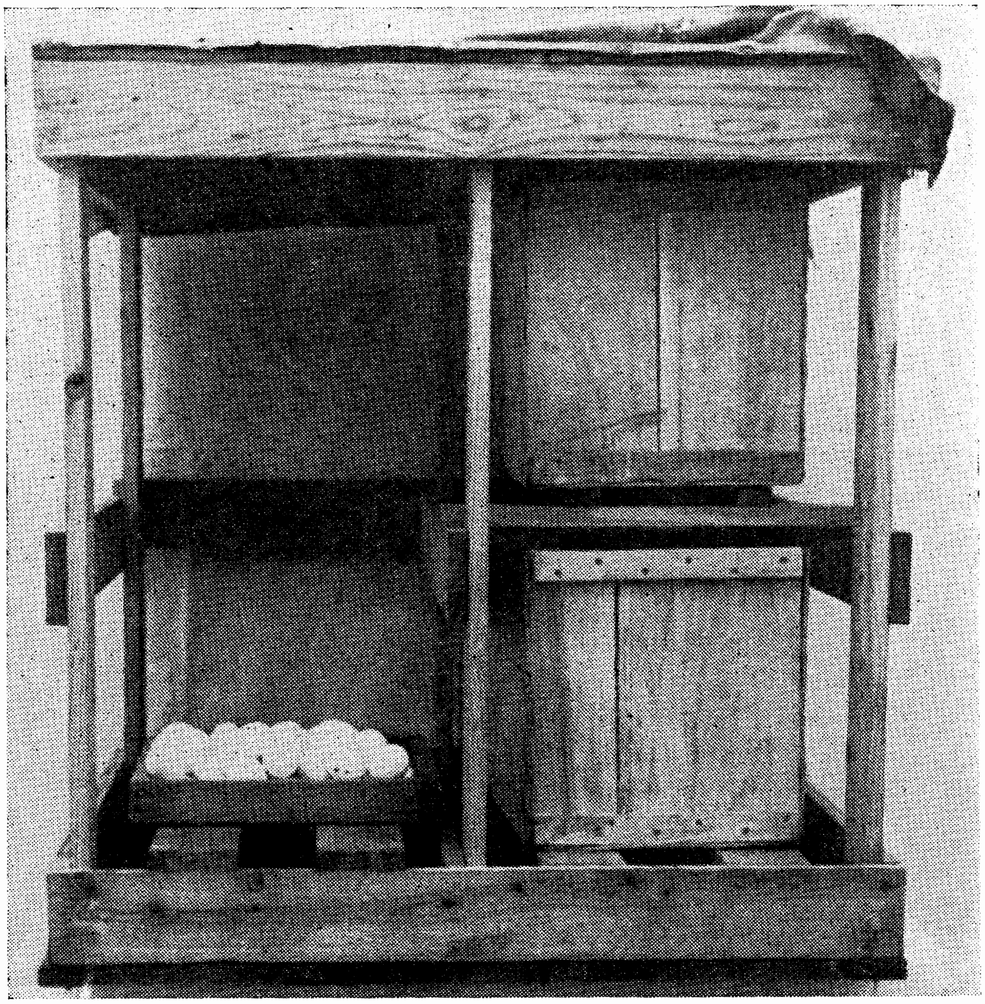
# A Homemade Egg-Cooler for Farm Use

BY R. B. THOMPSON AND C. A. ROBERTS
DEPARTMENT OF POULTRY HUSBANDRY



**Cooler with burlap cover removed to show interior arrangement. Pre-cooling compartment is at left. After cooling, eggs are stored until market day in cases at right.**

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# A Homemade Egg-Cooler for Farm Use

**By R. B. Thompson and C. A. Roberts**

The increasing need and demand for an inexpensive method of preserving egg quality on the farm from one market day to the next is much in evidence. This need has led to the development at the Oklahoma Agricultural Experiment Station of an inexpensive, homemade cooler which will preserve egg quality quite satisfactorily for seven days. The cooler is easy to operate; and it is adaptable to use on any farm, because it requires no electricity, gas, or running water.

Because this cooler uses the evaporation of water to reduce the temperature, it is of value only through the hot, dry summer months. But it is in just those months that a cooler is most needed on Oklahoma farms. The cooler also provides moisture, which prevents the eggs from going stale due to evaporation of their contents when exposed to hot, dry weather conditions.

The summer egg-cooler consists of an open framework of 1″x4″ slats covered with burlap, with provision for keeping the burlap saturated with water. The outside dimensions of the framework should be 36 inches wide, 36 inches high, and 33¾ inches deep. This size is sufficient to hold two egg cases and provides an adequate amount of space for a pre-cooling tray and wire basket.

In testing various possible covering materials, birdseye, canvas, wick cloth and burlap were tried. It was found that burlap, with its more open weave, permitted a greater circulation of air, which was necessary to prevent mold from developing on the eggs. (See Appendix.)

Tests of different types of coolers have been made during several seasons, and in these tests the type of cooler described in this circular was found most effective. Results of these tests, which are described in the Appendix, have led to the following observations:

1. Care of eggs before storage influences quality after storage.
2. Humidity aids in preventing evaporation of the interior content of eggs and the consequent destruction of quality.

