Table No. 3

	Flavor	Texture	Color	Clearness	Surface	Total
Arkansas Black .....	33	30	15	8	5	91
Ben Davis .....	30	30	15	7	5	87
Rome Beauty .....	32	31	13	7	5	88
Winesap .....	34	31	15	9	5	94

The jelly was graded on the following scale:

Flavor .....	35 points
Texture .....	35 points
Color .....	15 points
Clearness .....	10 points
Surface .....	5 points

In all the experiments the C and Cull grades were judged separately, but in every case no difference in results was detected. After cooking, there was no difference in the appearance.

## DRIED VEGETABLES

### DRIED BEANS

The white wax beans are thought by many people to have a better flavor than green beans. Soak dried beans over night. Pour off water, add fresh water and cook until tender. Season with fat pork, butter, drippings or cream.

### DRIED PEAS

Among the best varieties are Marrowfats, white Canadians, and Swede peas. Soak and cook until tender.

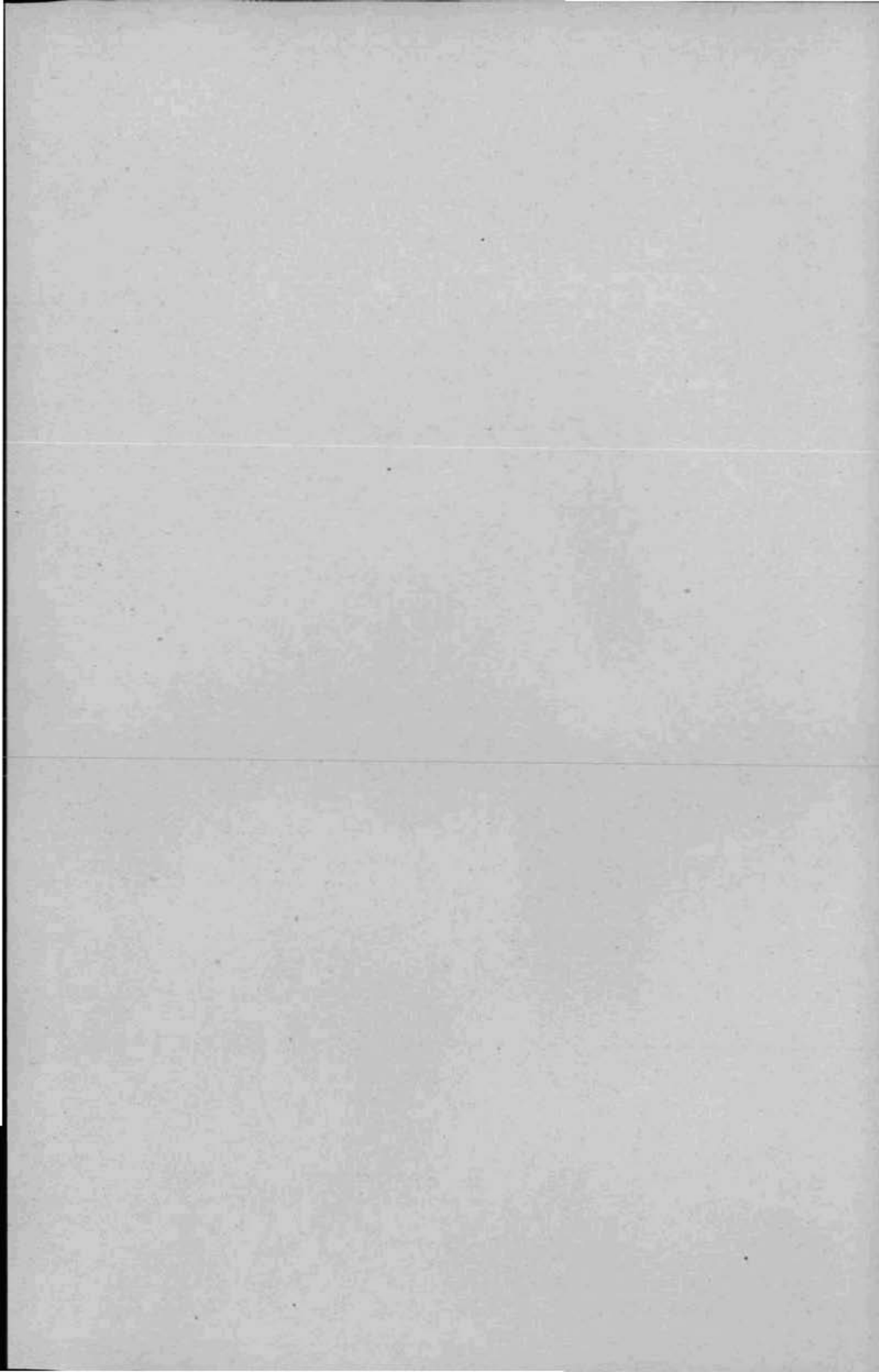
Other vegetables are soaked over night and cooked until tender and seasoned.

