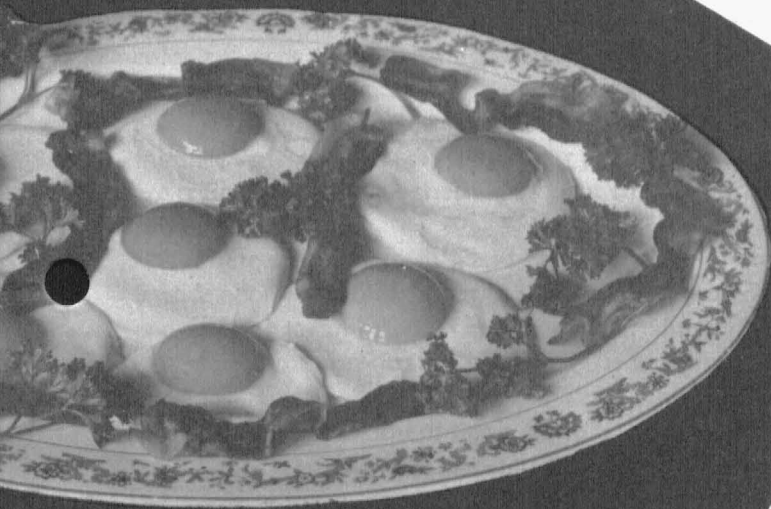


# PRODUCING QUALITY EGGS



UNIVERSITY OF MISSOURI  
COLLEGE OF AGRICULTURE  
AGRICULTURAL EXPERIMENT STATION

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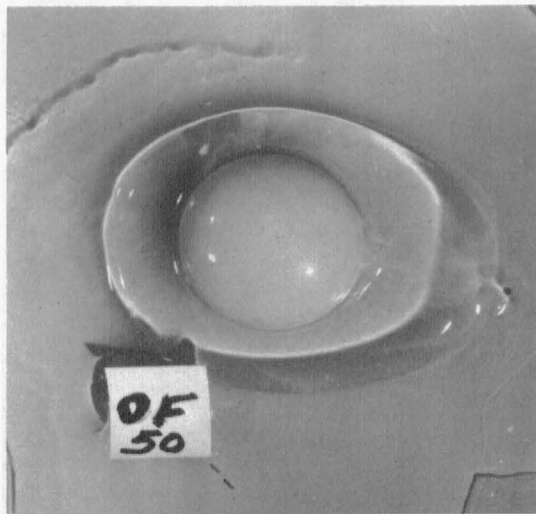
*Your key to quality egg production*

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Freshly laid infertile egg.



Freshly laid fertile egg.



# Producing— HIGH QUALITY EGGS

*Demand for high quality eggs is increasing. Producers who sell such eggs on a graded market are averaging \$1.50 to \$2.00 per case more for their eggs than those who sell ungraded eggs. This extra premium often increases the annual profit as much as \$1.00 per layer.*

*In order to market high quality eggs throughout the year, producers must follow certain practices. For several years, the Missouri Station has been investigating the factors that affect egg quality. Here is a report of those practices that should help producers market more high quality eggs.*

E. M. FUNK AND JAMES FORWARD

## Well Bred, Well Fed

The ability of a breed or strain of chickens to produce a large number of high quality eggs is inherited. The producers should have stock that lay good quality eggs at a high rate of production. The size, shape, and color of eggs are determined by breeding; and for greatest profit, producers must obtain strains that lay good market eggs. Some strains produce eggs containing more meat and blood spots than others. Breeders are trying to eliminate these spots, but there are still too many of them.

There are a few freshly laid eggs that have an offensive odor when broken out. This also is an inherited condition that can be corrected only by breeding.

The albumen quality of the egg is another inherited character. Some eggs, even when laid, have a much larger proportion of thick white than do others.

Table 1 shows that some hens lay eggs of very high quality while others may lay eggs of inferior quality. Hen 126 laid extra large eggs with fine albumen quality (perfect score of 1.0) and her eggs were free of meat and blood spots. Hen 473 laid large eggs with an albumen score of 1.5, but all of her eggs contained small meat spots that would have caused them to grade C in quality. Hen 368 laid extra large eggs, but the albumen was thin and watery and some of her eggs would have been discarded as inedible because they contained large meat spots (more than 1/8" in diameter).

Fortunately, more than 95 percent of fresh laid eggs are of AA or A quality when laid. Breeding is important in increasing the percentage of high quality eggs. However, the care the eggs receive after they are laid is even more important. Most of the poor quality eggs reaching the consumer result from improper care after the eggs are laid.

The laying stock must be fed well balanced rations at all times if they are to lay at a high rate. Shell

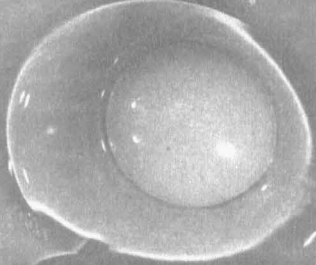
quality is affected by the mineral content of the ration and the vitamin D available. Shell-making materials such as crushed limestone or oyster shell should be hopper fed. Most laying mashers are fortified with vitamin D.

An important market factor affected by feeding is yolk color. Birds on range all day when green feed is available will produce yolks that are too rich in color to grade well. In extreme cases, such hens may produce olive or greenish colored yolks. The consumer prefers eggs with uniform yolk color.

We have seen a few egg yolks with dark brown spots on them. Such brown discoloration is apparently caused by the birds eating acorns.

