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Quality of Inspected Eggs Sold in Tennessee 1952 to 1959

University of Tennessee Agricultural Experiment Station

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SUMMARY

This study was based on 20,300 inspection reports of the eggs sold by wholesalers and retailers in Tennessee for the period of July 1, 1951, through June 30, 1959.

The proportion of eggs sold as Grade A in Tennessee increased from 19 percent in 1952 to 63 percent in 1959. For the same years, the proportion of eggs sold as Grade B increased from 2 to 5 percent, and the proportion sold as Ungraded decreased from 79 to 32 percent.

The inspected quality of eggs sold as Grade A averaged 69.5 percent Grade A in 1952 and 83.3 percent Grade A in 1959; the quality of eggs sold as Grade B averaged 77.4 percent Grade B or better in 1952 and 89.6 percent Grade B or better in 1959; and for eggs sold as Ungraded the quality averaged 77.6 percent Grade B or better in 1952 and 85.3 percent Grade B or better in 1959. For all eggs sold in the state as Grades A and B, as an average from 1952 to 1959, considerable decreases occurred in the proportions of Grade C, Dirty eggs, and eggs found to be underweight. On the other hand, the proportions of eggs classed as Check and Loss showed no downward trend.

For all Ungraded eggs sold, as an average from 1952 to 1959, some decreases occurred in the proportions classed as Grade C, but the percentages of eggs classed as Dirty, Check, and Loss showed no downward trend.

For the period 1952 to 1959, the quality of inspected eggs sold by chain stores averaged slightly higher than the quality of those sold by independent stores but no significant differences (95 per cent level) in grades of eggs were found in 1959, the last year of study. No significant differences (95 percent level) were found in the inspected average quality of eggs sold in the three divisions of the state—East, Middle, and West Tennessee.

The quality of inspected eggs sold in the state was generally lower than average during the months of April to August; that is, the proportion of eggs classed as C, Dirty, and Loss were highest during these months. The proportions of eggs classed as Check showed little seasonal variation. The proportions of eggs not meeting weight requirements were greater for the months of October to February.

The quality of inspected eggs sold as Grade A by commercial egg producers in Tennessee in 1959 averaged 85.6 percent Grade A, compared with 83 percent Grade A sold by other wholesalers and retailers, but contained a higher percentage of eggs classed as Dirty and Underweight.

This study indicates that considerable progress is being made in Tennessee in the sale of Grade A eggs. Important factors relating to future progress in the sale of high quality eggs are: (1) reducing the proportion of eggs sold as Ungraded, (2) obtaining better refrigeration facilities at the producer, wholesaler, and retailer levels to maintain the quality of eggs, (3) eliminating Dirty eggs, (4) reducing the percentage of eggs classed inedible, smashed, or broken, and (5) prohibiting the sale of eggs not meeting net weight requirements.

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I. INTRODUCTION

Purpose of the Study

During the period July 1, 1949, to August 31, 1950, the Tennessee Agricultural Experiment Station made a study of wholesale and retail egg marketing in the state. Information was obtained by personal interview from 995 retail grocery stores, 112 produce dealers, 118 commercial hatcheries, 81 eating establishments, 64 agencies handling frozen and dried eggs, 43 poultry and egg dealers, 43 rolling stores, 20 meat packing companies, 15 chain store headquarters, 12 dealers handling eggs only, and 9 other agencies. This study revealed that 88 percent of the retailers, 75 percent of the wholesalers, and 62 percent of other agencies handling eggs were in favor of revision and rigid enforcement of the Tennessee Egg Law. A summary of the recommendations of retail and wholesale egg dealers was made available to the State Department of Agriculture in January, 1951, for use in revision of the Law.[1]

The Tennessee Egg Law of 1949 was revised and passed by the State Legislature on March 7, 1951, and became effective on July 1, 1951. It was amended in April, 1953. The law was enacted to promote the development of the Tennessee poultry and egg industry, to define certain types of eggs, to prohibit the sale of eggs unfit for human food, to prevent deception in the sale of eggs at wholesale and retail levels by adopting specifications for quality and grade of eggs based on U.S.D.A. standards,[2] to provide for proper labeling and advertising of eggs, to license dealers, wholesalers, and processors of eggs, to provide for the sanitary operation of egg breaking and processing plants, and to provide for administration and enforcement of the Law.

Since the Revised Egg Law became effective in 1951 it has been administered on an educational as well as enforcement basis; that is, farmers have been encouraged to produce and market high quality eggs on a graded basis, and the sale of eggs by wholesalers and retailers has been regulated for the purpose of preventing deceptive labeling of the quality and size or weight.

This study was undertaken to determine the extent to which some of the objectives of the Tennessee Egg Law have been achieved. Specifically, the objectives of this study were: (1) to determine the proportion of eggs sold by wholesalers and retailers as Grade A, Grade B, and Ungraded by size of city in Tennessee, (2) to determine how the labeled grades of eggs sold by wholesalers and retailers in the state compared with the inspected grade, by years, (3) to determine the variation in percentage of labeled and inspected grades of eggs as related to such factors

[1]Raskopf, B. D., **Egg Marketing Wholesale and Retail in Tennessee,** Tennessee Agricultural Experiment Station, Monograph No. 267, July 15, 1953.

[2]**Egg Grading Manual,** Agricultural Handbook No. 75, A.M.S., U.S.D.A., June 1956.

as type of store, geographic area, seasonality, and type of selling agency, (4) to measure the progress made in selling Grade A eggs, and (5) to point out some of the important factors related to egg quality control.