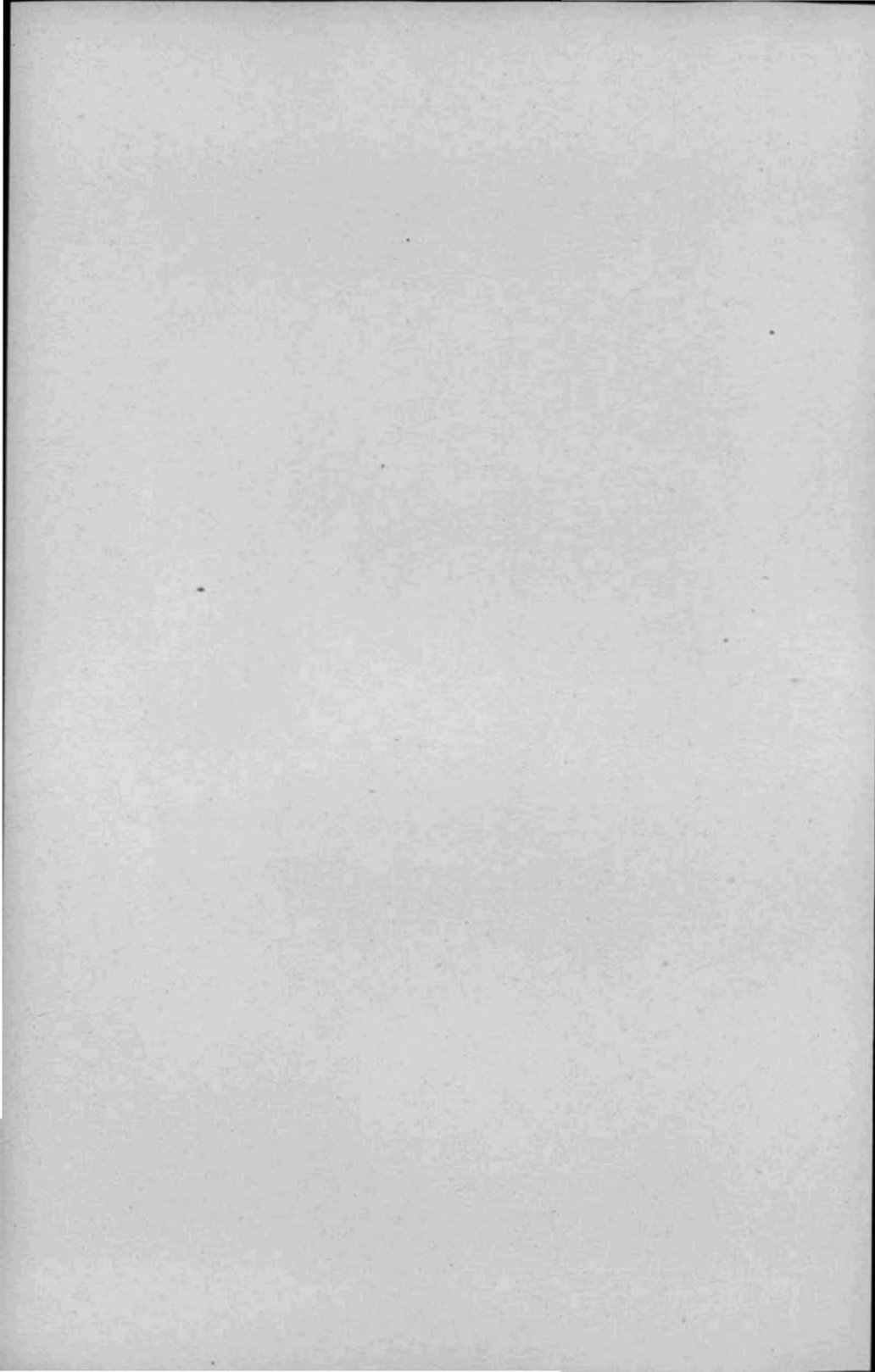
### DRIED CORN FRITTERS

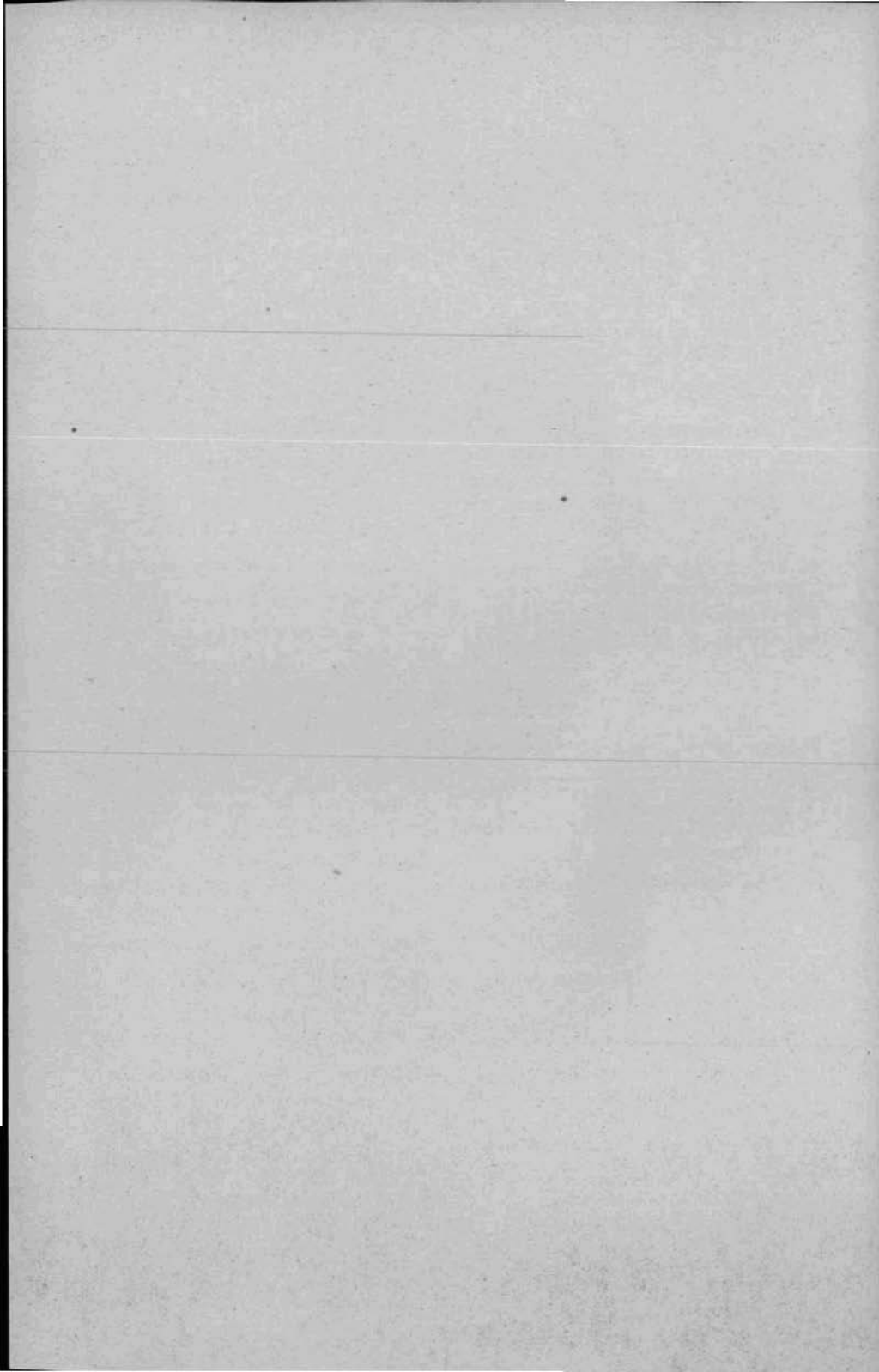
Soak the corn over night. Cook until tender in boiling salted water.