3. The body temperature of the hen should be removed from the eggs as soon as possible after they are laid.

4. Eggs held longer than seven days in the summer evaporation cooler are likely to develop a mold growth that will greatly lower their quality.

5. Eggs held at high and dry temperatures before storage lose quality rapidly while in storage.

6. Eggs held in the summer evaporation egg cooler before storage have much better quality after storage than eggs held in a normal temperature room.

All trials have been with infertile eggs. Since the temperature rises to above 68 degrees in the coolers on warm days, fertile eggs are likely to lose quality, although not as rapidly as in the open, dry air. The cooler reaches its greatest efficiency with infertile eggs and when the eggs are not held in it longer than seven days.

## CONSTRUCTION OF THE COOLER

### Materials Needed

Bill of material necessary to construct a two-case-capacity egg-cooler (all dimensions are inches):

11 pieces—1x4x36
11 pieces—1x4x32
2 pieces—1x4x33¾
1 piece —1x4x19½
2 pieces—1x2x29
2 pieces—1x2x33¾
6 pieces—1x12x33¾
2 pieces—33¾x36 composition roofing free of punctures and tears
1 piece —40x100 burlap
1 piece —40x44 burlap
1 piece —40x42 burlap
1 lb. galvanized nails (No. 5)
1 lb. ½ or ¾-inch galvanized roofing nails
2 lath 36½
2 lath 33¾

Figure 1 shows the material, with the exception of the nails, with part of the framework put together.

## Steps in Construction

### *Step No. 1*

The first step in construction of the cooler is to nail up three panels as illustrated in Figure 1. The upright pieces at the ends of each panel are 36 inches long, while the three crosspieces are 32 inches long. These panels must be identical as to outside measurements and absolutely square. The distance between the top of the bottom crosspiece and the top of the middle crosspiece is 13½ inches.

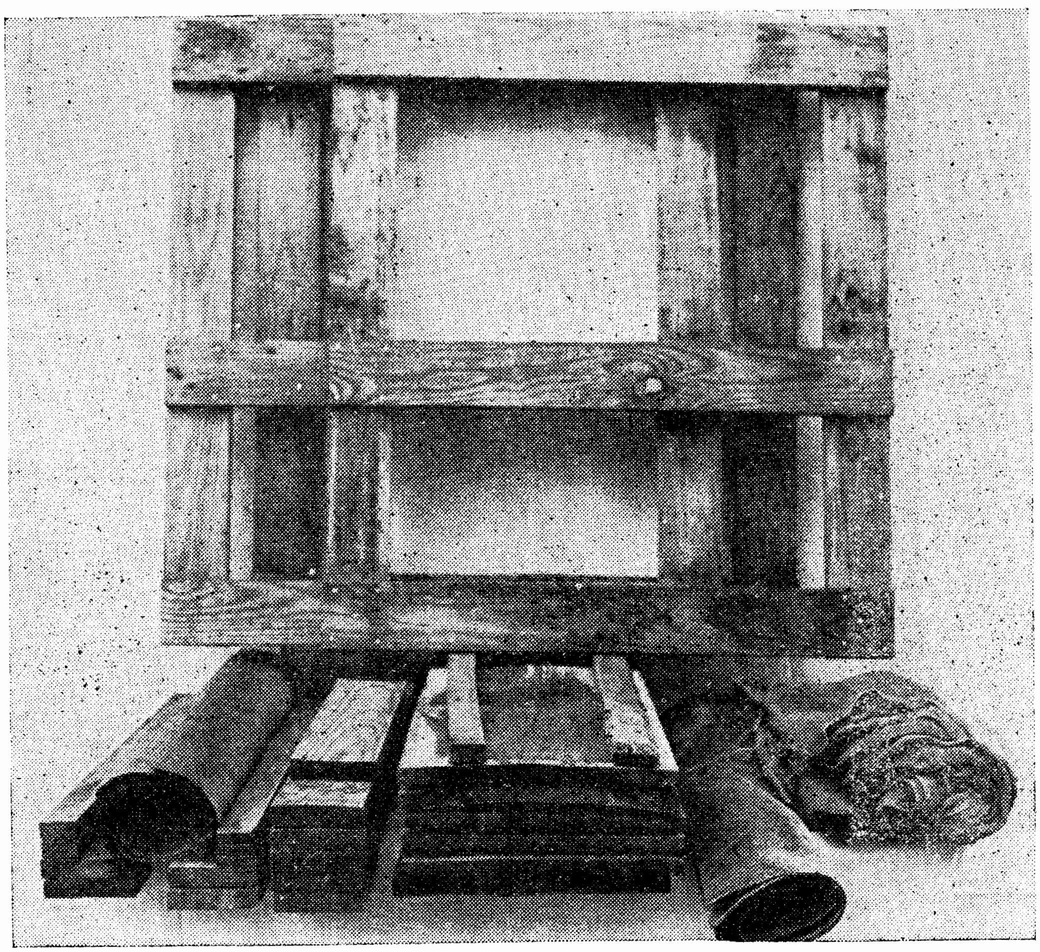

Figure 1.—The materials, except for nails, used in constructing the cooler. The back and side panels have already been nailed together. (Step No. 1.)