Method and Scope of Study

The study was based on egg inspection reports made available by the Poultry and Egg Marketing and Inspection Service of the Division of Marketing, Tennessee Department of Agriculture, from July 1, 1951, through June 30, 1959. Over the eight-year period, about 20,300 egg inspections were made and 1,079,000 eggs examined. Of all inspections, about 11 percent were of eggs handled by wholesalers and 89 percent by retail agencies. Inspections were conducted in all of the counties and were fairly representative of the different grades of eggs handled by wholesalers and retailers, by size of town or city, type of store, geographic divisions of the state, and season of sale. The 2,300 inspections of Wholesalers included the headquarters of chain stores, produce dealers, poultry and egg dealers, and other agencies wholesaling eggs. The 18,000 inspections of retail agencies included chain stores, independent stores, and commercial egg producers. The inspection reports revealed that generally one egg inspector was operating in each of the major geographic divisions of the state—East, Middle and West Tennessee.

During the eight years, the Division of Marketing of the Tennessee Department of Agriculture issued about 11,700 egg licenses to egg dealers and wholesale agencies; 68 egg grading and quality improvement schools were conducted throughout the state; and 43,000 persons, including producers, dealers, and processors, were personally assisted in the egg quality improvement program or received materials pertaining to the Egg Law.[3]

II. RESULTS OF THE STUDY

GRADES OF INSPECTED EGGS SOLD IN TENNESSEE

By Years, 1952 to 1959

One objective of this study was to determine from egg inspection reports the variation which has occurred in the proportions of different grades of eggs handled by wholesalers and retailers in the state during the years 1952 to 1959. Of all eggs inspected, 19 percent were sold as Grade A in 1952 and the proportion increased to 63 percent by 1959. Conversely, the proportion of eggs sold as Ungraded decreased from 79 to 32 percent during the same years. The proportion of Grade B eggs remained at 2 percent from 1952 to 1957, but increased to 5 percent in 1959 (Figure 1).

By Size of City, 1952 to 1959

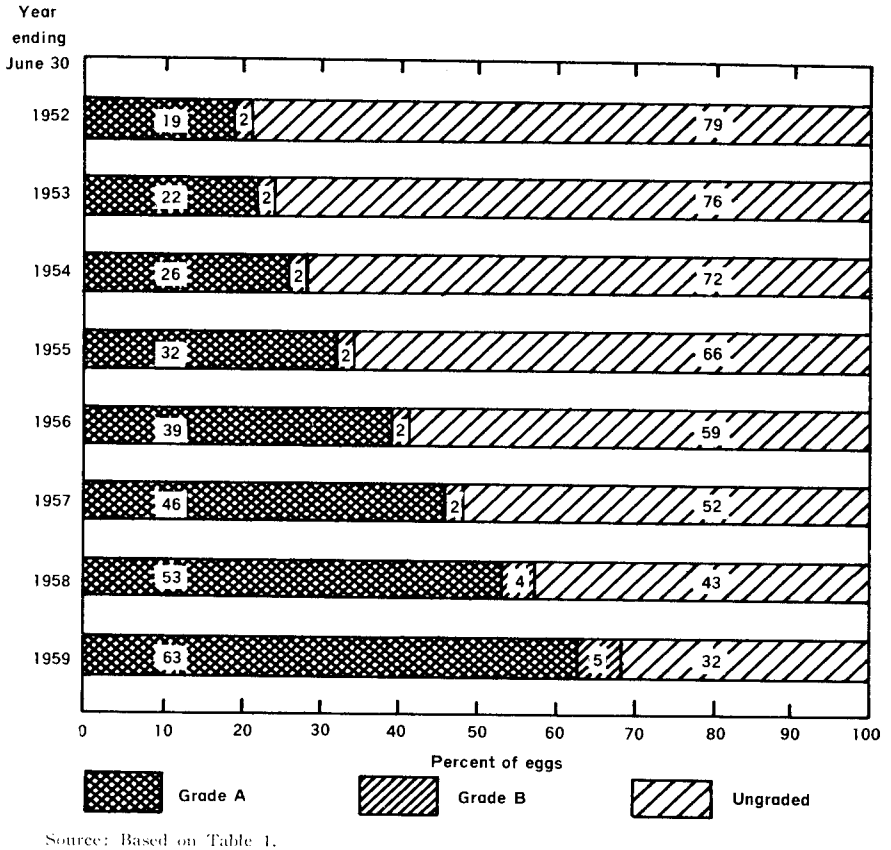
The frequency of egg inspections and the number of eggs inspected during each year depended upon such factors as the quantity of eggs produced, processed, and marketed in a given area, and the number of inspectors operating. However, a sufficient number of egg inspection reports were available to determine the variation in the proportion of different grades of eggs marketed according to size of town or city.

Of all eggs inspected in the state in 1952 about 19 percent were mar-

[3]Reports of the Tennessee Department of Agriculture, 1951-52 to 1958-59.

keted as Grade A, but the proportion ranged from 1 percent in towns having under 500 population to 65 percent in the cities of Knoxville, Chattanooga, Nashville, and Memphis. By 1959 over half the eggs marketed in the towns under 1,000 population were Grade A and the proportion had increased to 89 percent in the four largest cities (Table 1).

The proportion of all inspected eggs labeled as Ungraded averaged 79



Source: Based on Table 1.

Figure 1. Percent of eggs marketed by wholesalers and retailers in Tennessee, by grade, 1952 to 1959.

percent in 1952 but ranged from 98 percent in towns having under 500 population to 29 percent in the four cities having over 100,000 population. By 1959 an estimated 46 percent of the eggs marketed in the smallest cities were Ungraded and the proportion had decreased to 4 percent in the four largest cities.

During the entire eight years only a small percentage of the eggs were marketed as Grade B regardless of the size of town or city. However, as shown later in this report, a considerable proportion of the eggs sold as Grade A and Ungraded were Grade B as inspected. Also, some of the eggs sold as Grade B were of higher or lower grades.

