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Quality Comparisons of Eggs
in
Idaho Retail Stores

By

E. A. Sauter

SUMMARY

A survey was conducted to study the quality of eggs available in retail stores. The sample included approximately one-third of the stores in three Northern Idaho cities. Samples of each grade, size, and brand of eggs were obtained from the store displays during each of the four seasons and taken immediately to the laboratory for quality evaluation.

Fifty-four percent of the eggs sampled were labeled as grade AA, 15 percent grade A, 30 percent ungraded, and only 1 percent as grade B.

Comparison on a candled basis showed that 65 percent of the dozens of eggs labeled grade AA and 58 percent of grade A were below grade. Forty-six percent of the dozens of ungraded eggs were below grade A. Appreciable differences were also found between seasons and between cities.

On an interior quality basis, the eggs labeled grade AA averaged 72 H.U. (Haugh units), those in grade A averaged 68 H.U. and ungraded eggs averaged 66 H.U. Variability among eggs was greater in grade A and ungraded eggs than in grade AA. There was no difference in Haugh¹ units between cities.

Direct marketing from producers to retailers resulted in higher interior quality, but in some cases this difference was not large indicating quality loss and that improved handling methods are needed.

Retail prices of ungraded eggs averaged 15 percent below grade AA large and 5 percent less than grade A eggs.

Fluorescent spoilage was found in 0.5 percent of the eggs in grade AA, as compared to 2.0 percent in grade A and 3.6 percent in the ungraded eggs.

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¹A measure of egg quality based on the weight of the egg and the height of the albumen when the egg is broken out on a flat plate of glass.

Grade AA	79 H.U. or more
Grade A	56 to 78 H.U.
Grade B	31 to 55 H.U.
Grade C	less than 31 H.U.

Quality Comparisons of Eggs in Idaho Retail Stores

By

E. A. Sauter

Assistant Poultry Husbandman

A major problem of the poultry industry has been to provide the high quality eggs necessary to promote consumer acceptance. In normal market channels, eggs are picked up at the farm (often only once each week) and taken to processing plants where they are graded and cased or cartoned. The eggs are then delivered to the retail stores as needed. Often more than two weeks have elapsed from the time the egg leaves the farm until it reaches the retailer's shelf. Producers, marketing agencies and large chain stores have attempted to overcome or at least minimize this delay. Various direct or other quality marketing programs have been used and incentive premiums paid for rapid delivery of high quality eggs.

This study was conducted to evaluate the effectiveness of some of these programs in terms of egg quality at the retail level and to learn the actual quality of eggs available in retail stores in Idaho.

REVIEW OF LITERATURE

A number of researchers have investigated the quality of eggs available to the consumer. Morrison, Stadelman and Darroch (1955) reported that eggs from refrigerated displays averaged 6 or more Haugh² units higher than eggs from non-refrigeration displays. They also found that more eggs were held without refrigeration in summer than in winter. Similar findings were reported by Sauter, Zaehring and Rickard (1960). In California Sanborn and Brant (1961) reported that grade AA eggs averaged 67 H.U. and grade A eggs 61 H. U. Buck (1963) reported that the average quality of eggs in Virginia equaled the labeled grade. However, no eggs labeled grade AA were included in the study. Eggs of grades AA and A were almost equal in acceptability, according to Waananen, Gislason and Darroch (1958) in a one-year study of stores in Spokane, Washington.

²See footnote on previous page for explanation of Haugh units.

PROCEDURE

A random sample of 21 stores in three cities in northern Idaho was made to study the quality of eggs available to consumers in the three areas. The survey included approximately one-third of all stores in the three cities. Store size ranged from small one-man operations to the large chain-store type of supermarkets. Eggs were obtained once during each of the four seasons of the year and taken to the laboratory for quality evaluation. Two dozen eggs each of all brands, grades³, and sizes available in each store each season were evaluated for quality and spoilage. Ungraded eggs were classed as one brand except where they could be identified as to source. The eggs from identifiable sources were classed as separate brands.

The eggs were brought into the laboratory immediately and placed under refrigeration until the quality determinations were made. This was never more than 3 days. The egg quality measurements included candled grade, number and percent of dirty eggs, weight of each egg, and the height of the thick albumen for computation of Haugh units. The yolk index and color, using a Herman-Carver Color Rotor, were also recorded for each egg. Blood spots and other interior quality defects were also noted. The incidence of fluorescent spoilage was observed using a Vogelite model 325 black light candler.