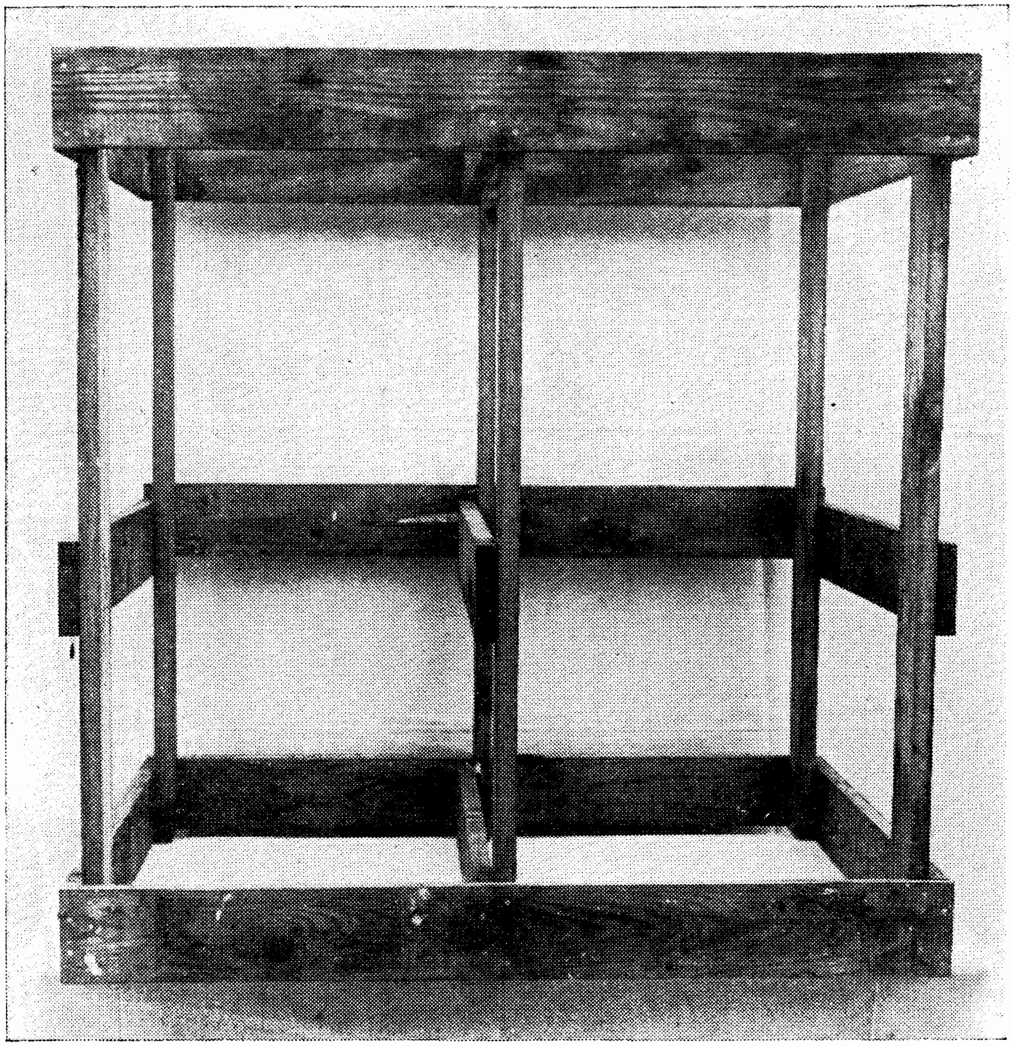

Figure 2.—The back and side panels have been nailed together to complete the framework. (Step No. 2.)

### *Step No. 2*

As shown in Figure 2, stand the three panels upright and make a rigid framework by nailing on two of the 36-inch pieces in front and three in the back. Notice that these pieces fit flush with the outer edges of the panels, and that the rear center piece is raised ¾ inch above the panel centerpieces.

The panels should be placed with the crosspieces of the center and left one on the same side and the center piece of the right one in the opposite direction. This arrangement makes more room for the egg cases, which will be placed on the right side of the cooler. The uprights of the center panel should center the crosspieces.

*Step No. 3*

When Step No. 2, as illustrated in Figure 2, has been completed, turn the framework bottom up and loosely attach one of the pieces of roofing material. Then nail on solidly over the roofing a floor of three of the 1x12 pieces, and one of the 1x2x33¾ pieces. The 1x2x33¾ pieces may vary slightly in width, depending upon the exact width of the 1x12 pieces.

*Step No. 4*

Turn the framework back to the topside up position and nail on a solid top, using the other three 1x12's and the remaining 1x2x33¾ piece.

The edges of the wood top should be beveled and the remaining piece of roofing firmly attached on the beveled edge of the board roof. Nails should not be driven through the top at any point, because the object of using the roofing paper is to make the cooler water and air tight at the top and bottom. Figure 3 shows how the board top should be beveled and the roofing paper nailed on.