LABELED GRADE OF EGGS COMPARED WITH INSPECTED GRADE

Actual Quality of Eggs Sold as Grade A

As shown in Figure 1, of all eggs inspected in Tennessee, the proportion sold as Grade A increased from 19 percent in 1952 to 63 percent in 1959. During the eight years studied all eggs sold as Grade A by wholesalers and retailers about measured up to this grade, considering the permitted tolerance in grades. As an average of all inspections during the

Table 1. Percent of Eggs Marketed by Wholesalers and Retailers, by Grade and Size of City, Tennessee, 1952 to 1959.

Year ending June 30	Population of towns and cities: Under 500	500 to 999	1,000 to 4,999	5,000 to 9,999	10,000 to 99,999	100,000 to 500,000	State
	Percent of Eggs Sold as Grade A						
1952	1	2	6	13	14	65	19
1953	3	5	11	15	25	68	22
1954	5	8	13	25	38	70	26
1955	11	13	20	30	42	76	32
1956	19	28	33	40	57	79	39
1957	30	32	35	52	61	80	46
1958	39	37	39	57	65	83	53
1959	51	53	57	64	68	89	63
	Percent of Eggs Sold as Grade B						
1952	(a)	(a)	(a)	(a)	(a)	6	2
1953	(a)	(a)	(a)	2	2	4	2
1954	(a)	(a)	(a)	2	2	3	2
1955	(a)	(a)	2	3	3	3	2
1956	(a)	(a)	3	4	3	3	2
1957	(a)	3	5	4	3	3	2
1958	2	5	7	6	4	5	4
1959	3	7	7	6	6	7	5
	Percent of Eggs Sold as Ungraded						
1952	98	97	93	86	85	29	79
1953	96	94	88	83	73	28	76
1954	94	91	86	73	60	27	72
1955	88	86	78	67	55	21	66
1956	80	71	64	56	40	18	59
1957	69	65	60	44	36	17	52
1958	59	58	54	37	31	12	43
1959	46	40	36	30	26	4	32

(a) Less than one percent.

NOTE: The number of eggs inspected ranged from 100,000 in 1952 to 140,000 in 1959.

eight years studied, 79.6 percent of the eggs labeled as Grade A were that grade and the proportion increased from 69.5 in 1952 to 83.3 percent in 1959 (Table 2).

Table 2. Quality of Inspected Eggs Sold as Grade A by Wholesalers and Retailers in Tennessee, 1952 to 1959.

Year ending June 30	Inspected quality of eggs labeled Grade A							Underweight
	A	B	C	Dirty	Check	Loss(a)	All eggs	
	Percent of Eggs							
1952	69.5	17.5	9.2	1.8	1.7	0.3	100	7.7
1953	80.9	11.1	1.6	3.9	2.0	0.5	100	1.8
1954	85.3	8.5	0.6	4.4	1.1	0.1	100	1.5
1955	78.3	17.0	1.2	0.7	2.7	0.1	100	2.6
1956	81.4	13.6	1.9	1.0	1.9	0.2	100	0.6
1957	76.4	18.8	1.8	0.7	2.1	0.2	100	0.2
1958	81.8	13.8	1.7	0.6	1.8	0.3	100	0.6
1959	83.3	13.5	0.9	0.5	1.6	0.2	100	0.7
Av. (b)	79.6	14.2	2.4	1.7	1.9	0.24	100	2.0

(a) Losses were eggs that were inedible, smashed, or broken so that the contents were leaking, frozen, contaminated, or containing bloody whites, large blood spots, large unsightly meat spots, or other foreign material.
(b) Weighted.

The U. S. Consumer Grade for shell eggs sold as Grade A must be 80 percent A quality or better with permitted tolerance of not over 15 to 20 percent B quality, and not over 5 percent (of the 20 percent) C or Check quality. Substitution of higher qualities for the lower qualities is permitted. However, eggs sold as Grade A cannot contain any Dirty eggs.

The results in Table 2 may be summarized as follows: (1) the greatest improvements in quality of eggs labeled and sold as Grade A occurred in 1953 or the first year after the State egg inspection program was started, (2) from 1952 to 1959 considerable increase occurred in the proportion of eggs of A quality and decreases occurred in eggs classed as B and C, (3) a considerable decrease took place after 1954 in eggs classed as Dirty, (4) the proportion of eggs classed as Check and Loss did not show any definite trend during the eight years, (5) the proportion of eggs not meeting minimum net weight requirements for size or weight class decreased considerably from 1952 to 1959, and (6) during the years 1952, 1955, and 1957, the inspected quality of eggs labeled Grade A fell below 80 percent.

Improvements in quality of eggs sold as Grade A, during the period studied, may be illustrated by a hypothetical example of consumer purchase of eggs. As an average, from 150 dozen or 1,800 eggs labeled Grade A, purchased annually by a five-person family during the years specified:

Actual purchases	*1952*	*1959*	*1952-59 av.*
		Number of eggs	
Grade A	1251	1499	1433
Grade B	315	243	255
Grade C	166	16	43
Check	31	29	34
Dirty	32	9	31
Loss	5	4	4
Total	1800	1800	1800
Underweight	139	13	36

Actual Quality of Eggs Sold as Grade B

The proportion of eggs sold as Grade B in Tennessee ranged from 2 percent in 1952 to 5 percent in 1959 (Figure 1). During the eight years studied, as an average, the eggs sold as Grade B measured up to standard. The consumer grade for shell eggs sold as Grade B must be 80 percent B quality or better, with permitted tolerance of not over 10 to 20 percent C quality, and not over 10 percent (of the 20 percent) Dirty or Check quality. Substitution of higher qualities for the lower qualities is permitted. Eggs sold as Grade B must meet minimum net weight requirements per dozen, specified according to size or weight class. Also, within the tolerance permitted an allowance is made at receiving points or shipping destinations for only 0.5 percent leakers in Grade B.

