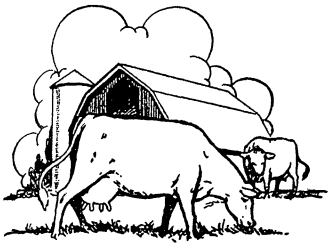
Special issue—*Eggs and Poultry*



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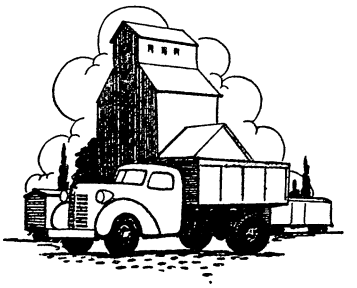

NO. 341 UNIVERSITY FARM, ST. PAUL OCTOBER 31, 1952

Interest in Egg Quality on Upswing in State

O. B. Jesness

Eggs have been increasing in importance as a source of cash income for Minnesota farmers. This means a growing interest in factors which affect the returns from this enterprise. Quality is a leader among these factors.

Eggs are a highly perishable food for which quality is of prime importance to the consumer. The prices the consumer is willing to pay are affected by quality considerations—as indicated by the range in prices for eggs of different grades.

The farmer is not in a position to improve on the quality of an egg after it has been laid. He and others concerned with the handling of that egg on its way to the consumer, however, can do a great deal to hold loss of quality to a minimum.

East Big Egg Buyer

Minnesota farms produce more eggs than required for consumption locally or even within the state. About two-thirds of the total supply is shipped to outside markets, especially to population centers in the East. Here Minnesota eggs come into competition with supplies from other regions, and if their quality fails to measure up to that of other eggs, Minnesota eggs lose out.

The fact that Minnesota eggs are sold largely in distant markets means that producers generally are not in a position to sell directly to consumers. Consequently, they are affected by the handling of eggs by marketing agencies, including charges for the services and the losses in quality during marketing.

But there is one area where the producers have direct control—their own management and marketing practices—and studies indicate that these are of major importance.

The first main area of quality loss is on the farm between the time eggs are laid and the time of delivery to the first buyer. In a study of egg marketing, grades of 1,337 lots of eggs sold by Minnesota producers were determined at delivery to the first buyer. Only 67 per cent of these eggs were Grade A. If it is assumed that all were Grade A when laid, 33 per cent of the eggs had dropped one or more grades before delivery.

Quality Varies All Along Line

Variations among different areas, seasons, and producers were found. The proportion of eggs of Grade A in type-of-farming area 2 in south-central Minnesota was 74 per cent. Areas 1 and 3 in southeastern and southwestern Minnesota also were above the state average, with 71 and 69 per cent, respectively. Areas 4 and 7 in west-central and northwestern Minnesota were below the average with 55 and 57 per cent.

This suggests a tendency for quality to be higher in areas where the enterprise is more important. This is logical because the attention given a farm enterprise is affected by its relative importance in the farm business. This indicates that if eggs increase in importance or their production becomes more concentrated, quality improvement may result.

Seasonal differences in quality are significant, too. The percentage of Grade A eggs shown by this study was 66 in spring, 64 in summer, and 73 in the fall. The year of the study had a comparatively cool summer; otherwise the drop in quality in summer probably would have been more marked.

Fifteen per cent of the farmers delivered 90 per cent or more of Grade A eggs. Over one-third delivered 80 per cent or more Grade A. This indicates a real possibility of improving quality through better practices.

Information was obtained from producers regarding the practices which they employed. These included frequency of gathering, containers used, holding room used, methods of sorting and cleaning, frequency of delivery, and methods of sale. Because of the variety of combinations of practices the available information does not provide data permitting exact measurement of the specific effects of each practice. The relationship between these practices and the quality of eggs, however, is clear.

Producers who reported gathering eggs three or more times daily delivered four per cent more Grade A eggs than those gathering less frequently. Those who cooled their eggs before packing in cases averaged five per cent more Grade A than those who did not.