TABLE 1 -- QUALITY OF FRESH LAID EGGS PRODUCED BY DIFFERENT HENS

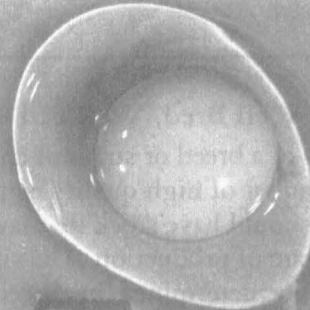
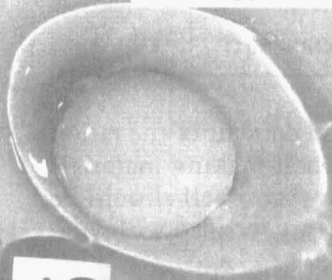
Hen No.	Date Laid	Size in oz. per doz.	Albumen Quality		Meat and Blood Spots
			(1.0 perfect, 5.0 very poor)		
126	5-16-49	25.2	1.0		None
	5-19-49	25.1	1.0		None
	5-20-49	24.3	1.0		None
	5-21-49	26.6	1.0		None
	5-22-49	27.3	1.0		None
368	5-15-49	26.4	4.5		4 large meat spots
	5-17-49	28.8	4.5		1 medium sized meat spot
	5-19-49	29.0	5.0		1 medium sized meat spot
	5-23-49	30.0	5.0		3 medium sized meat spots
	5-24-49	30.6	5.0		2 small meat spots
473	5-23-49	24.7	1.5		2 medium sized meat spots
	5-24-49	24.7	1.5		4 small meat spots
	5-25-49	23.8	1.5		4 small meat spots
	5-26-49	23.5	1.5		4 small meat spots
	5-27-49	22.9	1.5		3 small meat spots



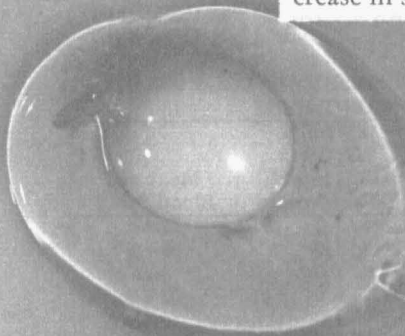
Infertile egg after 1 day at 50° F.  
Fertile egg after 1 day at 50° F.



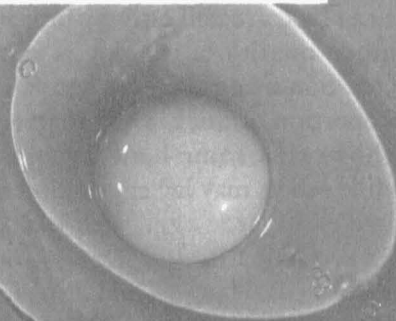
Infertile egg after 1 day at 85° F.  
Fertile egg after 1 day at 85° F.



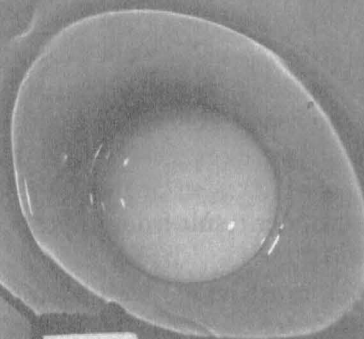
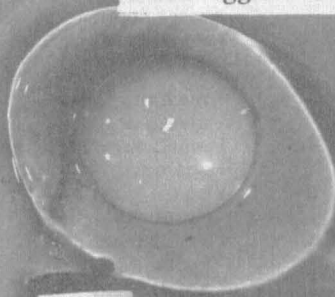
**Produce Infertile Eggs.** Roosters are expensive to raise and feed, and they should not be allowed in a flock that is producing market eggs. Pictures on these two pages and the previous page show the rapid increase in size of the germ spot in fertile eggs held at high temperatures,

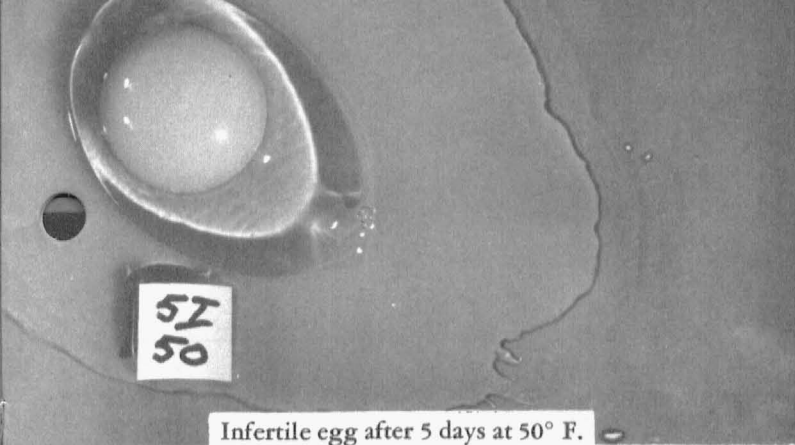


Infertile egg after 3 days at 50° F.  
Fertile egg after 3 days at 50° F.

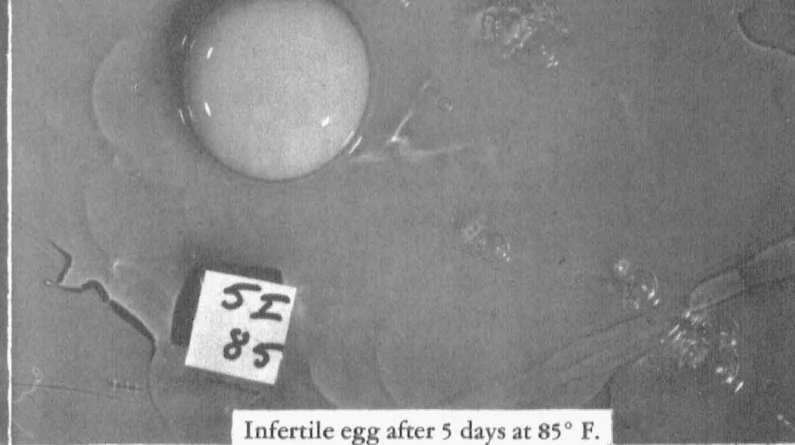


Infertile egg after 3 days at 85° F.  
Fertile egg after 3 days at 85° F.

