COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF OKLAHOMA
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OKLAHOMA AGRICULTURAL AND
MECHANICAL COLLEGE AND
UNITED STATES DEPARTMENT OF
AGRICULTURE, COOPERATING
EXTENSION SERVICE
COUNTY AGENT WORK
STILLWATER, OKLAHOMA
Distributed in Furtherance of the Acts of Congress of May 8 and June 30, 1914

Cream Grading Increases Profits

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Circular No. 342 1937 General Series 286

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WHY GRADE CREAM?

To improve the price of cream to the individual farmer, increase the state income from dairy products, and to increase the consumption of all dairy products are purposes of cream grading.

Quality Increases Consumption, Stimulates Price

High quality cream makes high grade butter. High grade butter is in greater demand by consumers than low grade. Low grade butter is consumed slowly and is in direct competition with butter substitutes. It is worth 2 to 5 cents per pound less. Low grade butter does not attract very many repeat orders and from a market standpoint is a detriment to the dairy industry.

Instead of manufacturing 87 to 90 score butter in Oklahoma, a 90 to 92 score product should be manufactured. In some cases the score should be raised to 93 points. This improvement in grade will reflect an increased price of from 2 to 4 cents per pound of butterfat to the producer.

Care: Producers should care for their cream in such a way as to make it possible for the butter maker to manufacture butter of the higher scores. On many farms this care can be provided with little extra expense of materials or time. The extra price for the good grade of butter manufactured should be returned to the producer. This is his reward for thoughtfulness and extra labor in production.

Cleanliness: Every precaution should be taken to prevent bacteria, yeast and dirt from getting into the milk and cream. The use of seamless milk pails which are easily cleaned is one way to help. Use the pails for milk and cream only. Wash and disinfect the separator and utensils after each use. Some dairymen plan to wash their separators only once daily (after the morning's use). This is a poor plan, as the resulting morning's cream is universally of lower grade than the evening's. This is due to bacterial and yeast growth in the bowl overnight. Milk with dry hands. Stanchioning cows while milking usually improves the quality of milk, and reduces the labor in properly caring for the cows and product.

Cool Cream Immediately: Separate cream into a small diameter, "shotgun" type can or tall earthern jar which is clean and contains no cream. This cream should be cooled immediately, if possible, to below 60° F. Place the can in the cream cooler. Pump fresh cool water into the cooler (58° to

66° F.) and gently stir the cream with a clean metal stirrer six times at five minute intervals to remove odor and reduce the temperature. Whether the cream can be cooled as directed or not, the fresh cream should always be kept separate 8 to 12 hours, and stirred to remove body and feed odors always present in fresh cream.

Cream Storage Methods on the Farm: The construction of a cooler using water, evaporation or mechanical refrigeration is essential for best results. Mechanical refrigeration is not usually available or economical at present under Oklahoma conditions except where fluid milk is sold; therefore, this type is omitted from this discussion.

Coolers may be made out of a barrel as shown in Fig. 1, or a larger type made of concrete or heavy wood as in Fig. 2, or the evaporator type, in Fig. 3, may be used.

Since experiments show that cold water (50°) reduces cream temperature from 92° F. down to 62° F. in one hour, while air at the same temperature (50°) reduces it only from 92° F. to 87° F., we can definitely state that cold water is six times more satisfactory than cold air as a cooling agent.[1]

In other words, water at the same temperature as air cools cream more in 10 minutes than air in 60 minutes. It is desirable to reduce the temperature of cream rapidly; therefore, water should always be used. On many farms it may be necessary to pump water into washtubs and use these temporarily until a permanent cooler can be constructed and put into use. The type to be used depends upon the conditions on the individual farm as to amount of cream, temperature of water, amount of water and other equipment available.

Objections to Cave or Cellar: Many producers at times keep cream in a cellar or cave with vegetables, fruits, etc. This storage offers a rather "cold place," but not as cold as the water drawn from a nearby well. (The water vein is usually located in lower strata of soil). The cellar offers possibilities of developing off-flavors from air passing over vegetables, fruits or moldy planks. In the absence of a better place, a cave or cellar might be used temporarily if the cream containers are placed in cold fresh water daily and care is exercised in avoiding off-flavors. The delivery of some cans of off-flavored cream may be expected. This off-flavored cream cannot be mixed with other cream at the creamery without injuring the quality of butter, and is, therfore, a problem at the creamery, usually resulting in separate churnings and added costs of operation.