RESULTS AND DISCUSSION

The results of this study are summarized in tables 1 through 9. Fifty-four percent of all eggs sampled during this study were labeled as grade AA, 15 percent as grade A, 1 percent as grade B, and 30 percent as ungraded.

Table 1. Actual percent of graded and ungraded eggs in the various grades.

Labeled Grade	Percent in Grade				
	AA	A	B	C	Reject
AA	70	23	6	0.3	0.7
A	14	71	12	2	1
Ungraded	17	57	22	2	2

Candled Grade

Eggs of a quality below labeled grade were found in all samples. The actual percentages of all eggs in the various labeled grades are shown in table 1. Seven percent of the eggs from grade AA, 15 percent of those from grade A and 26 percent of the ungraded eggs were below the minimum requirements for grade A.

Sixty-five percent of the dozens of eggs labeled AA and 58 percent of those in grade A failed to meet the minimum requirements for their respective grades on a candled basis. Forty-six

³Idaho law permitted the sale of ungraded eggs prior to July 1, 1963.

percent of the dozens of ungraded eggs did not meet minimum grade A standards. These findings are summarized in tables 2 and 3. On an individual egg basis 30 percent of all eggs labeled as grade AA were below requirements for this grade.

Table 2. The percent of dozens of graded and ungraded eggs below labeled grade by seasons (on a candled basis).

Season	Percent Below Grade		
	Grade AA	Grade A	Ungraded*
Spring	77	58	67
Summer	72	57	74
Fall	49	41	35
Winter	63	64	15
Average	65	58	46

*Below grade A

Table 3. The percent of dozens of graded and ungraded eggs below labeled grade by cities (on a candled basis).

City	Percent Below Grade		
	Grade AA	Grade A	Ungraded*
1	73	38	41
2	69	66	49
3	47	50	47
Average	65	58	46

*Below grade A

The candled grade of the eggs varied significantly by seasons and by cities as is shown in tables 2 and 3. Grade AA had the greatest percentage of dozens below grade during the spring. In contrast, more grade A eggs were below grade in the winter and more ungraded eggs below grade A during the summer. These seasonal differences were due in part to the age of the hens, handling methods, and the supply of eggs in the various grades. The supply factor is particularly noticeable with grade A eggs. During the fall months when large eggs are characteristically in short supply, 41 percent of the dozens of grade A eggs were below grade as compared to 64 percent during the winter when supplies were ample. Most of the grade A eggs in this study were large. A factor which contributed to the low grade of AA eggs during the spring was the presence of some eggs with dark yolks. Yolk color scores as high as 20 were found in some eggs during the spring as compared to scores of 14 to 16 during other periods of the year.

Interior Quality

The eggs sold as grade AA averaged 72 H.U. (Haugh units) on a broken-out basis, those in grade A averaged 68 H.U., those in grade B average 63 H.U., and the ungraded eggs averaged 66 H.U. The lowest individual H.U. values were 33, 15, 22, and 5

for grades AA, A, B and ungraded eggs respectively. The eggs in grade AA averaged 7 H.U. below the minimum standard for AA. The four brands of grade AA eggs having the highest interior quality averaged 79 H.U., whereas all other brands of grade AA ranged from 67 to 73 H.U. for the survey period.

Table 4. Seasonal variation in interior quality of eggs based on albumen height

Season	Average Haugh Units*		
	Grade AA	Grade A	Ungraded
Spring	75	73	66
Summer	70	65	58
Fall	71	66	70
Winter	74	71	72
Average	72	68	66

The seasonal variations in interior quality as measured by Haugh Units for grades AA, A, and ungraded eggs respectively are shown in table 4. Grade B eggs are omitted because of the small number of dozens involved. These eggs were graded B largely because of stained shells and were often not typical grade B eggs on an interior quality basis.

Interior quality as measured by Haugh units was significantly lower during the summer and was particularly marked in the case of ungraded eggs, which were 8 H.U. below the average for the year. Grade AA eggs during the summer were only 2 H.U. below the yearly average and grade A eggs were down 3 H.U. during the summer. Variation in quality between cities was not significant with only 2 H.U. in grade AA, 5 in grade A, and none in ungraded eggs.

Table 5. The average range of Haugh units per dozen of graded and ungraded eggs by seasons.