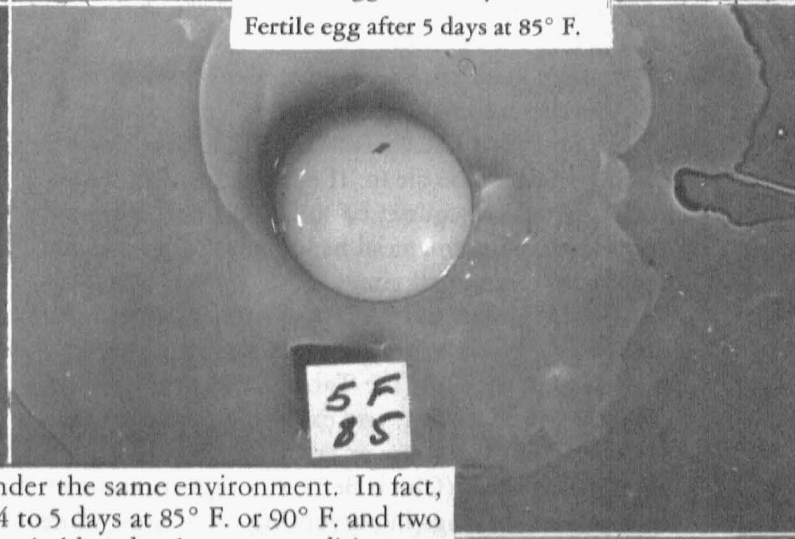
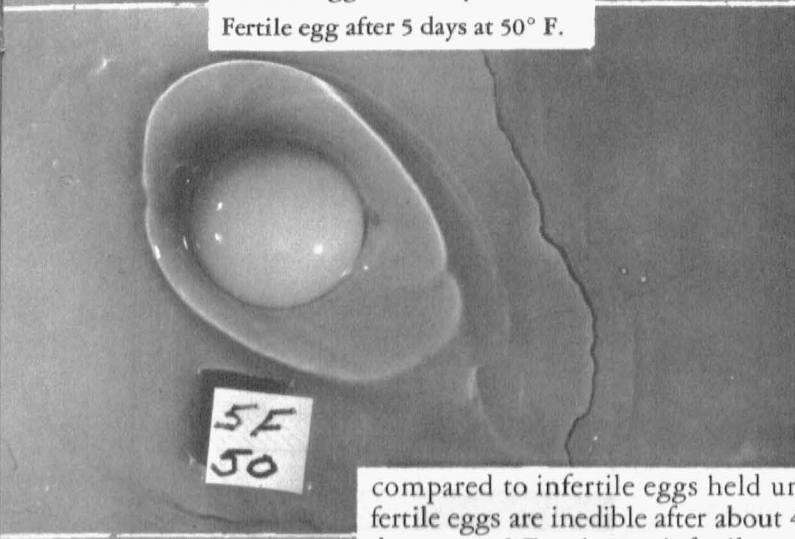




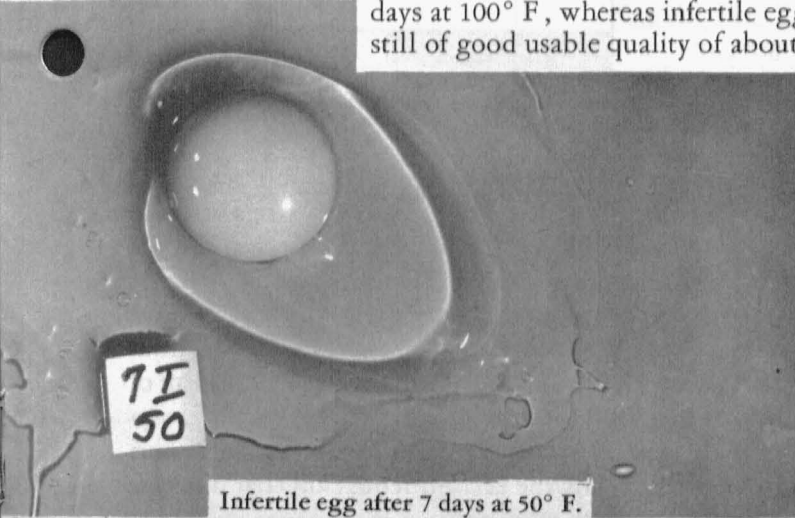
Infertile egg after 5 days at 50° F.  
Fertile egg after 5 days at 50° F.



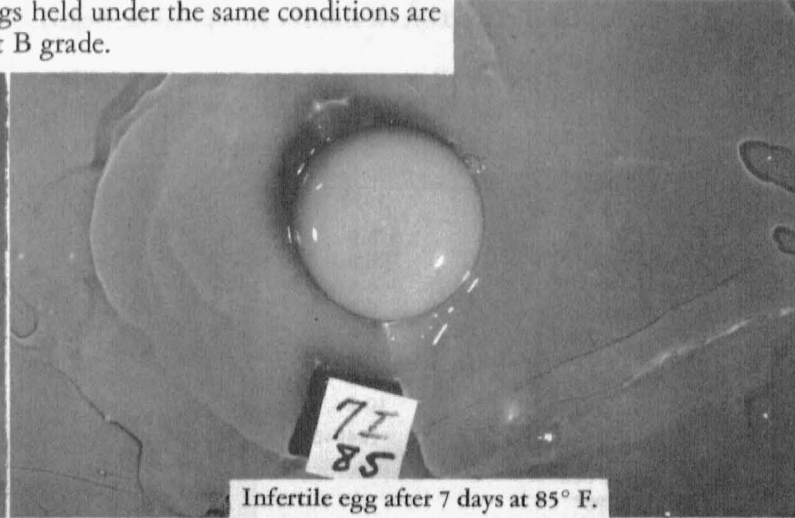
Infertile egg after 5 days at 85° F.  
Fertile egg after 5 days at 85° F.