*Step No. 5*

As illustrated in Figure 3, form a false floor on the left side of the cooler by nailing the two 1x4x33¼ pieces to the top edge of the lower border pieces. The false floor in the opposite side is formed by nailing the two remaining 1x4x32 pieces with their upper surfaces flush with the top edge of the lower border 1x4, front and rear. See Figure 3.

*Step No. 6*

On the right side of the cooler (see Figure 3) and against the front uprights and resting on the middle crosspieces, attach the 1x4x19 piece, which is to support the front end of a slatted shelf made by nailing the two 1x2x29 pieces to it. The rear end of the shelf is to be supported by the rear center crosspiece. The shelf slats should be about 7 inches apart.

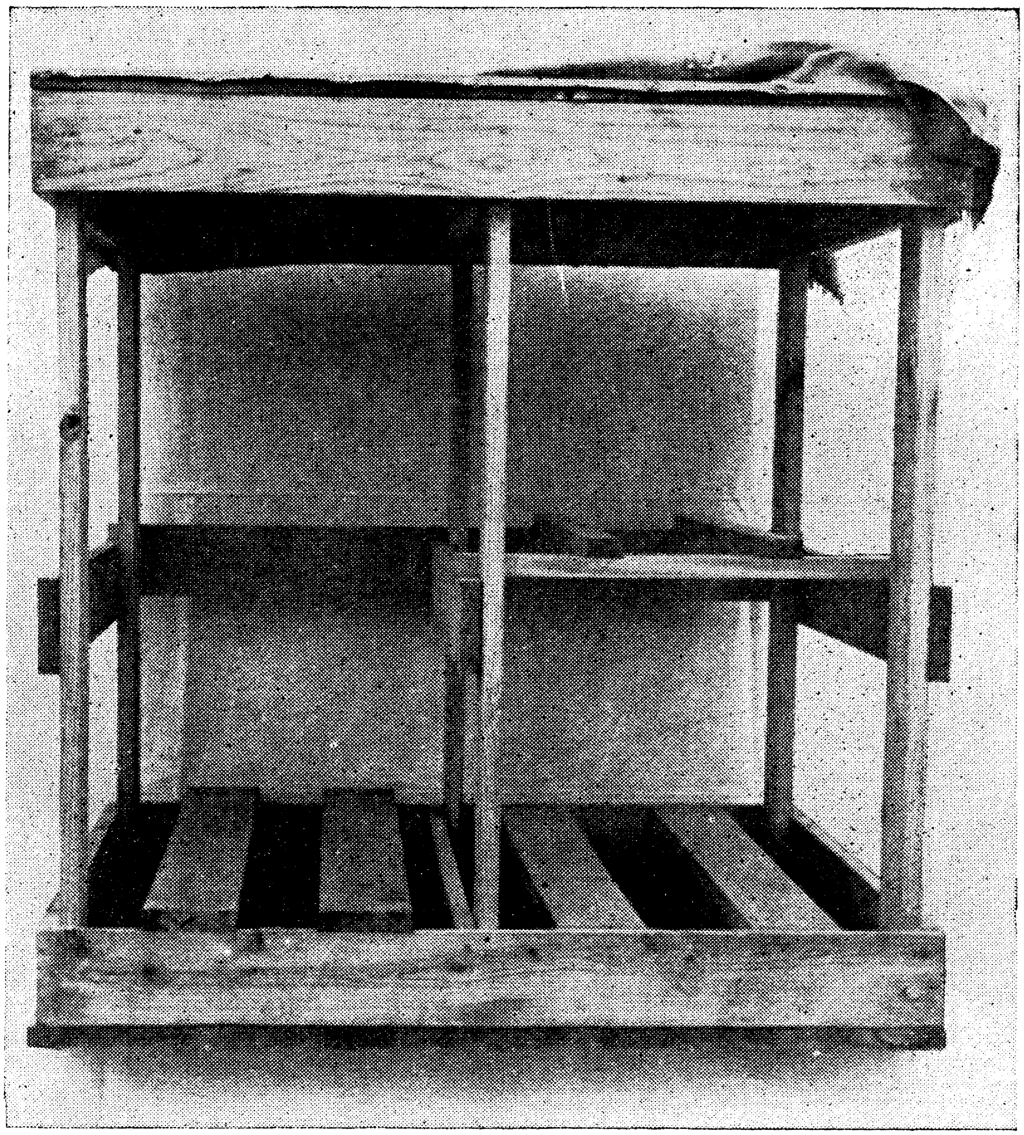

Figure 3.—After completion of Step No. 6. The framework is now ready to be covered with burlap. Note difference in levels of false floors (Step No. 5), and construction of slatted shelf (Step No. 6).

*Step No. 7*

Place the 40x42 burlap over the top and space it so that the edges hang down about 3 inches over each side as shown by top front of Figure 4.