As an average of all inspections during the eight years studied, 87.7 percent of the eggs labeled as Grade B were that grade or better and the proportion increased from 77.4 percent in 1952 to 89.6 percent in 1959 (Table 3).

Table 3. Quality of Inspected Eggs Sold as Grade B by Wholesalers and Retailers in Tennessee, 1952 to 1959.

Year ending June 30	Inspected quality of eggs labeled Grade B							Under-weight
	A	B	C	Dirty	Check	Loss	All eggs	
	Percent of Eggs							
1952	0.1	77.3	11.3	8.3	2.6	0.4	100	1.8
1953	2.9	87.7	4.8	2.0	2.1	0.5	100	2.9
1954	1.4	81.3	4.0	7.6	5.6	0.1	100	0.1
1955	25.0	61.6	8.3	0.1	4.9	0.1	100	0.1
1956	29.3	62.2	5.1	0.1	3.1	0.2	100	0.1
1957	21.9	69.6	5.6	0.1	1.7	1.1	100	1.2
1958	7.1	84.2	4.4	0.2	2.5	1.6	100	0.2
1959	14.4	75.2	5.7	2.0	2.4	0.3	100	1.9
Av. (a)	12.8	74.9	6.2	2.5	3.1	0.5	100	1.0

(a) Weighted.

The results in Table 3 may be summarized as follows: (1) the greatest improvement in quality of eggs labeled and sold as Grade B occurred in 1953 or the first year after the State egg inspection program was started, (2) from 1952 to 1959 considerable increase occurred in the proportion of eggs of B quality or better and decreases occurred in eggs classed as C, and Dirty, (3) the proportion of eggs classed as Check, Loss, and Underweight did not show any definite trend during the eight years, (4) after 1952 considerable proportions of the eggs labeled Grade B actually classed one grade higher, and (5) as an average, eggs sold as Grade B, compared with Grade A, had a higher percentage of Dirty, Check, and Loss.

Improvements in quality of eggs sold as Grade B during the period studied may be illustrated by a hypothetical example of the annual egg purchases of one family. As an average, from 150 dozen or 1,800 eggs labeled Grade B purchased by a family during the eight-year period, the actual qualities of the eggs were as listed below:

Actual purchases	*1952*	*1959*	*1952-59 av.*
		Number of eggs	
Grade A	2	259	230
Grade B	1392	1354	1348
Grade C	203	103	112
Check	47	43	56
Dirty	149	36	45
Loss	7	5	9
Total	1800	1800	1800
Under-weight	32	34	18

Quality of Eggs Sold as Ungraded

For the years 1952 to 1959 the inspected quality of Ungraded eggs averaged 54.7 percent Grade A, 26.9 percent Grade B, 9.3 percent Grade C, and 9.1 percent other grades. The results in Table 4 may be summarized as follows: (1) when a 20 percent grade tolerance is considered, 68.4 percent of the eggs during the eight-year period could have been sold as Grade A and most of the balance as Grade B, (2) the proportion of eggs classed as Dirty, Check, and Loss showed no definite trend, and (3) as an average, the eggs sold as Ungraded, compared with those sold as Grade A or Grade B, contained a higher proportion of Dirty eggs and Losses.

Table 4. Quality of Inspected Eggs Sold as Ungraded by Wholesalers and Retailers in Tennessee, 1952 to 1959.

Year ending June 30	Inspected quality of eggs sold as Ungraded						
	A	B	C	Dirty	Check	Loss	All eggs
			Percent of Eggs				
1952	46.1	31.5	12.9	4.9	3.5	1.1	100
1953	54.2	20.1	17.1	6.2	1.9	0.5	100
1954	57.4	22.7	7.4	9.3	2.9	0.3	100
1955	63.4	23.4	4.6	4.4	3.3	0.9	100
1956	52.1	29.9	9.3	4.8	2.9	1.0	100
1957	53.6	30.4	8.3	4.1	3.0	0.6	100
1958	54.2	29.1	9.2	3.7	3.2	0.6	100
1959	57.2	28.1	5.3	5.6	2.8	1.0	100
Av. (a)	54.7	26.9	9.3	5.4	2.9	0.8	100

(a) Weighted.

The low proportion of Grade A's in the eggs sold as Ungraded during each of the eight years indicated that many producers and dealers followed the practice of partially grading eggs by candling out the top grades and selling the lower ones as Ungraded or that practices followed in producing

and marketing ungraded eggs were inferior, compared with the practices employed in the production and marketing of graded eggs.

As an average, an improvement has occurred in the quality of eggs sold as Ungraded. As shown in Table 4, the proportion of A's in Ungraded eggs increased from 46.1 percent in 1952 to 57.2 percent in 1959. Considering the 20 percent permitted tolerance, 57.6 percent of the ungraded eggs could have been sold as Grade A in 1952, compared with 71.5 percent in 1959.

Changes occuring in the quality of eggs sold as Ungraded, during the period studied, may be illustrated by a hypothetical example of the annual egg purchases of one family. As an average, from 150 dozen or 1,800 eggs labeled as Ungraded purchases by a family during the eight-year period, the actual qualities of the eggs were as listed below:

Actual purchases	*1952*	*1959*	*1952-59 av.*
		Number of eggs	
Grade A	830	1030	985
Grade B	567	506	484
Grade C	232	95	168
Checks	63	50	52
Dirty	88	101	97
Loss	20	18	14
Total	1800	1800	1800

QUALITY OF INSPECTED EGGS SOLD BY TYPE OF STORE

Actual Quality of Eggs Sold as Grade A

Based on weighted averages for the eight years studied the inspected grade of eggs labeled as Grade A sold by chain stores averaged 80.7 percent Grade A, compared with 78.5 percent that grade for independent stores (Table 5).