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[1] Yapp, W. W., and Nevens, W. B., "Dairy Cattle," Chapter 7, pages 97 and 98, John Wiley & Sons, New York, 1930.

TYPE OF COOLER TO CONSTRUCT

In general, where the volume of cream warrants it, and the water supply is adequate and of low temperature, a separate milk house with the cooling tank constructed in the house is recommended. However, where only a small quantity of cream is to be cooled, a barrel-type cooler can be economically constructed, and with slightly more daily labor very satisfactory results are secured with such a cooler.

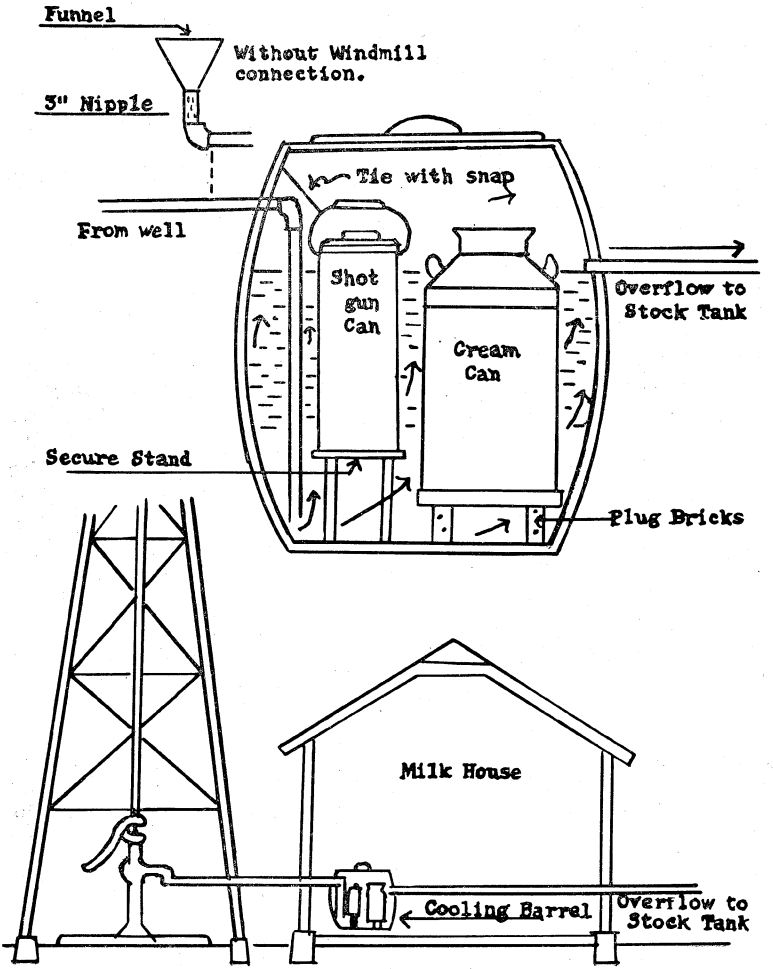


Fig. 1.

Where the supply of water is inadequate and is of high temperature, it is advisable to use the evaporation cooler, Fig. 3. This cooler is ineffective unless placed in a current of air. Therefore, it should be located near open windows, on a porch or in some other protected place where the prevailing winds will strike it.

Construction of Barrel Cooler

To construct a barrel cooler (Fig. 1), an ordinary tight 50 to 55 gallon wooden barrel should be obtained. An appropriate location is then selected near the well, and between the well and the stock tank. (In case a milk house is constructed, it should be located in it.) In case no housing facilities are available, the tank may be placed in the open. The barrel should be placed on an "open" rock or brick foundation.

Two pipes of appropriate length are obtained and cut, one to serve as an intake from the water supply, and the other an outlet to the stock tank. These pipes should be of a size to fit pump connections. These are usually 1⅞ inches in diameter. On the intake pipe a short thread should be cut. On this an elbow is placed with a short piece of pipe attached to carry the cold water to within two inches of the bottom of the barrel.

The hole for the intake pipe should be at least two inches above the outlet, and should not be drilled until the outlet is located. The outlet hole is cut after placing the cream can to be used in the barrel in an elevated position on bricks—the bricks to provide space for complete water circulation under the can. The outlet should then be placed at the upper rim or flange of the regularly used cream can.