On most farms the cellar is the storage place which comes nearest to meeting the requirements of temperature and humidity for eggs which are being held prior to delivery. Farmers who kept the eggs in the cellar averaged four per cent more Grade A than those who reported some other holding place. In addition, producers who sorted eggs before delivery had eight per cent more of the top grade. Those who cleaned eggs by buffing had 72 per cent Grade A, those who washed had 68 per cent, while those not cleaning before delivery averaged 65 per cent.

Farmers Respond to Rewards

Farmers who delivered eggs to buyers three or more times a week averaged 72 per cent Grade A, those who delivered twice weekly averaged 70 per cent, and those with only one delivery averaged 68 per cent. Eggs sold by producers on a grade basis showed a higher proportion of Grade A eggs

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Prepared by the Division of Agricultural Economics and Agricultural Extension Service.

Published by the University of Minnesota Agricultural Extension Service, University Farm, St. Paul 1, Minnesota.

than those sold as current receipts. This indicates that producers respond to the incentive of rewards for good quality.

The above practices can be used by producers to lessen the deterioration in quality of eggs while in their care. These are the ways that producers can improve the prices they receive for eggs. While exact measurement is not available, it is a reasonable assumption that the practices employed on the farm also affect the amount of loss between the farm and the consumers.

Many Eggs Drop in Grade

Information on grades was obtained on representative lots of eggs to provide an indication of losses during marketing. The lots studied showed a drop of eight per cent in the number of Grade A eggs between delivery to the first buyer and arrival at the central plant. An additional loss of 21 per cent occurred before the eggs reached the terminal market.

The study indicates that only about 30 per cent of the eggs reached the final destination as Grade A eggs. As suggested, some of these losses can be reduced by better farm practices.

Dealers, too, can do much to aid in maintaining quality. They can buy on a grade basis and thereby provide an incentive to farmers to deliver eggs of higher quality. Better and more rapid handling, improved packing and refrigeration, proper loading and care in transit, and more direct routing of shipments are ways of reducing quality losses during marketing.

The dollars and cents importance of reducing quality losses may be illustrated by use of prices prevailing at the time of the study. Had the producers sold only Grade A eggs they would have averaged about 45 cents a dozen. However, with 67 per cent of the eggs of Grade A, 17 per cent Grade B, and 16 per cent Grade C, the average instead was approximately 40 cents.

A decrease of five cents a dozen applied to all eggs sold by Minnesota farmers during the year results in a reduction in returns of nearly 15 million dollars. The quality losses at the country buying station averaged an additional cent a dozen.

Because all eggs do not go through each step in the marketing process, it is not possible to apply this type of calculation for each step. However, losses of 2.5 cents a dozen appear representative of those occurring while eggs are in the hands of the central assembly plant. Additional losses occur during wholesaling and retailing. Obviously all of these losses cannot be eliminated, but they can be reduced materially.

Marketing Margins Interest Many

Widespread interest in the margin between prices received by farmers and those paid by consumers is evident. This spread frequently is used as an indicator of efficiency in marketing.

A rather common practice in the instance of eggs is to compare the average farm price for Minnesota eggs with the prices paid by consumers for Grade A eggs at retail stores in eastern cities. The wide spread shown by such comparisons leads to charges that marketing is very inefficient or that inordinate profits are obtained by handlers. Marketing methods are far from perfect, but this method is very misleading.

The Grade A Minnesota eggs bought by consumers at retail in Washington or New York do not include all of the eggs involved in establishing the average price to farmers. As indicated above only about two-thirds of the eggs were Grade A when delivered by the producer. Additional losses during marketing led to the result that less than one-third of the eggs reached the consumer as Grade A.

Of the remainder, some were sold to consumers at lower prices or to drying and breaking plants. Breakage and spoilage resulted in complete loss on some eggs. Quality deterioration and losses, including handling costs on discarded eggs, are part of the spread.