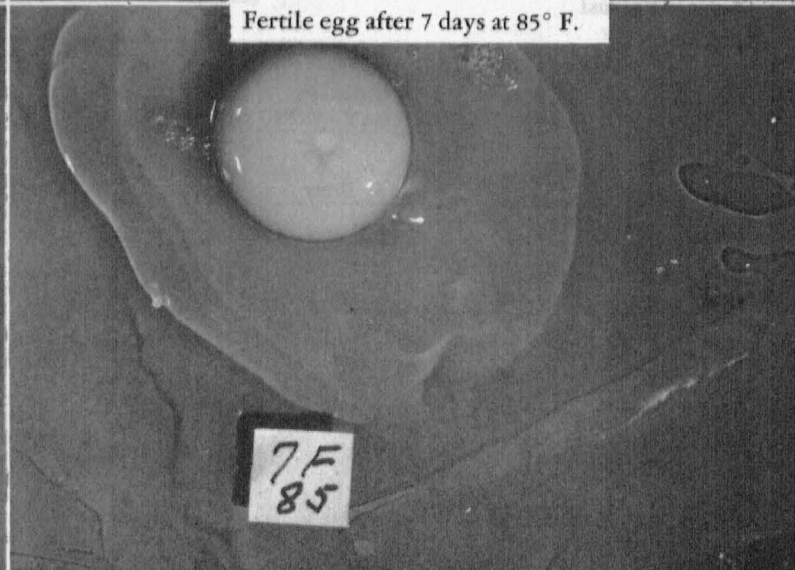
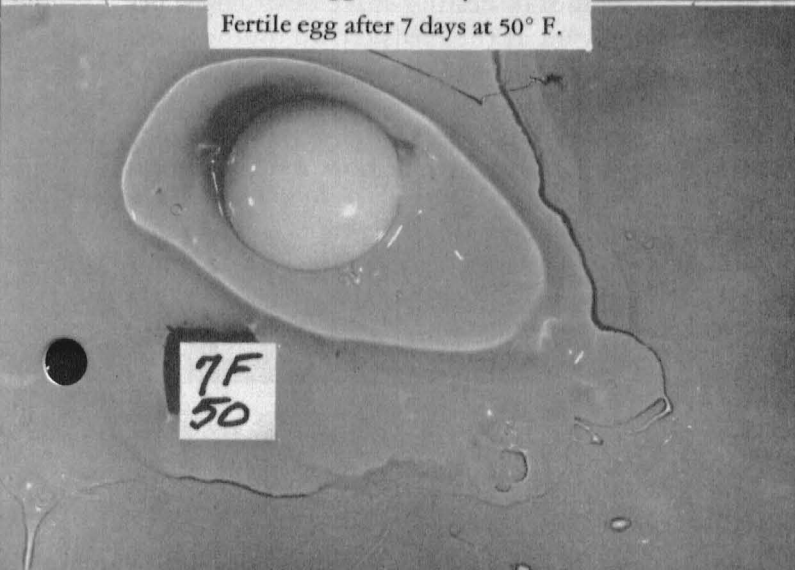
compared to infertile eggs held under the same environment. In fact, fertile eggs are inedible after about 4 to 5 days at 85° F. or 90° F. and two days at 100° F, whereas infertile eggs held under the same conditions are still of good usable quality of about B grade.



Infertile egg after 7 days at 50° F.  
Fertile egg after 7 days at 50° F.



Infertile egg after 7 days at 85° F.  
Fertile egg after 7 days at 85° F.



# Produce Clean Eggs

Practically all eggs (more than 99 percent) are clean before they come in contact with the nest. Observations made at the Missouri Station on 20,933 eggs showed that 154 eggs or 0.7 percent were stained with blood. Therefore, the bulk of the soiled eggs reaching the markets are caused by the eggs being soiled in the nests before the eggs are gathered.

Studies made at the Missouri Station reveal some practices that will reduce the percentage of dirty eggs.

**Keep Nests Clean.** It is very important that the nesting material be clean. If eggs are laid in a dirty nest, they will, of course, be soiled. Producers should keep clean nesting material handy to refresh nests and keep them clean at all times.

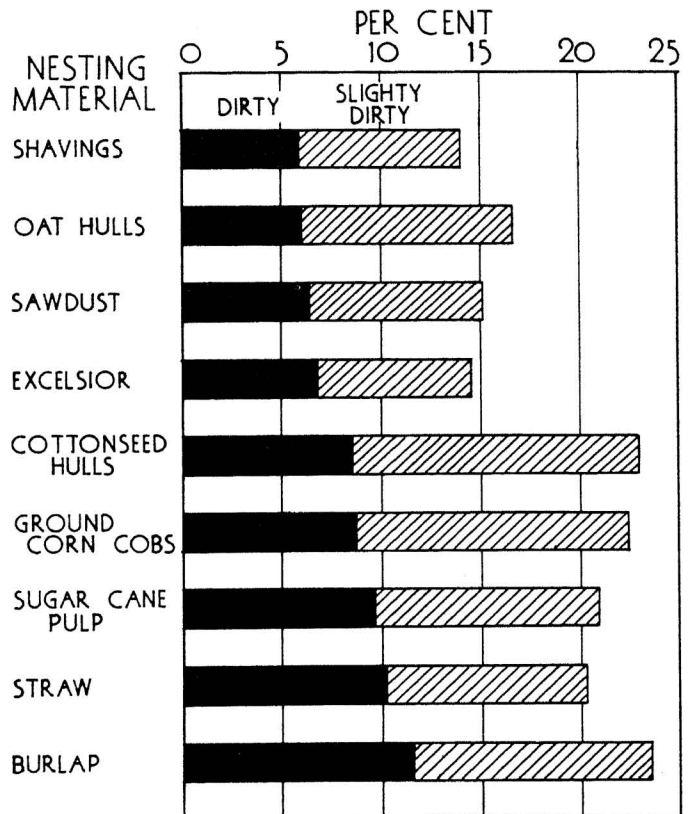
**Nesting Materials.** The kind of nesting material may be a factor in keeping eggs clean. Work done at the Missouri Station (see Table 2 and graph) show that shavings, sawdust, and excelsior are better nesting materials than straw or crushed corn cobs. A diatomaceous silica (Chick Bed) was slightly more effective than shavings in preventing dirty eggs. More time is required to service nests (keep them clean)

TABLE 2 -- EFFECT OF NESTING MATERIALS ON THE PERCENTAGE OF DIRTY EGGS GATHERED

Nesting Material	% Dirty Slightly Dirty Clean		
	% Dirty	% Slightly Dirty	% Clean
1936 Tests - University Flock			
Shavings	5.9	8.1	86.0
Oat hulls	6.0	10.6	83.4
Sawdust	6.4	8.7	83.9
Excelsior	6.8	7.7	85.5
Cottonseed hulls	8.5	14.5	77.0
Ground corn cobs	8.7	13.7	77.6
Sugar cane pulp	9.6	11.3	79.1
Straw	10.2	10.1	79.7
1949-50 - Commercial Flock			
Chick bed			73.9
Shavings			70.3
Sawdust			65.8
Straw			61.6

TABLE 3 -- GATHERING FOUR TIMES DAILY COMPARED WITH GATHERING ONCE A DAY

	% Dirty Slightly Dirty Clean		
	% Dirty	% Slightly Dirty	% Clean
Eggs gathered four times daily	6.0	8.7	85.3
Eggs gathered at the end of the day	13.4	17.5	69.1



when straw is used as compared to shavings or Chick Bed. Nesting materials should be odorless so that the eggs will not absorb odors from the nest.