The outlet pipe should not leak; therefore, it is necessary to cut threads for a tightly fitting threaded washer on the inside and outside of the barrel. This avoids moist surfaces which attract flies, bugs and livestock—resulting in insanitary conditions. The outlet pipe should lead to the stock tank or other reservoir. A loose lid should be provided for the barrel.

The shotgun can for warm cream should also be placed in the barrel on a separate stand, for which proper space should be arranged. A convenient wire with a snap to tie the bail to the shotgun can in place should be provided as the can often contains only a small quantity of cream and it may tip over unless secured.

Shade and Protection: The barrel should be placed on rocks to prevent decay and rusting of hoops. Where a building is not provided, four 10-foot posts should be sunk into the ground forming a 6-foot square. Hog wire should be stretched around the bottom and over this, and above poultry netting to

protect the cooler from all classes of pests and livestock. On the north side construct a door for entrance. A few rocks may be provided to stand on while handling the cream. A roof should be made of the wire, and permanent or temporary vines set to provide shade. Shade may also be provided by nearby trees. The surrounding plot should be set to Bermuda grass or kept in annual cover crops to reduce dust and dirt. If posts, gate and tank are painted an attractive color, the effect will be more pleasing and permanent.

Operation of Cooler: Warm cream is placed in the shotgun can and cooled by stirring. It is left in this can for 8 to 12 hours, when it can be emptied into the regular can for delivery. Before emptying the cream into the carrying can, the cream in both cans should be stirred. This should be repeated after mixing as this prevents the formation of circles and layers. Cold water should be pumped into the tank three to five times per day. The tank is so constructed that cool water displaces the warm water and when as much as 12 to 17 gallons of water are pumped for the livestock the cream tank is completely refilled with cool water at well temperature.

Commercial Water Cooler

The commercial type water cooler, with or without insulation of various sizes, is shown in Fig. 2. It is especially desirable for larger dairies and where a milk house is available. It may, however, be used in the open with good results.

Evaporation Cooler

This type of cooler, Fig. 3, is very effective for cream where small quantities are to be cooled, a suitable place with a current of air is available and where water is of high temperature.

The following discussion of an evaporation cooler is taken from the Oklahoma Experiment Station Bulletin No. 226, "Improving the Quality of Oklahoma Butter," by E. L. Fouts and J. I. Keith:

"Where only a small quantity of cream is produced, or in cases where the water temperature is quite high, the evaporation cooler (shown in Fig. 3) has been found to be more suitable than the barrel cooler. For this cooler, two shallow pans are needed. One should be about six inches larger in diameter than a five-gallon cream can, and the other should be about the same diameter as the lid of the can. A piece of light weight muslin is also needed. It should be large enough to wrap around the can and cover it completely and long enough to extend into each pan.