An important share of the apparent difference between farm and consumer prices is accounted for by quality deterioration. This difference can be narrowed very decidedly if producers more generally adopt management and marketing practices which lessen quality losses and if handlers improve their equipment and methods.

Still another indicator of the need for better egg quality is supplied by the relative rank of Minnesota among the states in average farm price of eggs. In 1950, Minnesota ranked forty-second among the states. It was well below the United States average and far below that of some of the eastern states.

Distance to market and the costs of getting them there are significant factors in such differences. However, an important reason is that the eggs fail to measure up to the quality standards necessary to bring top prices.

What Is This Thing Called Egg Quality?

M. H. Swanson

The term "quality" with reference to eggs has a variety of meanings to the American consumer. Many housewives think of quality in terms of freshness only. Others place major emphasis on egg size, yolk color, or absence of blood and meat spots.

In reality, many of these and other interpretations of quality are based on misunderstandings and misinformation. For example, the terms "freshness" and "high quality" are not interchangeable when applied to eggs, for it has been shown that holding and handling are much more important than age in determining the quality of any lot of eggs.

Likewise, egg size has no influence on either shell quality or interior quality of the egg. Housewives who think that all large eggs are good eggs may be sadly disappointed.

What, then, are the standards which eggs must meet in order to carry the label of high quality? Let us examine some basic facts about egg quality.

Egg shape, to be sure, has no direct relation to the appearance or flavor of the broken-out egg, but there are several reasons why uniformity of egg shape is important. In the first place, if all eggs were of uniform shape, it would be possible to design cases and cartons that would do a much better job of protecting the eggs.

Also, the handling of eggs in the plants of egg assemblers and processors is becoming more and more mechanized. Here again uniformity of egg shape would enable much of this equipment to do a better job.

Finally, uniformity in the shape of eggs when packed in dozen cartons will add to their attractiveness and thus indirectly to their quality. Eye appeal is important in merchandizing eggs just as it is in many other commodities.

(Continued on next page)

More important, perhaps, than egg shape is shell quality. Eggs with good shell quality have shells that are strong, uniform in color, and are not porous. A recent study in a midwestern state indicated that an average of 8.8 per cent of all eggs were cracked between the time they were laid and the time they reached the terminal market. In terms of total Minnesota production and the differential in price between cracked and sound eggs, this means annual losses of several million dollars.

Nonporous shells are desirable because they reduce the rate of evaporation and thus the deterioration and grade loss in holding and marketing eggs.

Appearance Important, Too

Shell color in itself is not important from a quality standpoint, but uniformity of color, whether it be white, cream, or brown, does add to the attractiveness of the dozen or case lot and thus contributes to its sales appeal. High-quality eggs should also have shells that are free of stains and dirt.

The most critical test for quality in eggs is their appearance when broken out. It is at this point that the housewife passes judgment. She is looking for a large amount of thick white that stands up high around the yolk.

The yolk must also be upstanding and round in shape rather than so flattened that it is near the breaking point. No germ development or mottling should appear on the yolk surface. And the yolk color should be neither extremely light nor dark but uniform for any given lot of eggs.

To be of high quality the opened egg must also be free of blood and meat spots, and it should have no off odor or undesirable flavor.

What determines whether or not eggs meet all these requirements? A number of factors are involved. One of these is heredity.

Research has shown that quality characters which are affected by heredity include egg shape, shell color, shell strength, amount of thick albumen, and presence of blood and meat spots. In the past, poultry breeders have been attempting to improve egg production and egg size and have given much less thought to egg quality.

However, within the past year or two a number of breeders have launched an active breeding program to improve the genetic factors for egg quality.

For example, take this matter of albumen quality. It has been found that certain hens will consistently lay eggs which have thin whites, even though these hens are provided with the best rations. Experimentally it has been possible through selection to develop lines or strains that average either high or low in albumen quality.

The chances for improvement in the albumen quality of freshly laid eggs are apparently good, and it is the breeders' responsibility to take advantage of that opportunity.