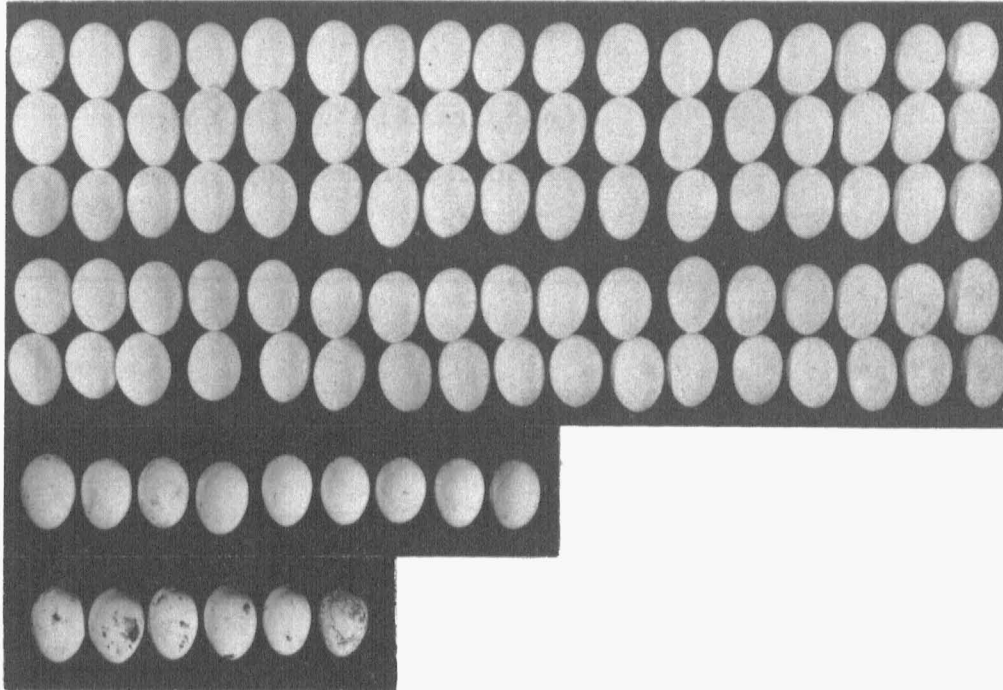
**Keep the Nests Dark.** In tests made at the Missouri Station, 91 percent of the eggs gathered from nests kept dark were clean, compared to 82 percent of clean eggs from nests well lighted.

**Use Plenty of Nests.** Work at the Missouri Station confirms the recommendation that one nest or one square foot of nesting space be provided per four or five layers. If the birds crowd on the nests, more eggs will be broken and soiled.

**Frequent Gathering Important.** Many eggs are soiled because they are left in the nests where they become broken and smeared or hens walk over them with soiled feet. Table 3 and the graph on page 7 show the effect on cleanliness of gathering eggs four times throughout the day, compared to gathering eggs only at the end of the day. Frequent gathering also reduces breakage of eggs in the nests.

# Gathering 4 Times Daily Gave . . .

(per 100 eggs)



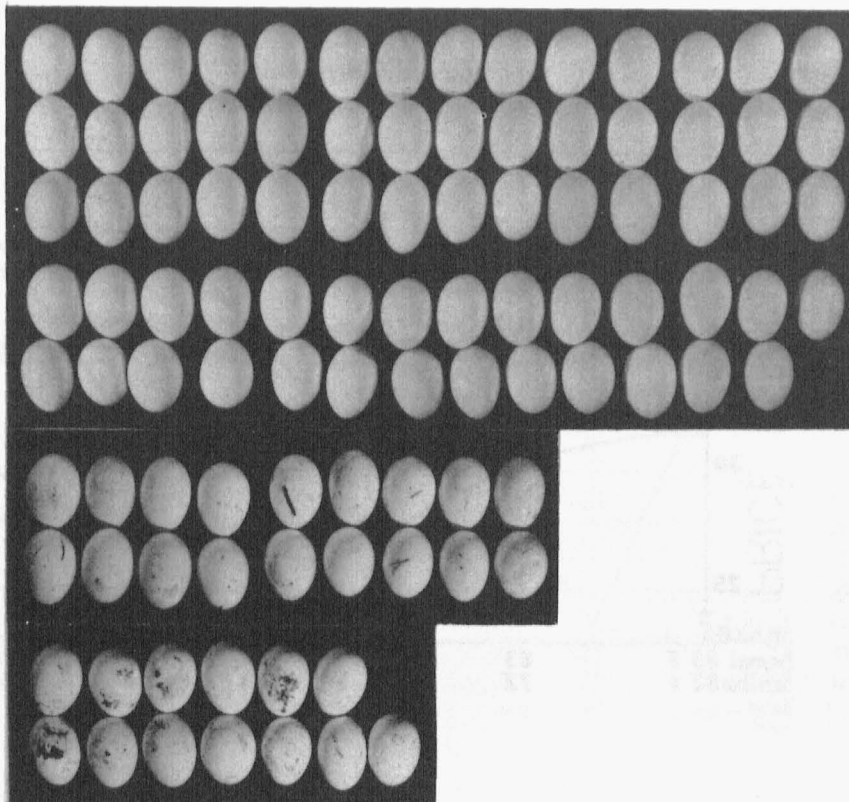
85 clean eggs

9 slightly dirty

6 dirty eggs

# Gathering Once Daily Gave . . .

(per 100 eggs)