Table 5. Quality of Inspected Eggs Sold as Grade A, by Type of Store in Tennessee, 1952-59 Average.*

Type of store	Inspected quality of eggs labeled Grade A							Underweight
	A	B	C	Dirty	Check	Loss	Total	
				Percent of Eggs				
Independent	78.5	14.9	2.6	1.9	1.9	0.2	100	2.1
Chain	80.7	13.5	2.2	1.5	1.9	0.2	100	1.9

*July 1, 1951, through June 30, 1959.

During the last year (1959) practically no variation existed between independent and chain stores in the average quality of eggs sold as Grade A. Part of this leveling out of egg quality difference may be attributed to the uniform application and enforcement of the Tennessee Egg Law throughout the state. As indicated earlier in this report, two of the important objectives of the law were to promote the merchandising of eggs on the basis of uniform standards and to provide for better egg quality control.

Actual Quality of Eggs Sold as Grade B

The inspected quality of eggs sold as Grade B averaged 89.5 percent that grade or better for chain stores, compared with 85.9 percent Grade B for independent stores (Table 6).

Chain stores, compared with independent stores, also handled a lower proportion of eggs classed as Dirty and Loss. While these differences were evident as an average over the eight-year period, they were not found during 1959. It seems that the quality differences in eggs sold as Grade B,

Table 6. Quality of Inspected Eggs Sold as Grade B, by Type of Store in Tennessee, 1952-59 Average.*

Type of store	Inspected quality of eggs labeled Grade B							Underweight
	A	B	C	Dirty	Check	Loss	Total	
	Percent of Eggs							
Independent	11.8	74.1	7.3	3.2	2.8	0.8	100	0.9
Chain	13.8	75.7	5.1	1.8	3.4	0.2	100	1.1

*July 1, 1951 through June 30, 1959.

by type of store, tended to level out with the increase in the number of years of enforcement of the Tennessee Egg Law.

From 1952 to 1957 only 2 per cent of the eggs sold by retail stores were classed as Grade B, but the proportion increased to 4 percent in 1958 and 5 percent in 1959. This increase in Grade B eggs appeared to be associated with two principal factors: (1) more rigid enforcement of the Tennessee Egg Law during the past two years, and (2) increased sale of eggs that in the past were sold as Ungraded. There was no evidence to indicate that the increased proportions of eggs sold as Grade B reflected an over-all lower quality of eggs handled by wholesale and retail agencies (Tables 2, 3, and 4).

Quality of Eggs Sold as Ungraded

Of the Ungraded eggs sold by independent stores, 83.2 percent averaged Grade B or higher, compared with 80 percent for chain stores (Table 7). This difference was due to the higher proportions of ungraded eggs sold by chain stores that were classed as Grade C, Dirty, and Check. Although the inspected quality of ungraded eggs handled by chain stores averaged lower than for independent stores for the eight years studied, this difference was not significant (95 percent level) in 1959.

Table 7. Quality of Inspected Eggs Sold as Ungraded, by Type of Store in Tennessee, 1952-59 Average.*

Type of store	Inspected quality of eggs sold as Ungraded						
	A	B	C	Dirty	Check	Loss	Total
	Percent of Eggs						
Independent	53.0	30.2	9.1	4.1	2.7	0.9	100
Chain	56.4	23.6	9.5	6.7	3.1	0.7	100

*July 1, 1951 to June 30, 1959.

In 1959 it was estimated that only 32 percent of the eggs sold by retail grocery stores were ungraded and about two-thirds of the ungraded eggs

were handled by independent stores. Of all retail grocery stores inspected in 1959, 73 percent of the independent stores and 90 percent of the chain stores handled graded eggs only; an additional 15 percent of the independent stores and 8 percent of the chain stores handled both graded and ungraded eggs; and 12 percent of the independent stores and 2 percent of the chain stores handled ungraded eggs only.

QUALITY OF INSPECTED EGGS SOLD BY GEOGRAPHIC DIVISIONS

Evaluation of the egg inspection reports, according to the three major geographical divisions of the state, did not reveal much regional variation in the average quality of eggs sold during the years 1952 to 1959. As an average for the eight years the quality of eggs sold as Grade A in East and West Tennessee did not quite meet Grade A requirements when the 20 percent grade tolerance was considered (Table 8). The differences in quality of eggs sold by geographical areas of the state were most apparent during 1952 and 1953. In recent years there were no significant differences (95 percent level) between the three geographical divisions of the state in the inspected average quality of eggs sold by wholesalers and retailers.

Table 8. Quality of Inspected Eggs Sold as Grade A, B, and Ungraded, by Wholesalers and Retailers, by Geographic Areas, Tennessee, 1952 to 1959 Average.*

Tennessee Divisions	Inspected quality of eggs labeled Grade A							Under-weight
	A	B	C	Dirty	Check	Loss	Total	
	(Percent of Eggs)							
East	79.7	14.3	2.7	1.1	1.9	0.31	100	1.9
Middle	80.3	13.9	1.5	1.5	2.6	0.22	100	2.0
West	78.5	14.4	3.0	2.5	1.4	0.19	100	2.1
	Inspected Quality of Eggs Labeled Grade B							
	(Percent of Eggs)							
East	18.0	65.6	8.5	3.7	3.5	0.7	100	0.3
Middle	12.4	78.7	4.4	1.5	2.5	0.5	100	1.4
West	8.0	80.4	5.7	2.3	3.3	0.3	100	1.3
	Quality of Eggs Sold as Ungraded							
	(Percent of Eggs)							
East	58.2	23.3	9.3	5.5	2.6	1.1	100	(a)
Middle	55.4	25.5	8.2	6.8	3.3	0.8	100	(a)
West	50.3	32.2	10.4	3.9	2.7	0.5	100	(a)

*July 1, 1951 to June 30, 1959.
(a) No data available.