*Step No. 8*

Beginning at the upper edge of one end of the 40x100 burlap, roll one of the 33¾ inch lengths of lath loosely into it until there is enough of the burlap left to just reach the bottom of the cooler. The top of the burlap-covered lath should be about one inch from the top of the cooler and exactly parallel with it. See Figure 4.

Continue the above procedure, using a 36½ inch lath for the rear and the remaining 33¾ lath for the other side. Three nails to each lath are sufficient to keep them in place.

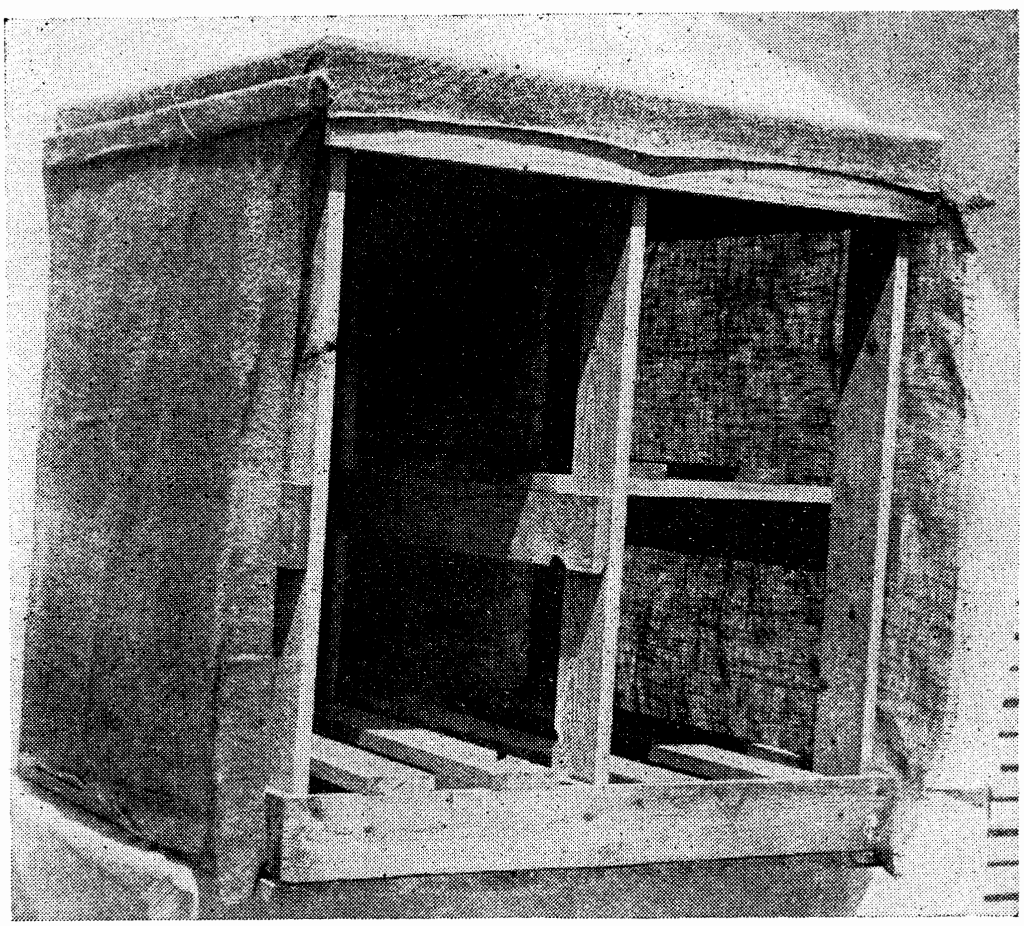

Figure 4.—Burlap covering in place (Steps Nos. 7 and 8 completed). The 44″x100″ piece of burlap starts at the front edge on the left side, runs around the back, and ends at the front of the right side.

As shown in Figure 4, the 40x100 burlap is sufficient to enclose the two sides and the rear of the cooler with about two inches to spare on each side of the front, which is open.

*Step No. 9*

For the front enclosure, roll the remaining 36½-inch lath in the 40x44 piece of burlap until it can be placed on the front in the same way as for the side and rear enclosures as shown in Figure 5. The 44-inch length should extend out over the ends of the lath sufficiently to form a loose flap about 4 inches in length. The flaps are to lap over the ends and prevent air from entering the cooler without passing through the meshes of the burlap.