Likewise, shell strength is at least in part an inherited character. An individual hen lays eggs which are much alike in size, color, and shape. The same is also true for shell texture and strength, and therefore hens laying thin-shelled eggs should be eliminated from the breeding flock.

Shell strength can be estimated from external appearance, but a more accurate method now being used by some progressive breeders is to measure the actual thickness of the shell after breaking out the egg. Shells less than 0.013 inches in thickness are considered bad risks.

The subject of blood and meat spots in eggs is a very controversial one. But it is generally agreed that our best approach to reducing these defects is also through a breeding program, since the tendency to produce them is inherited.

The economic loss from blood and meat spots is manifested in two ways. First, Minnesota grading standards require that eggs with blood or meat spots over ⅛ inch in diameter be classed as inedible. Smaller spots detected by candling drop the egg to C quality.

Spots Annoy Housewives

Another loss which cannot be so directly measured results because candling methods are not accurate enough to detect all of the blood and meat spots in eggs. Consequently, many eggs reach the consumer which never should. The housewife's dissatisfaction with this type of egg is understandable, and the loss to the industry through reduced consumption cannot be estimated.

There are other factors which affect the quality of eggs delivered to the consumer. At the farm level we might group them under the term of feeding and management. Let us discuss feeding first.

Generally speaking, if a ration has been designed for high egg production, that same ration will produce eggs of good quality. Shell strength, for example, is affected by both heredity and diet. A bird may have the ability to produce thick shells, but if her ration is not properly balanced in calcium, phosphorus, manganese, and vitamin D, she will not produce eggs with strong shells. It is a good practice to feed free-choice a calcium supplement such as oyster shell so that an adequate supply of this mineral is assured.

The ration will also affect yolk color. If the birds are confined so that their choice of feed is limited to mash and whole grains, uniformity of yolk color should be a natural result.

Yolk pigments come from yellow corn and alfalfa meal. If the ration contains normal amounts of these two ingredients, yolk color should be neither too light nor too dark to satisfy the average consumer.

There is just a little evidence that diet has some effect on the frequency of blood and meat spots. Some research workers believe that fresh green feeds probably contain an unidentified factor which can reduce these defects.

Good Management—Clean Eggs

These points show the importance of feeding to egg quality. Now let us turn to management, which plays an equally important part—especially in the production of clean eggs.

Farm flocks which are confined to a laying house where the litter and nesting materials are kept dry and the eggs are gathered frequently will produce a relatively small percentage of dirty eggs.

Producers who do not follow these recommended practices and rely on egg washing are creating a serious problem for the industry, for at the present time there is no foolproof method for cleaning eggs. Many washed eggs turn "sour," a condition which cannot be detected by the regular candler.

Once the egg is laid, the most potent enemy in the battle to maintain original quality is high temperature. Most farmers know that milk and cream are perishable products, but not all realize that eggs belong in this same category.

Follow These Rules

There are just a few simple rules to follow on the farm to maintain good egg quality:

First, gather the eggs in wire baskets three or more times daily so that the eggs are not exposed for long to the relatively high temperature of hens on the nest.

Second, place the basket of eggs in an egg-holding room where the temperature is no higher than 60 to 65 degrees and the humidity is above 70 per cent. The cellar of the farm home will come close to satisfying these condi-

(Continued on page 4)

TURKEY MEN MUST WEIGH COSTS AND RETURNS

Truman R. Nodland

Turkey growing has become a chief source of income on many Minnesota farms. With flock numbers running into the thousands, growers have to weigh cost of poults, cost of feed, and other expenses carefully against probable market price.

The farm records of cooperators in the various farm management services in Minnesota are a source of information for turkey growers who are trying to study operations. The information may be of help in budgeting feed supplies and when supplemented with outlook material may aid in making plans for the future.

The records cover a 16-year period which has seen wide fluctuation in both costs and market price. The data in this article were obtained from farmers who purchased their poults and did not maintain breeding flocks.