QUALITY OF EGGS SOLD BY MONTHS

Grade A Eggs

For the eight years, 1952 to 1959, the inspected quality of eggs sold as Grade A by wholesalers and retailers varied considerably by months. The important results in Table 9 may be summarized as follows: (1) when the 20 percent grade tolerance was considered, eggs labeled as Grade A fell below such requirements as an average during the summer and fall months, May to October, (2) the proportions of Grade C eggs were higher than average from May to August, (3) the proportions of Dirty eggs were higher than average from March to August, (4) the proportions of

Checks showed little seasonal variation, (5) egg losses were higher than average during the months of May to September, and (6) much higher proportions of eggs were found not to meet weight requirements during the fall and winter months, November to February.

Table 9. Quality of Inspected Eggs Sold as Grade A by Wholesalers and Retailers, by Months, Tennessee, 1952-59 Average.*

Month	Inspected quality of eggs labeled Grade A							Under-weight
	A	B	C	Dirty	Check	Loss	Total	
	Percent of Eggs							
Jan.	82.5	13.6	1.6	0.7	1.5	0.11	100	4.9
Feb.	81.6	13.9	1.6	1.0	1.8	0.13	100	5.8
Mar.	80.7	13.3	1.8	1.7	2.3	0.17	100	0.2
Apr.	80.3	13.2	1.9	2.3	2.1	0.20	100	0.3
May	79.8	12.0	3.1	2.7	2.1	0.30	100	0.6
June	77.5	13.5	3.9	3.0	1.8	0.32	100	0.8
July	75.4	13.6	4.7	3.2	2.7	0.38	100	0.8
Aug.	74.4	15.3	4.9	2.9	2.0	0.46	100	0.9
Sept.	77.9	17.9	1.7	1.0	1.1	0.36	100	1.2
Oct.	78.0	17.6	1.4	0.9	1.9	0.21	100	1.9
Nov.	81.8	13.9	1.4	0.9	1.9	0.14	100	2.6
Dec.	85.6	10.4	1.5	0.8	1.6	0.10	100	3.4
Av. (a)	79.6	14.2	2.4	1.7	1.9	0.24	100	2.0

*July 1, 1951 to June 30, 1959.
(a) Weighted.

Grade B Eggs

For the eight years, 1952 to 1959, the inspected quality of eggs sold as Grade B by wholesalers and retailers varied considerably by months. The important results in Table 10 may be summarized as follows: (1) the

Table 10. Quality of Inspected Eggs Sold as Grade B by Wholesalers and Retailers, by Months, Tennessee, 1952 to 1959 Average.

Month	Inspected quality of eggs labeled Grade B							Under-weight
	A	B	C	Dirty	Check	Loss	Total	
	Percent of Eggs							
Jan.	14.3	77.8	3.1	1.5	3.1	0.2	100	2.1
Feb.	16.0	74.5	3.4	1.7	4.1	0.3	100	1.2
Mar.	16.9	74.4	3.8	2.5	2.1	0.3	100	0.6
Apr.	17.2	72.1	4.2	2.9	3.2	0.4	100	0.3
May	19.4	66.7	6.9	3.0	3.4	0.6	100	0.4
June	9.6	74.9	8.4	3.4	2.9	0.8	100	0.4
July	7.1	75.0	9.5	4.2	3.1	1.1	100	0.4
Aug.	6.7	73.3	10.9	3.9	4.0	1.2	100	0.6
Sept.	9.3	79.4	6.6	1.8	2.5	0.4	100	1.2
Oct.	11.1	78.3	6.3	1.7	2.4	0.2	100	1.5
Nov.	12.7	76.3	6.2	1.7	2.9	0.2	100	1.5
Dec.	13.2	76.3	5.3	1.5	3.5	0.2	100	1.8
Av. (a)	12.8	74.9	6.2	2.5	3.1	0.5	100	1.0

(a) Weighted.

proportion of eggs grading B or better ranged from 80 percent in August to 92.1 percent in January, (2) the proportions of C Grade eggs were higher than average during the months of May to September, (3) the proportions of Dirty eggs were higher than average during the months of April to August, (4) the proportion of Checks showed little seasonal variation, (5) egg losses were higher than average during the months of May to August, and (6) the proportions of eggs not meeting weight requirements were above average during the months of September to February.

Ungraded Eggs

The inspected quality of ungraded eggs, like those sold on a graded basis, varied considerably by months during the eight-year period. The important results in Table 11 may be summarized as follows: (1) the proportion of eggs grading B or higher fell below 80 percent during the months of May to July, (2) the proportions of C Grade eggs were higher than average during the months of May to October, (3) the proportions of Dirty eggs were higher than average during the months of January to July, (4) the proportions of Checks showed little seasonal variation, and (5) egg losses were higher than average during the months of May to August.

Table 11. Quality of Inspected Eggs Sold as Ungraded by Wholesalers and Retailers, by Months, Tennessee, 1952 to 1959 Average.