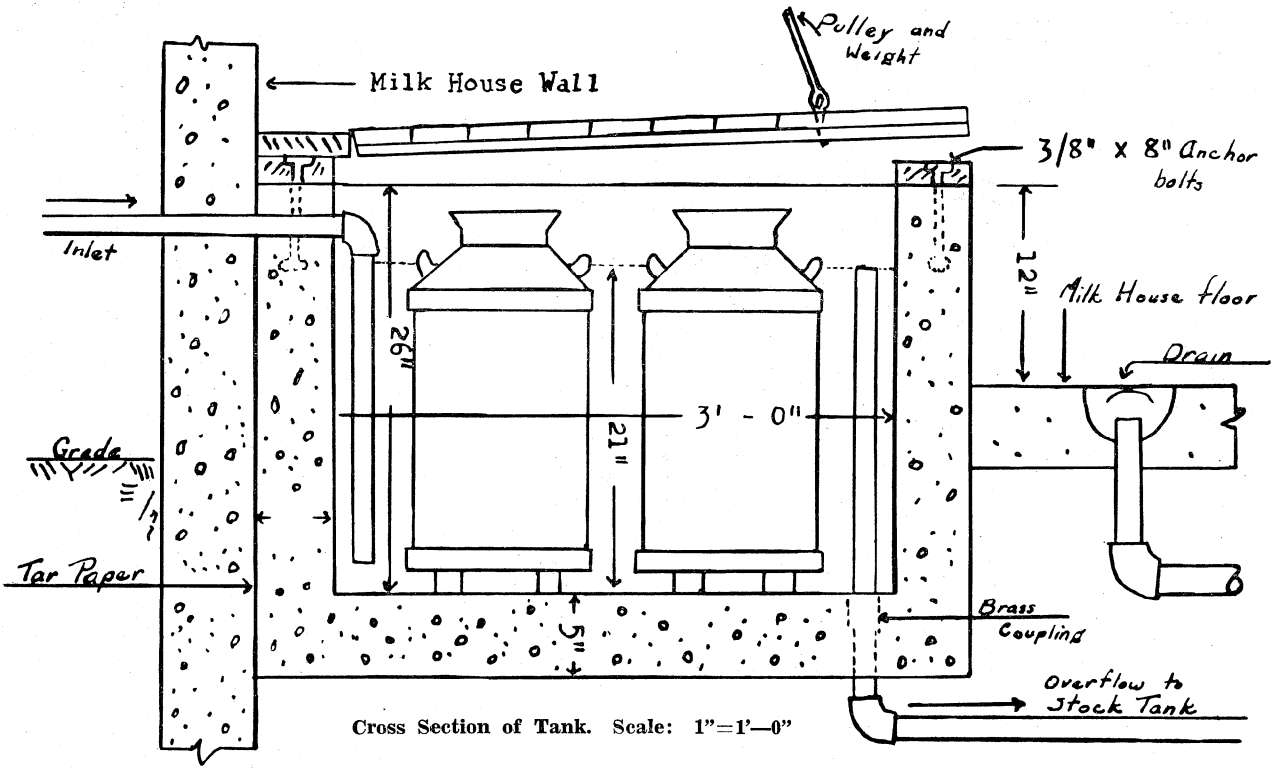
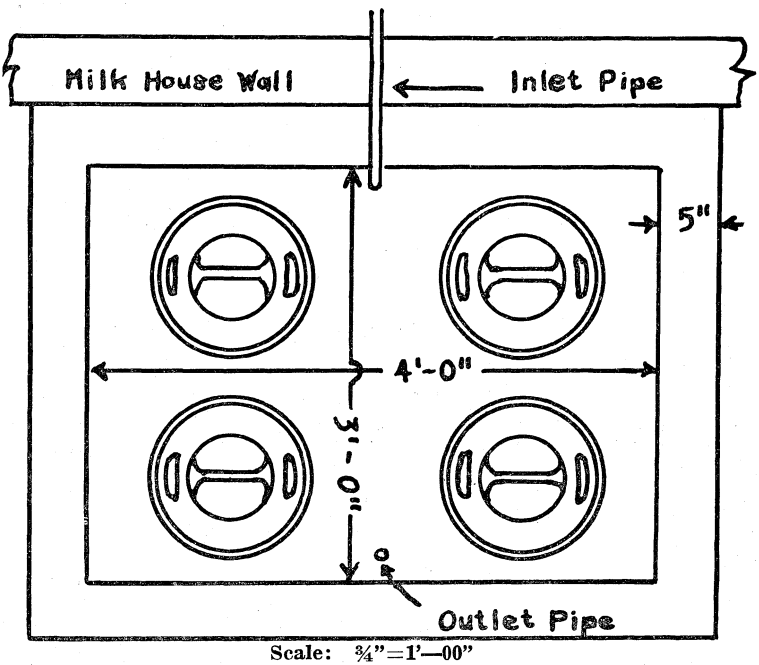


Fig. 2-(A). Cross section view of commercial cream cooler constructed of concrete. See also Fig. 2-B (opposite page). Plans by C. V. Phagan, former assistant Extension agricultural engineer.



Scale: ¾"=1'—00"

Fig. 2-(B) Floor plan of commercial cream cooler constructed of concrete—four can capacity. See also Fig. 2-A (opposite page). Data for tank construction are given below. All tanks 36" wide and 28" deep, inside dimensions.

Item	4 can* capacity	6 can* capacity	8 can* capacity
Inside length	4'-0"	5'-10"	7'-10"
Cement (sacks)	6½	8½	10½
Sand (Cu. Ft.)	13	17	21
Pebbles (Cu. Ft.)	13	17	21
⅜" Reinforcing bars (Lin. Ft.)	56	68	80

* Number of 40 qt. cans cooled. Other materials needed include forms, tar paper, bolts and nails, pipe connections, etc.

NOTE: A concrete tank may be built so that it can be converted into an insulated tank later in case the owner desires to use ice or mechanical refrigeration instead of running water from the well. In this case, the tank should be made 6" deeper, 1' wider, and 1' longer than the dimensions given. These dimensions allow for a 3" lining of cork board or other suitable insulation and an inner tank of concrete 3" thick. Plans and instructions for building an insulated tank will be furnished on request. The cover shown on the tank need not be used unless ice or mechanical refrigeration are used for cooling.