69 clean eggs

18 slightly dirty

13 dirty eggs

# Comparison of Refrigeration with

## EGGS HELD 1 TO 7 DAYS

Gathered 3 Times Daily

### Cleaning Soiled Eggs

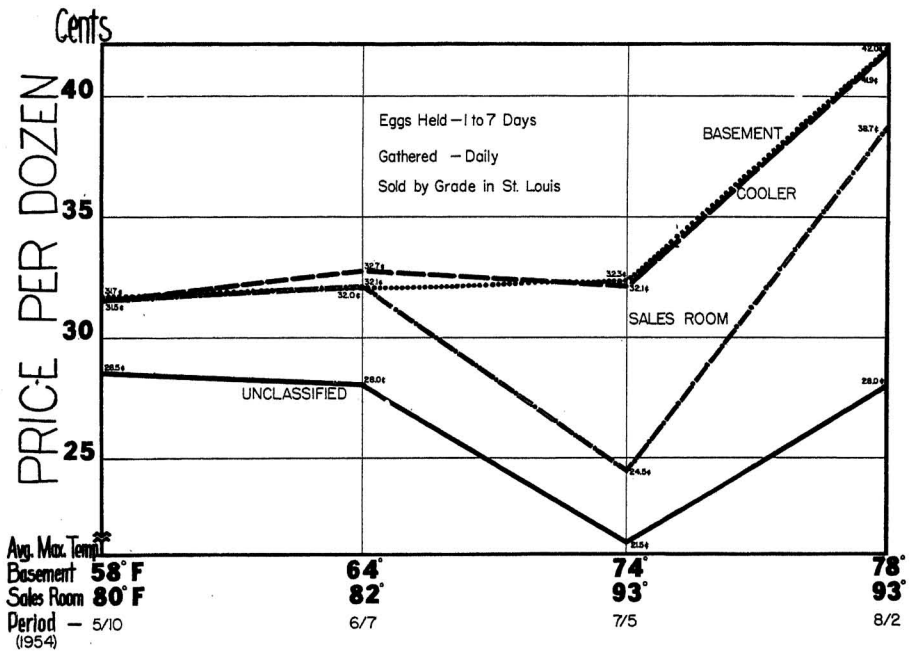
Producers should make every effort to produce clean eggs by following the practices outlined above, but there will be some soiled eggs under the best of management. Those that are only slightly soiled may be cleaned by the use of an abrasive (sandpaper, emory cloth, or steel wool). Those that are badly soiled may be cleaned by soaking for about five minutes and washing in warm (100° F. to 120° F.) water.

There are a number of small egg-washing machines on the market that reduce labor in washing eggs. The use of a cleaning and sanitizing agent in water is also desirable. If stains on white shells are a problem, they may be removed by dipping the eggs in a 0.5 percent solution (1 tablespoon per gallon) of sodium perborate after washing, or use one tablespoonful of one of the odorless laundry detergents or bleaches that contain sodium perborate for each gallon of warm or hot water.

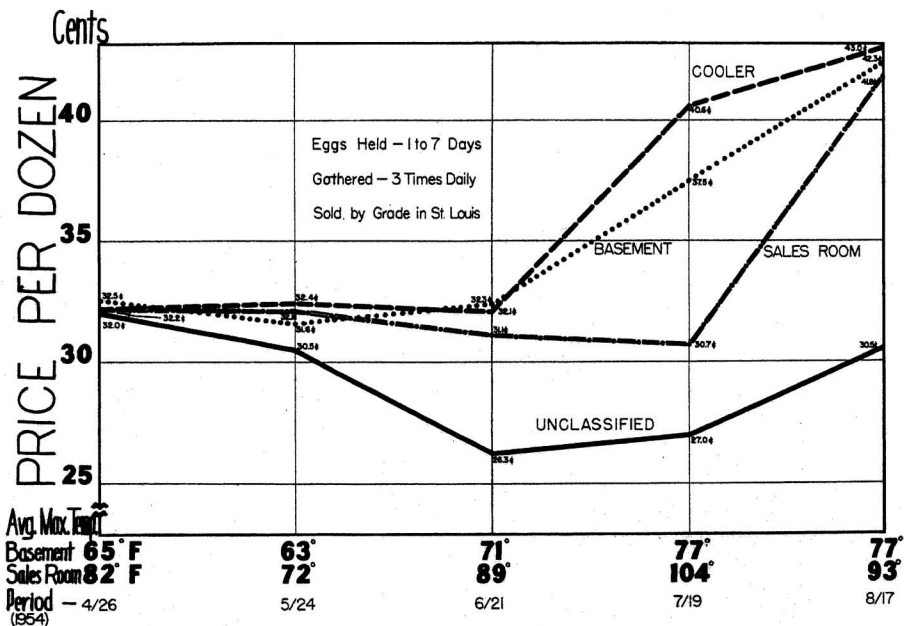
If eggs are going into storage, those that are washed should be pasteurized by immersing them for about three minutes in water at 145° F. or in egg processing oil for three minutes at 150° F.

### Maintaining Quality

Most of the damage to egg quality in the Middle West is done on the farm. A study made under the Regional Research Project, NCM-6, showed that only about two-thirds of the eggs marketed in this region were of grade A when delivered to the first buyer.