3 c corn	1 t salt
1 c flour or substitute	¼ t paprika
1 t baking powder	2 eggs









The following publications may be obtained without cost, by addressing the Agricultural Experiment Station, Moscow, Idaho.

#### Bulletins

72. A Report on the Milling Properties of Idaho Wheat.
73. A Study of Idaho Butter with Suggestions for Improvement.
75. Composition of Irrigated and Non-Irrigated Fruits.
85. The Use of Lime-Sulfur as a Summer Spray for Apple Scab.
86. Some Poisonous Plants of Idaho
87. Insect Pests of the Orchards and Gardens of Idaho, and Their Control.
88. The Milling Values of Dry-Farmed and Irrigated Wheat.
90. Creamery Records.
91. Methods of Clearing Logged-off Lands.
92. The Annual Report of the Experiment Station for the Year Ending June 30, 1916.
93. Experiments with Small Grains Under Irrigation.
94. Experiments with Legume Crops Under Irrigation.
95. The Management of Irrigated Grass Pastures.
96. The Management of Farm Flocks in Idaho.
97. Commercial Onion Culture in Idaho.
98. Winter Versus Summer Pruning of Apple Trees.
99. Experiments in the Irrigation of Apple Orchards.
100. The Production of Clover Seed Under Irrigation in Southern Idaho.
101. The Production of Alfalfa Seed in Southern Idaho.
102. Dairy Herd Management.

103. Performance Records of Some Eastern Wheats in Idaho.
104. Annual Report of the Experiment Station for the Year ending Dec. 31, 1917.
105. Trees: What, Where, When and How to Plant.
106. The Home Garden in Idaho.
107. Soils of Latah County.
108. Sprays for the Control of San Jose Scale.
- .... Measurement of Irrigation Water.
- .... Hog Cholera in Idaho.
- .... The Alfalfa Weevil.
- .... Directory of Idaho Pure-bred Breeders.

Farmers' Bulletin 769. Growing Grain on Southern Idaho Dry Farms.

Farmers' Bulletin 907. Bean Growing in Eastern Washington and Oregon and Northern Idaho.

\*Ground Squirrel Control.

\*Oats in Washington.

\*The Home Drying of Fruits and Vegetables.

\*Purchased of Washington State Experiment Station for distribution in Idaho.

#### Circulars

2. Field Peas.
3. Feeding for Egg Production.
5. Tested Forest Trees for Planting in Idaho. This circular is a price list of trees for sale by the Department of Forestry at approximate cost.
6. The Spray Calendar.