"After the cream has been separated, it should be pre-cooled in water for about an hour with frequent stirring before being placed in the evaporation cooler. It is advisable to have two cans for cream, one for the pre-cooling in water and the other one in which to hold the cream until it is ready to be taken to market.

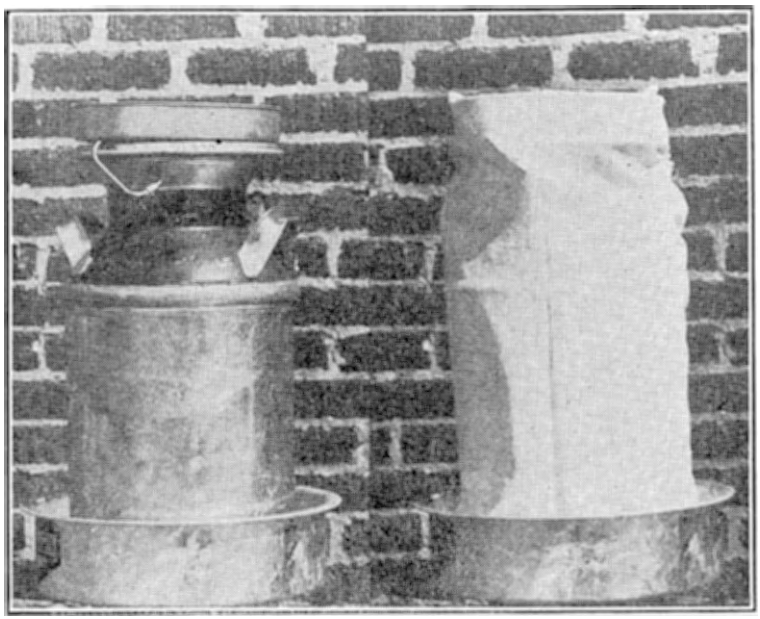


Fig. 3. An evaporation cooler for cooling cream on farms where a plentiful supply of cold water is not available. Two views showing (left) cream can with water pans in place; (right) same, except that the can is completely covered with a piece of light weight muslin which extends into both top and bottom pans. Almost any pan of suitable size and with vertical sides may be used. (From Oklahoma Experiment Station Bulletin 226, "Improving the Quailty of Oklahoma Butter," by Fouts and Keith.)

"After the cream is pre-cooled the storage can should have the cloth and top pan removed, the fresh cream should be added, stirred well, and the pan and cloth replaced. Both pans should be kept supplied with water in order that the cloth surrounding the can will stay saturated with water. During extremly hot weather it will be necessary to replenish the water several times during the day."

DELIVERY OF CREAM

Cream should be delivered to the creamery at least two times weekly in the winter, and in the summer three times per week. The proper use of the cooler and delivery of cream with the can wrapped in clean, moist cotton or burlap bags in the summer will improve the quality of the cream.

Cooperative Hauling of Cream

In some sections of Oklahoma two or three farmers are alternating in hauling their cream. This method reduces the cost of delivery, brings the cream in sweeter, reduces time spared from the fields in busy seasons, and teaches a few simple lessons in cooperation to the entire farm family.

PRICE IMPROVEMENT

A good reliable measuring stick for Oklahoma price improvement is to compare the monthly state price of butterfat, 1926 to 1935, inclusive, received by producers, with the United States price, (Fig. 4).

Freight on butter to the central markets remained about the same during the 10-year period, 1926 to 1935, inclusive, but

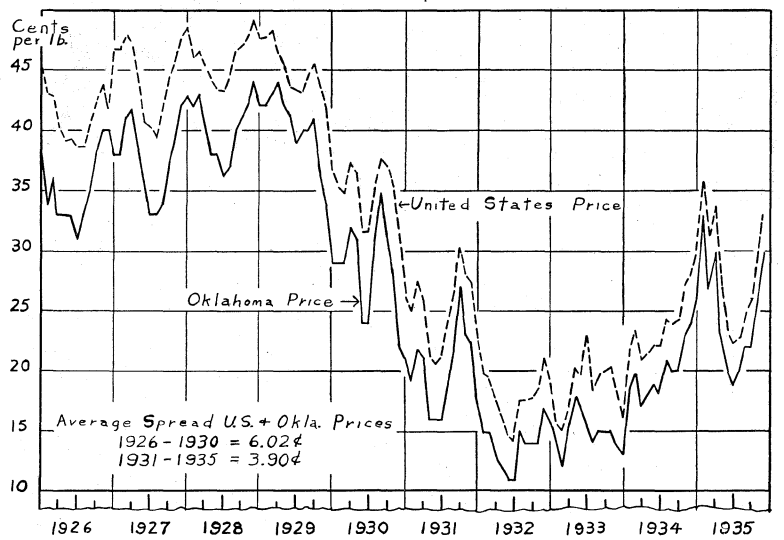


Fig. 4. Butterfat prices paid producers by months in United States and Oklahoma, 1926-1935 inclusive.