Month	Inspected quality of eggs sold as Ungraded						
	A	B	C	Dirty	Check	Loss	Total
	Percent of Eggs						
Jan.	55.3	28.1	6.6	6.7	2.8	0.5	100
Feb.	60.8	22.6	6.6	6.6	3.0	0.4	100
Mar.	61.5	23.0	5.3	7.2	2.6	0.4	100
Apr.	64.8	15.9	8.3	7.8	2.8	0.4	100
May	57.3	20.6	11.2	7.1	2.7	1.1	100
June	50.5	20.7	18.0	6.2	3.3	1.3	100
July	48.7	30.0	11.1	5.9	2.9	1.4	100
Aug.	48.3	32.2	10.6	3.6	3.8	1.5	100
Sept.	48.9	33.9	10.0	3.5	2.9	0.8	100
Oct.	51.4	32.6	9.8	2.9	2.7	0.6	100
Nov.	54.2	32.1	7.4	2.9	2.9	0.5	100
Dec.	54.5	31.3	6.7	4.4	2.6	0.5	100
Av. (a)	54.7	26.9	9.3	5.4	2.9	0.8	100

(a) Weighted.

QUALITY OF INSPECTED EGGS SOLD BY TYPE OF AGENCY

During the period July 1, 1958, to June 30, 1959, sufficient data were available from egg inspection reports to separate the data on inspected quality of eggs marketed as Grade A by commercial egg producers in Tennessee. These data were compared with the inspected quality of eggs sold as Grade A by all other wholesalers and retailers in the state. The important results in Table 12 may be summarized as follows: (1) a higher proportion of the eggs sold by commercial egg producers than of those sold by all other agencies, as an average, was Grade A, but they contained a higher percentage of Dirties, (2) eggs sold by commercial egg producers

as an average contained a lower proportion of Checks and (3) as an average a higher proportion of the eggs sold by commercial egg producers did not meet minimum net weight requirements per dozen specified for Grade A eggs.

Table 12. Quality of Inspected Eggs Sold as Grade A by Commercial Egg Producers, Compared with Sales of All Other Wholesalers and Retailers in Tennessee, July 1, 1958 to June 30, 1959.

Egg seller	Inspected quality of eggs labeled Grade A							Under-weight
	A	B	C	Dirty	Check	Loss	Total	
	Percent of Eggs							
Commercial egg producers	85.6	11.0	1.0	1.0	1.2	0.2	100	2.6
Other wholesalers and retailers	83.0	13.7	0.9	0.5	1.7	0.2	100	0.6

III. CONCLUSIONS AND DISCUSSION

Progress in Selling Grade A Eggs

The proportion of eggs labeled and sold as Grade A increased from 19 percent in 1952 to 63 percent in 1959. During this period the proportion of all inspected eggs grading A or better, including Grade A eggs found in eggs sold as Grade B and Ungraded increased from 49.6 percent in 1952

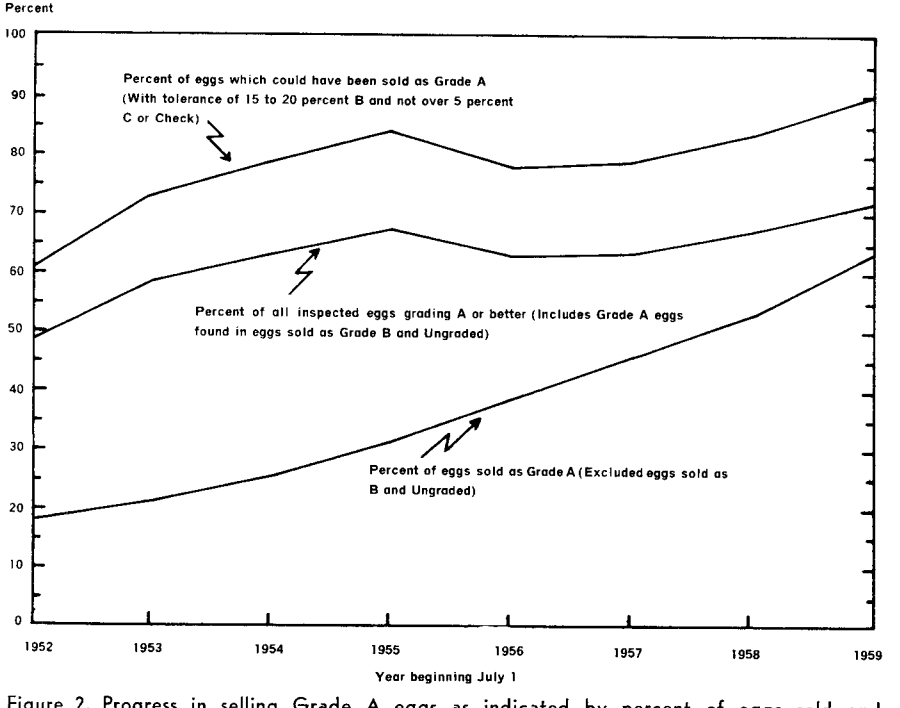


Figure 2. Progress in selling Grade A eggs as indicated by percent of eggs sold and inspected, and proportion which could have been sold as Grade A by wholesalers and retailers, Tennessee, 1952 to 1959.

to 71.5 percent in 1959. With permitted tolerance in U. S. Consumer Grades of 15 to 20 percent B, and not over 5 percent C or Check, 62 percent of the eggs could have been sold as Grade A in 1952 and the proportion could have increased to about 90 percent in 1959 (Figure 2).

Ungraded Eggs

Although the proportion of ungraded eggs in the state decreased 59 percent during the 8 years studied, an estimated 26,130,000 dozen eggs were sold as ungraded in 1959. In this year 57.2 percent of the ungraded eggs were found by inspections to average Grade A. With 20 percent permitted tolerance, 71.5 percent of the eggs sold as ungraded or about 18,683,000 dozen could have been marketed as Grade A and most of the remainder sold as Grade B.