The pounds of turkeys raised per farm and the feed required to produce 100 pounds of turkeys on a live weight basis are shown in table 1. The large increase in production beginning with the 1941-1945 period was due in part to the addition of several large producers who were not included during the earlier period. Forty per cent of the feed consumed was purchased concentrates consisting largely of high-protein feeds. The farm-raised grains—mainly corn—made up the balance.

Costs and returns are shown in table 2. Farm-raised grains were charged at average farm prices in the area and commercial feeds were charged at purchase prices.

The average price received for turkeys during the 16-year period was $29 per 100 pounds, or 29 cents per pound. For every pound sold the poults cost 4.5 cents and the feed 14.7 cents, leaving a return above feed cost of 9.8 cents. The return above feed cost represents the amount available to pay the farmer for his labor, management, and items such as shelter, interest, taxes, insurance, and similar costs.

Information on the number of poults purchased, price paid per poult, death loss, and weight per bird sold is available for a six-year period and is shown in table 3. Approximately 1,900 poults were purchased at a cost of 77 cents per poult. The average death loss was 19.5 per cent. When one considers the death loss the cash outlay per bird raised for purchase of poults was 92 cents. In addition the feed and care spent on birds which later die have to be charged against the marketable birds.

Table 1. Feed Per 100 Pounds Turkeys Raised

	1936-1940	1941-1945	1946-1950	1951	16-year average
Number of records per year	11	14	8	11	11
Pounds of turkeys produced	12,852	25,106	24,924	34,953	21,835
Pounds of feed per cwt. produced					
Farm-raised grains	301	366	364	330	343
Commercial feeds	234	207	255	250	233
Total concentrates	535	573	619	580	576
Skim milk and buttermilk	35	10	4	5	15

Table 2. Turkey Costs and Returns

	1936-1940	1941-1945	1946-1950	1951	16-year average
Price received per cwt. sold	$17.52	$29.92	$38.16	$38.00	$29.00
Cost of poults per cwt. produced	3.19	4.69	5.23	5.61	4.48
Feed cost per cwt. produced	8.09	13.38	21.33	20.52	14.66
Total cost of poults and feed	$11.28	$18.07	$26.56	$26.13	$19.14
Return above feed cost	6.24	11.85	11.60	11.87	9.86
Return for $100 feed	$155.00	$166.00	$144.00	$145.00	$152.00

Table 3. Number and Cost of Poults Purchased, Death Loss, and Weight Per Bird Sold

	1946-1947	1948-1949	1950	1951	Six-year average
Number poults purchased	2,032	1,617	1,680	2,545	1,920
Cost per poult, cents	70.7	88.4	72.1	71.4	77.0
Per cent death loss	23.4	18.4	16.8	16.6	19.5
Weight per bird sold, pounds	17.2	16.8	16.7	15.9	16.8

(Continued from page 3)

tions, if no strong odors are present.

Third, after the eggs are cooled down, pack them in cases which have been held in the egg room for pre-cooling.

Fourth, the eggs should be marketed two to three times weekly.

From this point on, the responsibility for quality maintenance rests with the egg handlers in the market channels from producer to consumer. And improved facilities and more rapid handling have done much in recent years to reduce quality loss.

It is apparent that in order to give the consumer eggs of high quality, the cooperation of a good many people is necessary.

If anyone slips along the line, the whole industry suffers. If every group does its part, the whole industry benefits.

UNIVERSITY FARM,
ST. PAUL 1, MINN.

Cooperative Extension Work in Agriculture and Home Economics, University of Minnesota, Agricultural Extension Service and United States Department of Agriculture Cooperating, Paul E. Miller, Director. Published in furtherance of Agricultural Extension Acts of May 8 and June 30, 1914.

UNIVERSITY OF MINNESOTA
Department of Agriculture
Agricultural Extension
University Farm, St. Paul 1, Minn.
PAUL E. MILLER, Director
Minn. 7—10-52—5500
Permit No. 1201

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FREE—Cooperative Agricultural Extension Work, Acts of May 8 and June 30, 1914.