SOURCE: *"Crops and Markets"*; U. S. D. A. and *"Current Farm Economics—Supplement"*; Lippert S. Ellis, Assistant Dean of School of Agriculture, Oklahoma A. and M. College.

the average annual spread between the Oklahoma farm price and the United States farm price by months was 6.02 cents per pound during the first five years, 1926 to 1930, and 3.90 cents during the five years 1931 to 1935, a decrease in spread of 2.12 cents per pound. A large part of this increase in Oklahoma farm prices relative to the United States prices can be attributed to the improved quality of butter offered for sale by manufacturing plants.

For the census year 1929, Oklahoma producers marketed 33,145,029 pounds of butterfat. Using this figure as a basis for production, the average value of the increase in quality at 2.12 cents per pound was worth $702,674.61 to the Oklahoma farmer annually during the latter period.

BUTTER SCORE IMPROVED

Records show that improvements in grades of butter come slowly and usually only as the result of producers selling cream on grade over a long period of time. Then the grade price differentials should be returned to producers. For example, it took Minnesota producers 30 years to put over an effective cream grading program. This resulted in a corresponding increase in high score butter manufactured. In Oklahoma, significant results have been secured during the last six years.

In the spring of 1933, the State Board of Agriculture, cooperating with the dairy industry in Oklahoma, made special effort to make the Oklahoma cream grading law effective. Since that date marked improvement has been made in the grade of cream delivered and a decrease in the percentage of low grade (No. 2) butter manufactured has been registered.

The following table from a report of the Oklahoma Dairy Improvement Association of July 24, 1936, is of interest.

TABLE I.—Percentage of No. 2 Butter Manufactured in Oklahoma for April, May and June, 1933 to 1936, Inclusive

	April	May	June	3 Months Average
1933	14.6	17.0	22.7	18.1
1934	13.8	12.0	11.6	12.5
1935	8.1	10.4	12.1	10.2
1936	6.0	8.7	10.2	8.5

SOURCE: C. P. Jerome, Manager, Oklahoma Dairy Improvement Association, 405 Continental Building, Oklahoma City, Oklahoma.

The above summary indicates a reduction of 9.6 percent in the amount of low grade butter manufactured for the three important months for 1933 to 1936.

In a study of the scores on 3,232,286 pounds of butter shipped to the central market by Oklahoma creameries from 1929 to 1934, inclusive, we find the following percentages in each grade:

TABLE II.—Average Percentage of Each Grade of Cooperatively Produced Butter Shipped to Land O'Lakes Creameries from Oklahoma, 1929-1934.

Score	PERIOD	
	1929-1931	1932-1934
93	None	.89
92	2.73	13.03
91	8.59	14.51
90	15.45	17.20
89	28.64	33.92
88	44.59	20.45

SOURCE: Reports on Scores of Butter received from Oklahoma, Land O'Lakes Creameries, Minneapolis, Minnesota.

During the period 1929 to 1931, the total shipment was 1,475,380 pounds, and for the 1932 to 1934 period, there were 1,756,906 pounds.

This table indicates an increase in percentages shipped of all grades of butter except 88 during the latter period. The percentage increases are very significant for the 91 and 92 grades. It has also been noted that retail sales of high quality butter have increased in recent years in Oklahoma, which shows a further improvement not recorded in the table.

SUMMARY

1. Economical types of cream coolers are now available for various sizes of farms.
2. The evaporation cooler is effective with high temperature water where air circulation is available.
3. When cream is purchased on grade producers are properly encouraged to improve the cream sold.
4. The Oklahoma cream price was 2.12 cents per pound nearer the United States price during the five-year period 1931 to 1935 than during the five years previous, 1926 to 1930.
5. The percentage of high quality butter manufactured during 1932 to 1934, inclusive, at the plants studied, was greater than for the three years previous, 1929 to 1931, inclusive.