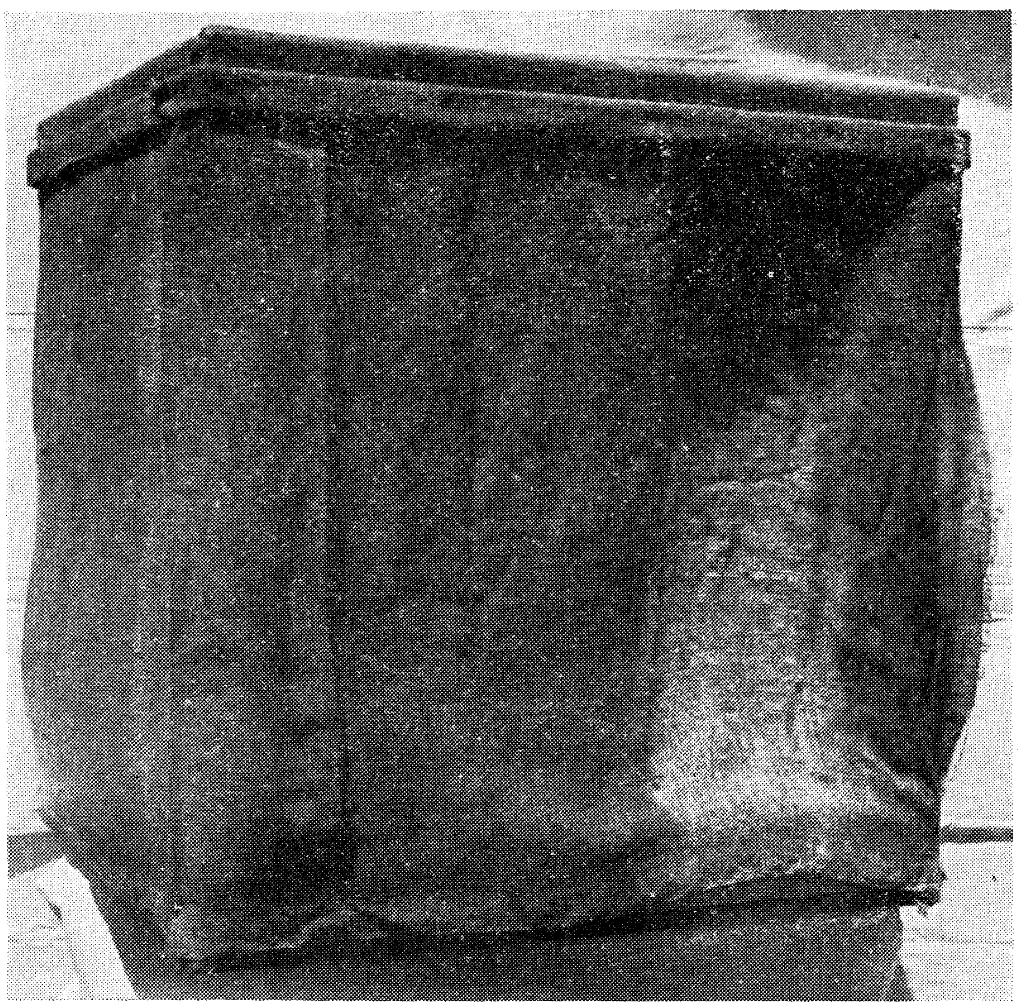

Figure 5.—Completed cooler, closed, showing front burlap in place (Step No. 9).