Season	Range of Haugh Units per Dozen		
	Grade AA	Grade A	Ungraded
Spring	18	20	25
Summer	19	25	34
Fall	20	26	27
Winter	18	20	25
Average	19	23	28

The highest interior quality of any dozens was 91 H.U. for grade AA, 81 H.U. for A, and 87 H.U. for ungraded eggs; whereas the lowest was 53, 46, and 29 respectively for grade AA, A, and

*Grade AA 79 H.U. or more
 Grade A 56 to 78 H.U.
 Grade B 31 to 55 H.U.
 Grade C below 31 H.U.

ungraded eggs. In the average dozen of AA eggs the spread between the highest and lowest interior quality was 19 H.U. This compared to 23 H.U. in grade A and 28 H.U. in ungraded eggs. This information is summarized by seasons in table 5 and by cities in table 6.

Table 6. The average range of Haugh units per dozen of graded and ungraded eggs by cities.

City	Range of Haugh Units per Dozen		
	Grade AA	Grade A	Ungraded
1	18	18	26
2	18	21	26
3	20	27	31
Average	19	23	28

While the average range does not appear particularly excessive, the ranges in individual dozens of both ungraded and grade A eggs were as much as 63 H.U. and up to 50 H.U. in eggs labeled grade AA. This lack of uniformity in quality is very serious from the standpoint of consumer acceptance.

Fluorescent Spoilage

Fluorescent spoilage was found in only 4 percent of the dozens of grade AA eggs, but in 14 percent of the dozens of both grade A and ungraded eggs. On an individual egg basis spoilage was 0.5, 2.0, and 3.6 percent respectively for grades AA, A, and ungraded eggs. Spoilage was not appreciably different between cities for eggs of any one grade. However, there were marked seasonal differences with the highest incidence of spoilage during the spring, and decreasing to none during the winter. This variation is shown in table 7.

Table 7. The percent of dozens of graded and ungraded eggs containing fluorescent spoilage by seasons.

Season	Percent Spoilage		
	Grade AA	Grade A	Ungraded
Spring	13	17	17
Summer	0	14	22
Fall	2	6	3
Winter	0	0	0

Fifteen percent of the eggs in grade AA and in the ungraded eggs contained blood or meat spots. The blood spots usually were small. However, 0.1 percent of those in grade AA and 1.2 percent of those in the ungraded eggs were larger than $\frac{1}{8}$ inch in diameter. Grade A eggs contained 11 percent blood or meat spots with no blood spots more than $\frac{1}{8}$ inch in size. Even though the percentage of individual eggs containing large blood or meat spots was not particularly high, 67 percent of the cartons sampled in grade AA, 55 percent of those in grade A, and 74 percent of those of ungraded eggs contained one or more eggs with blood or meat spots.

Marketing Methods

Table 8. Comparison of the interior quality of eggs marketed through various channels by season

Marketing Method	Spring	Average Haugh Units Summer	Units Fall	Winter
Conventional	71	64	66	72
Quality Program	74	68	68	73
Direct Marketing (Producer branded)	76	70	73	75
Ungraded Eggs	66	58	70	72

A comparison of the interior quality according to the marketing procedures used is shown in table 8. The quality spread found between direct-marketed (producer to retailer) eggs in the producer's branded cartons and eggs that had gone through conventional marketing channels ranged from 3 to 7 H.U. depending on the season. Marked differences among cities were noted as indicated in table 9 with a spread of 13 H.U. between conventional and direct marketed eggs in the first city as compared to 1 and 2 H.U. in the other cities. From these findings it would appear that the eggs being marketed directly from producers to retail stores are often losing quality more rapidly than is necessary. An improvement in handling and holding techniques appears desirable.

Table 9. Comparison of the interior quality of eggs marketed through various channels by cities.

Marketing Method	I	City II	III	Av. of all cities
Conventional	65	71	70	70
Quality Program	70	71	75	73
Direct Marketing (Producer branded)	78	73	71	73
Ungraded eggs	65	67	66	66

Dirty eggs were found among all grades; 3.7 percent of the eggs in grade AA, 8.7 percent in grade A, and 11.8 percent of the ungraded eggs were dirty.

The average weight of grade AA eggs was 25 ounces per dozen, for grade A 26 ounces per dozen, and for ungraded eggs 23.5 ounces per dozen. Most of the grade A eggs available were labeled as large. Grade AA and ungraded eggs were more generally available in all sizes. No cartons of eggs were found that failed to meet the minimum weight as specified on the carton. There were a few instances, however, where an individual egg within a carton was below the minimum size permitted for the weight class specified on the carton.

The price of grade AA large eggs averaged 8 cents per dozen or about 15 percent more than ungraded eggs. The average price of grade AA eggs (all sizes) was 9 percent more than ungraded eggs. Eggs in grade A averaged 5 percent above the retail price of ungraded eggs during the period of the survey.