Gathered Once Daily

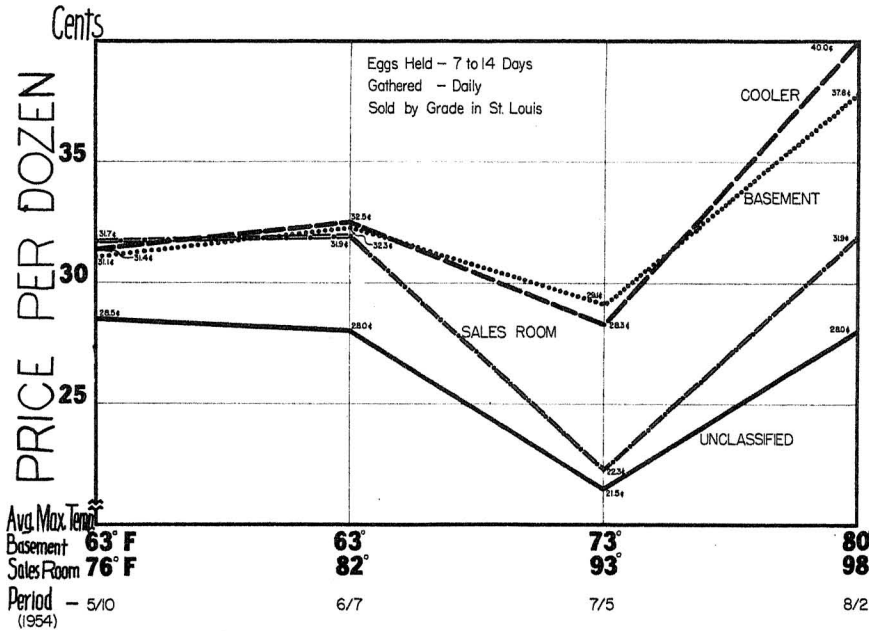




# Basement and Sales Room Storage

## EGGS HELD 7 TO 14 DAYS

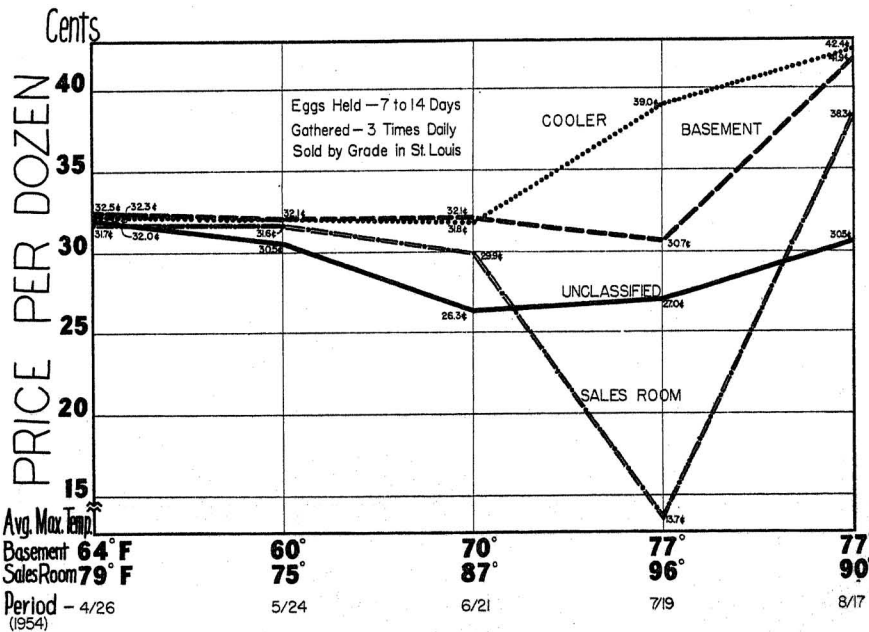
Gathered Once Daily



**Keep Eggs Cool.** Heat causes more damage to egg quality than any other factor. During a summer such as the one in 1954, millions of eggs become inedible because of germ development resulting from the heat.

A basement or cellar will maintain the quality of eggs. If neither is available, a refrigerated cooler is necessary in hot weather. The Missouri Station has conducted a series of tests to determine the value (in dollars and cents) of holding eggs on the farm in a basement and in a refrigerated cooler as compared to holding them in a room above ground. The graphic display of eggs at left shows the results obtained during the summer of 1954 which was an unusually hot summer.

Gathered 3 Times Daily



It was evident from the results obtained that eggs held in a basement for no longer than one week sold for approximately as much as eggs held in a refrigerated cooler, except for one week when the average maximum air temperature outside was 104° F. During that one week the difference was 3.1 cents per dozen in favor of the refrigerated cooler. It is likely that if the eggs had been marketed twice weekly that week there would have been little or no difference in selling price.

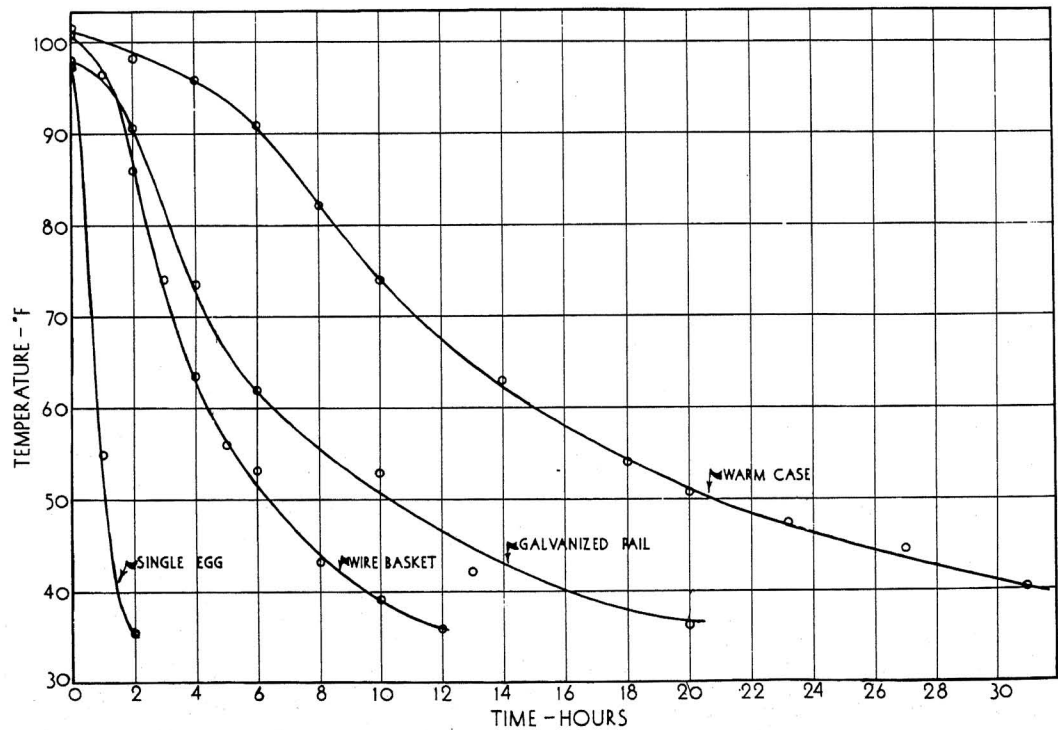
Eggs held in a room above ground for one to seven days averaged only 30.7 cents per dozen as compared to 40.6 cents per dozen for eggs held in a refrigerated cooler. Eggs held for seven to fourteen days in such a room sold for 13.7 cents, compared to 39.0 cents for eggs held in the refrigerated cooler.