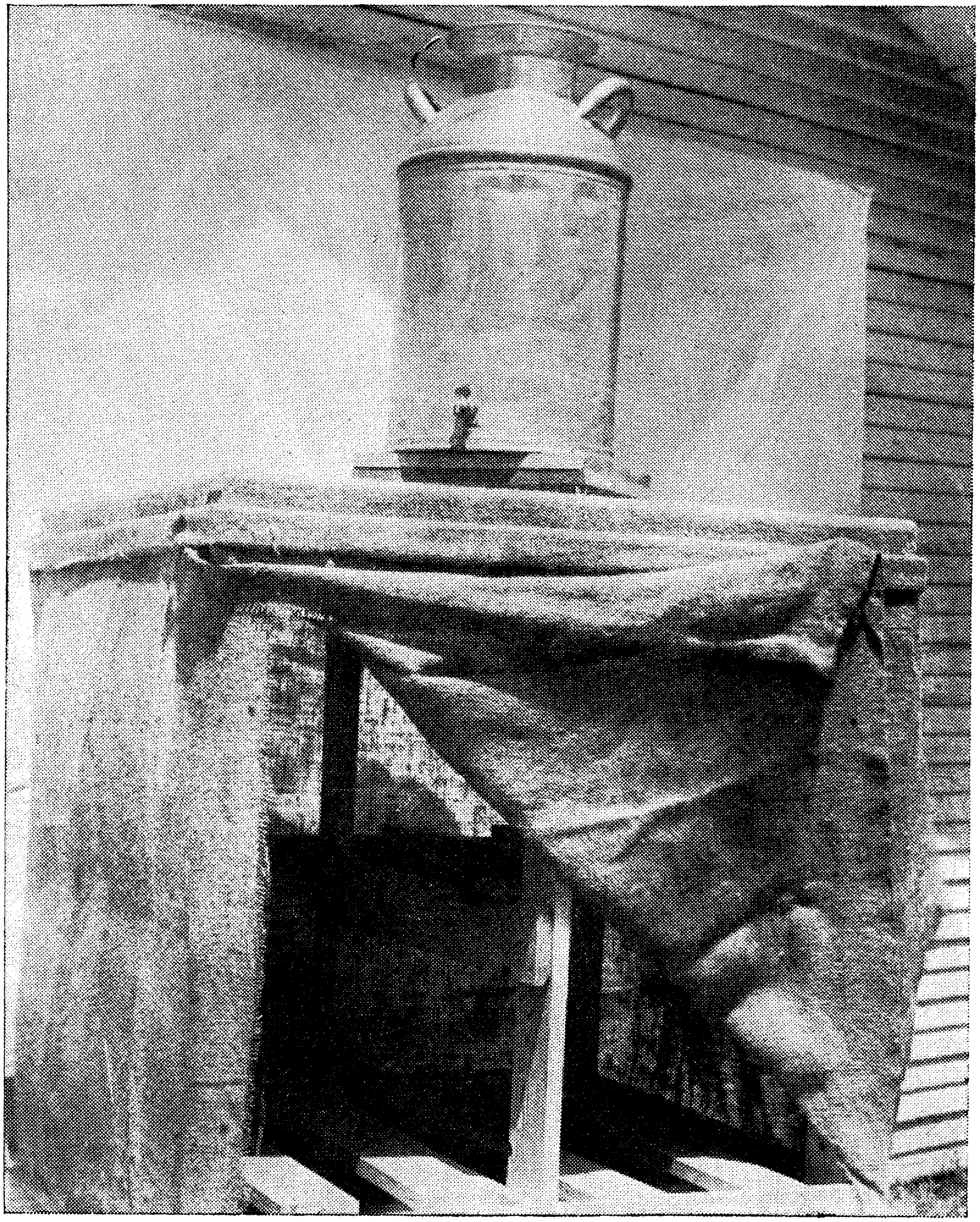

Figure 6.—Completed cooler, with pre-cooling compartment open. The cream can contains water which drips on cooler from faucet at base of can.

Only the top part of the front should be attached permanently to the cooler. Hooks or some method should be provided that will hold the front enclosure in place at the sides and bottom but still permit the front to be opened for placing eggs in the cooler. See Figures 5 and 6.

## OPERATION OF THE COOLER

### Location

The summer evaporation egg cooler will give better results if it is placed where a breeze can strike it at all times. It should be raised to a height of at least 30 inches from the ground to further aid air circulation.

Temperature inside the cooler will be about 2 degrees lower if operated in the shade rather than in the sunshine. Natural shade trees are satisfactory if there are no low hanging limbs to interfere with air circulation. Where it is necessary to provide artificial shade, burlap stretched over a frame about 2½ feet above the top of the cooler will serve the purpose. The shade should be sufficiently large to prevent the sun from striking the cooler after about 8:00 a. m. and not earlier than 5:00 p. m.

Nearness to the water supply is also important in locating the cooler. Place the cooler where it will be out of the way of other farm operations and will not have to be moved during the season it is to be used.

It is not necessary to protect the cooler from rain.

### Preparing for Operation

After the cooler has been permanently located, it should be rigidly anchored to prevent strong winds from moving it. The top of the cooler must be exactly level in all directions and at all times to insure uniform water run-off to saturate the burlap equally on all sides.

If running water is available, a water pipe should extend to the center and about four inches above the top of the cooler and be fitted with a faucet or pet cock that can be adjusted to release only a small stream of water. The stream should be just sufficient to keep the burlap enclosing the cooler saturated without water dripping off the bottom of the burlap. This is difficult to do, and too small an amount of drip will do but slight damage to the effectiveness of the cooler. The less drip with all the burlap wet, the lower the temperature inside the cooler.

If running water is not available, a 10-gallon milk can or similar container fitted with a small faucet will do as well. (See Figure 6.) The water container should be placed on a platform above the cooler, with the faucet over the exact center of the cooler. The platform supporting the can should rest on small metal or wooden legs to avoid interference with the flow of water to the edge of the cooler.

Uniform saturation of the burlap around the cooler depends upon an even flow over the edges of the top. Dry areas on the enclosing burlap permit the entrance of hot, dry air into the cooler and consequently a higher temperature.

From 8 to 10 gallons of water every 24 hours are required to properly operate the cooler. Only enough water to keep the burlap thoroughly saturated is necessary. There is no advantage in saturating the burlap to the extent that the water will drip off around the bottom.

### Putting Eggs in Cooler

The cooler should be operating satisfactorily for a few days before eggs are put in it.

A wire-bottomed frame or wire egg basket, and egg cases together with the fillers and flats to be used in them, should be put in the cooler so that they may be cooled before eggs are put in. Putting hot dry fillers and flats in daily may cause the temperature to rise several degrees, and as much as 8 to 12 hours will be required to again lower the temperature in the cooler.

The eggs gathered each day should be left over night in the wire basket or wire-bottomed tray in the pre-cooling compartment, and then cased early the following morning. The temperature in the cooler reaches its lowest point about 5:00 a. m. If the eggs are kept in the pre-cooling compartment (See cover picture) over night, they will be cooled to the early morning temperature. If, however, they are cased within the cooler as soon as they are gathered, the insulation afforded by the fillers and flats may prevent them from cooling down for from 24 to 36 hours.

Where the eggs are pre-cooled over night and then cased in the early morning, the insulation of the fillers and flats may be enough to keep them at the early morning temperature throughout the day.