Grade B, C, and Check Eggs

As an average of all inspections during the years 1952 to 1959, the combined proportions of eggs grading B, C, and Check, decreased from about 45 percent in 1952 to 26 per cent in 1959 and averaged 33 percent for the 8 years (Table 13). If the proportion of these grades of eggs could be reduced to 20 percent or 6 percentage points below the 1959 level, most of the eggs marketed in the state could be sold as Consumer Grade A. When the inspected quality of the eggs reaches 80 percent A Grade, the permitted tolerance is 15 to 20 percent B Grade, including not over 5 percent C or Check.[4]

Evaluation of the egg inspection reports indicated that in the majority of cases of violation of the Tennessee Egg Law, where the quality of eggs fell below Grade A, there was a lack of adequate refrigeration or cooling facilities at the producer, wholesale, or retail level. Data show that eggs held at 72° F. lose 12 percent of their initial quality in three days, 23 percent in seven days, 34 percent in 14 days, and 45 percent in 21 days. On the other hand, eggs held at 55° F. lose only 22 percent of their initial

Table 13. Quality of All Inspected Eggs Sold by Wholesalers and Retailers in Tennessee, 1952 to 1959.

Year ending June 30	Inspected quality of all eggs(a)						
	A	B	C	Dirty	Check	Loss	Total
	Percent of Eggs						
1952	49.63	29.76	12.16	4.38	3.14	0.93	100
1953	59.05	19.47	13.44	5.61	1.93	0.50	100
1954	63.54	20.18	5.56	7.99	2.49	0.24	100
1955	67.40	22.11	3.59	3.13	3.14	0.63	100
1956	63.07	24.19	6.33	3.22	2.52	0.67	100
1957	63.45	25.85	5.25	2.46	2.56	0.43	100
1958	66.94	23.20	5.03	1.92	2.43	0.48	100
1959	71.50	21.26	2.55	2.21	2.02	0.46	100
1952-59	62.95	23.28	6.82	3.88	2.53	0.54	100

(a) Based on weighted averages of all eggs sold as Grade A, Grade B, and Ungraded.

[4] U. S. Wholesale Grades for Shell Eggs, 80 percent Grade A, lot average, permits a tolerance of 15 to 20 percent B Grade, including not over 11.7 percent C, Check, and Dirty, and not over 3 percent Loss.

quality in 21 days, and at 32° F. lose only 13 percent of initial quality in 21 days.[5]

The results of this study emphasize the importance of adequate refrigeration for eggs the year-round, but particularly during the spring and summer months. For eggs sold as Grades A, B, and Ungraded, the proportions of Grade C eggs were found to be considerably higher than average from May to August (Tables 9, 10, and 11).

Dirty Eggs

One of the most important problems facing the Tennessee egg industry is the elimination of dirty eggs. In U. S. Consumer Grades, eggs of A quality must have clean shells, although small tolerances are permitted to take care of the human error factor during normal candling operations. Clean eggs should be free from stains, dirt, foreign matter, and discolorations that are readily visible. Eggs are considered clean if they have only very small specks or stains, or if these are not of sufficient number or intensity to detract from the generally clean appearance of the eggs.[6]

As an average of all inspections during the eight years of study the proportion of eggs classed as Dirty ranged from 8 percent in 1954 to 1.9 percent in 1958 (Table 13). As indicated in Table 2, some eggs sold as Grade A each year from 1952 to 1959 were classed as Dirty and the sales of such eggs were in violation of the Tennessee Egg Law.

The results of this study indicate that higher proportions of Dirty eggs are found in eggs sold as Grade B and Ungraded, and in eggs sold during the summer and fall months. For eggs sold in Tennessee in 1959 the proportion of eggs classed as Dirty averaged 0.5 percent in Grade A, 2 percent in Grade B, and 5.6 percent in Ungraded eggs (Tables 2, 3, and 4). For eggs sold as Grade A, B, and Ungraded, the proportion of Dirty eggs was higher than average from March to August (Tables 9, 10, and 11).

Egg Losses

An important aspect of the egg marketing problem in Tennessee is the wastage that occurs as the result of eggs' becoming inedible during the marketing procedure; being broken or smashed so that the contents are leaking, frozen, or contaminated; or those containing bloody whites, large blood spots, unsightly meat spots, or other foreign material. Within tolerance permitted, an allowance is made at receiving points or shipping destination for 0.5 percent leakers in Grades A and B, and 1 percent in Grade C.

Egg losses borne by wholesalers and consumers might be reduced by better control of egg quality through the use of refrigeration, more rapid movement of eggs throughout the egg marketing channel, and better grading and handling practices. This study revealed that losses for eggs sold as Grade A were considerably lower than for those sold as Grade B or Ungraded (Tables 2, 3, and 4).

For all eggs sold in Tennessee the losses averaged 0.93 percent in 1952, and ranged from 0.24 percent in 1954 to 0.67 percent in 1956. In 1959,

[5]Stadelman, W. J., and Jenson, L. S., **Egg Quality From the Farm to the Home,** State College of Washington, Extension Service Bulletin No. 461, August, 1952.

[6]**Egg Grading Manual,** Agricultural Handbook, No. 75, A.M.S., U.S.D.A., June, 1956.

the losses averaged 0.46 percent for all eggs, compared with 0.2 percent for eggs sold as Grade A (Tables 2 and 13).

Under-Weight Eggs

One of the most important problems confronting the Tennessee Egg Inspection Program has been the task of prohibiting the sale of eggs not meeting the U. S. minimum net weight requirements. During the eight years studied the proportion of under-weight eggs found in eggs sold as Grade A ranged from an average of 7.7 per cent in 1952 to 0.2 percent in 1957; and for eggs sold as Grade B the proportion ranged from 2.9 percent in 1953 to 0.1 percent in the years 1954 to 1956 (Tables 2 and 3).

It was found that as an average for the eight years, much higher proportions of eggs did not meet weight requirements during the fall and winter months, particularly from November to February (Tables 9 and 10).

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