## Gather and Cool in Wire Basket

**Cool Eggs Before Casing.** Eggs should be gathered in wire baskets and left overnight in these baskets in a cool place to remove the animal heat. It is very doubtful if any special means are needed for cooling the eggs. The rate of cooling can be speeded up by using a fan to circulate air around the eggs for 30 to 40 minutes.

**Hold Eggs Where Humidity is High.** Since the size of the air cell is important in grading eggs, they should be held where the humidity is relatively high, at least not extremely dry. This may be done in a basement by sprinkling the floor. Some mechanical refrigerators tend to "dry down" the eggs. This should be avoided.

### *Effect of Container on Cooling Rate*



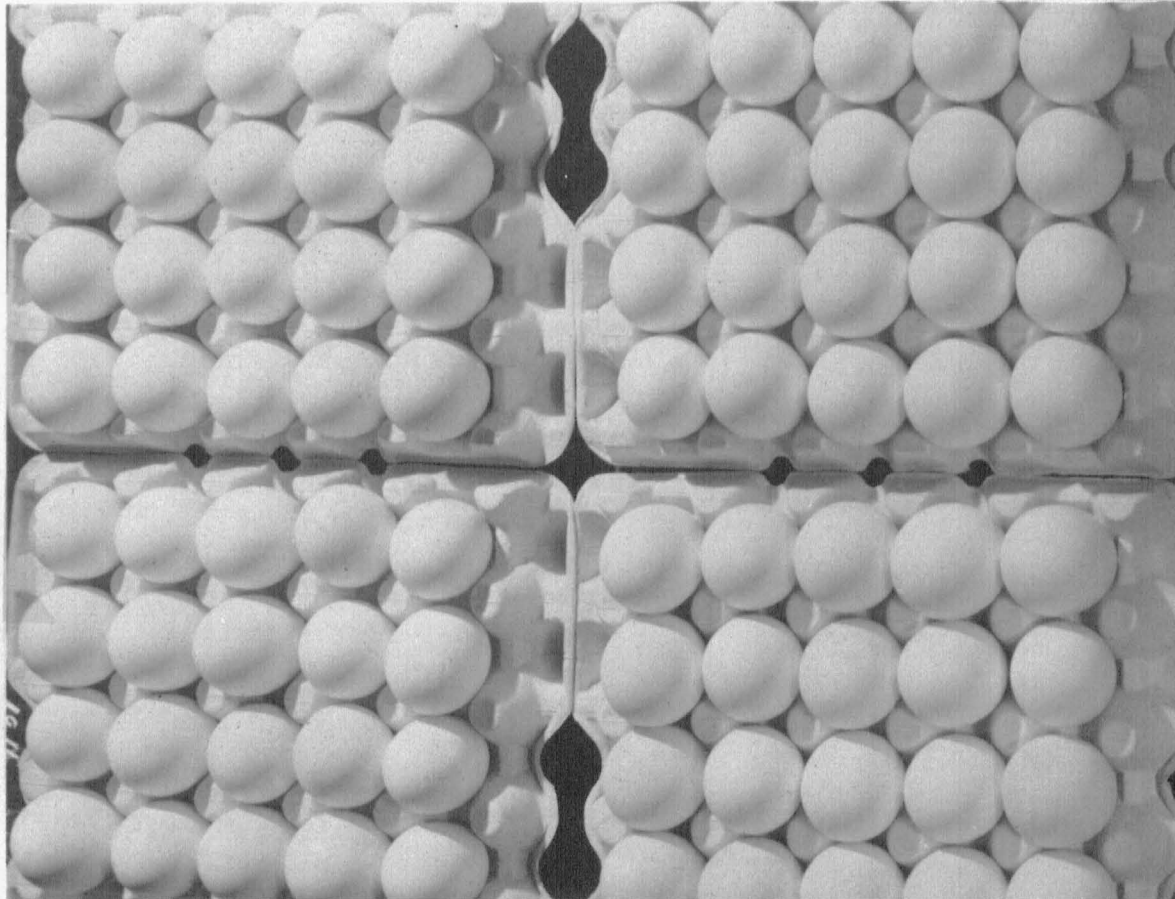
**Place Small End Down In Case After Cooling.** After the eggs have cooled overnight, they should be cased, small end down, in pre-cooled cases. In this position, they hold their quality better in moving to market.

**Handle Carefully and Market Often.** Excessive shaking or jarring will cause broken or tremulous air cells and cracked eggs.

It is most important that eggs be marketed often, at least weekly and better twice weekly.

**Sell on a Graded Market.** Records show that it pays producers of quality eggs to sell to a graded outlet. Those who are producing quality eggs and do not have such a market should see their county agent, market man, or hatcheryman about such a market where eggs are purchased by grade.

Attractive clean eggs like these, with high quality inside attract and satisfy consumers.



## Steps to Obtain High Egg Quality

1. Choose breeding that gives quality.
2. Feed well balanced rations.
3. Produce infertile eggs.
4. Keep nests clean.
5. Use shavings or absorbent nesting material
6. Keep nests dark.
7. Use plenty of nests.
8. Gather frequently.
9. Keep eggs cool.
10. Cool before casing.  
cool in wire basket.
11. Hold where humidity is high.
12. Put small end down in case.
13. Market often.
14. Sell on graded market.