To get the greatest benefit from the cooler it should be opened only when necessary to put eggs in as gathered, to transfer eggs to the case, or to take the case out.

## APPENDIX

### TESTS OF VARIOUS TYPES OF HOMEMADE EGG-COOLERS*

Tests of various types of evaporation egg-coolers have been made during three summers. Details of some of these tests are given in the following pages:**

TESTS OF COVERINGS: One major test was devoted to determining the relative effectiveness of birdseye, canvas, wick cloth and burlap as a covering. A fifth frame was covered with burlap and operated without wetting the burlap. A mechanical refrigerator was also used for comparison. Temperature and relative humidity readings were made outside the coolers as well as inside each cooler.

The temperature in each cooler followed a similar curve. In all coolers the high temperature for each day was between 11:00 a. m. and 1:00 p. m. and the low at 5:00 a. m.

The relative humidity curves were also similar. The high humidity was at 5:00 a. m. each day in each cooler and the low humidity at 3:00 p. m. each day in each cooler.

The highest outside temperature during one 8-day observation period was at 2:00 p. m. on the third day. At that same hour temperature and relative humidity readings of all coolers were as in Table I.

*Table I. Temperature and Relative Humidity Readings in the Farm Egg Coolers Taken on the Hottest Day of an 8-Day Test Period*

| | Outside Air | Dry Burlap | Wet Burlap | Wet Birdseye | Wet Wick Cloth | Wet Canvas | Mechanical Refrigerator |
|---|---|---|---|---|---|---|---|
| Temperature | 103 | 97 | 79 | 87 | 78 | 84 | 29 |
| Relative Humidity | 9 | 6 | 48 | 40 | 75 | 56 | 67 |

During this hour a decrease of 24 degrees in the wet burlap cooler and 25 degrees in the wet wick cloth cooler, below out-

* All tests were made with infertile eggs.

**For more detailed descriptions of these tests see:

**Science Serving Agriculture,** Report of Agricultural Experiment Station, Oklahoma A. and M. College, 1934-1936, pp. 79-83.

**Science Serving Agriculture,** Report of Agricultural Experiment Station, Oklahoma A. and M. College, 1936-1938, pp. 154-156.

side temperature, was observed. The temperatures alone of the two coolers would indicate that the wet wick cloth was the most desirable, but as indicated in the table the relative humidity in the wet wick cloth was 27 points higher than in the wet burlap cooler. This extra amount of humidity was sufficient to cause the eggs to collect a coat of moisture, and a growth of mold occurred on the eggs in the wick cloth covered cooler within 5 to 7 days. In later trials an attempt was made to control the mold growth by mixing formaldehyde with the water on the wick cloth but without satisfactory results.

The temperature decreases shown in Table I were the greatest in the eight day period, and later trials proved that under similar conditions these temperatures could be depended upon and were not difficult to maintain.

Table I shows a relative humidity reading of 9 for the outside air at the same hour the temperature readings were taken. This same humidity was observed at 3 other readings but at no time was a lower reading taken for the outside air. The relative humidity inside the dry burlap cooler, however, was as low as 2 with a temperature of 97.

The lowest temperature in any cooler was 61 in the wet burlap cooler at 5:00 a. m. of the first day. Temperature and humidity readings of all coolers at that same hour are shown in Table II.

*Table II. Lowest Temperature and Accompanying Relative Humidity Readings Made During an 8-Day Test of the Farm Egg Coolers*

| | Outside Air | Dry Burlap | Wet Burlap | Wet Birdseye | Wet Wick Cloth | Wet Canvas | Mechanical Refrigerator |
|---|---|---|---|---|---|---|---|
| Temperature | 63 | 62 | 61 | 64 | 63 | 64 | 28 |
| Relative Humidity | 83 | 57 | 76 | 70 | 80 | 80 | 66 |

The wet and dry burlap covered coolers were the only coolers to show temperature at this hour which was lower than the outside air temperature.

96.78% of the eggs out of the wet burlap cooler, 92.46% of the eggs out of the wet wick cloth cooler and 97.20% of the eggs from the mechanical refrigerator graded as number one eggs after 8 days in the coolers. These eggs were candled by a commercial egg grader.

23.16% more eggs were saved for market in the wet burlap cooler than in the dry burlap cooler, and only 00.33% less than in the mechanical refrigerator.

Wick cloth is eliminated because of the mold.

TESTS OF SIZES: To determine the most satisfactory size, coolers of three different sizes were constructed. Each was covered with burlap and cooled by evaporation. The variation in the temperature of the three coolers was insignificant.

The inside measurements of the largest of the egg coolers were 36 inches high, 32 inches deep, and 72 inches wide. It had a capacity of from four to eight cases of eggs and a compartment for pre-cooling the eggs before putting them in the case. The next smaller cooler had a capacity, in addition to the pre-cooling compartment, of four cases of eggs. Its inside measurements were 36 inches high, 32 inches deep, and 52 inches wide. These two coolers were awkward to operate.

The most convenient size of farm egg cooler proved to be the two-case size, the inside measurements of which are 36 inches high, 32 inches deep, and 34½ inches wide.