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Behavior and Opinion Studies of Homemakers' Preferences for Hen Eggs

Norman Nybroten

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BULLETIN 400T

May 1957

BEHAVIOR AND OPINION STUDIES OF

Homemakers' Preferences for Hen Eggs

WEST VIRGINIA UNIVERSITY AGRICULTURAL EXPERIMENT STATION

THE AUTHOR

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Summary

The research on which this report is based was done under several projects—some based on the experimental approach, some on the observation or survey approach, and some on both. In the studies involving both approaches the two methods were compared in some of their aspects.

Analyses of the data received from the two approaches indicate that it would be hazardous to claim that either method is superior. Each method seems to have its place, depending on the objectives of the research and the nature of the preference or acceptance being studied. If the preference seems to be of little immediate economic importance, and if the distinction differentiating the products or services is a simple visual concept, there is evidence to the effect that the survey method may bring about more serious consumer consideration more readily than a designed matched-lot experiment. Isolating the variable is a problem in both methods, but perhaps more difficult in the experimental method in which, under conditions usually available for such work, trade prejudices tend to become confounded with the introduced variables.

Although certain socio-economic factors would logically have no bearing on the preference or acceptance at issue, they may be of importance in analysis. Some of these factors should be used in sample and analysis stratification. They also become important in reporting results in a realistic manner. For example, it does not seem logical that there would be a significant relationship between preference for shell color of eggs and the amount of formal education received by the person whose preference is being studied. There is, however, an association, and regardless of whether there is any causal relationship, the practicability of the results will hinge on the relationship. Over-stratification, on the basis of socio-economic factors, would seem safer than erring in the other direction.

Behavior and Opinion Studies of Homemakers' Preferences for Hen Eggs

NORMAN NYBROTEN

Introduction

ONE of the most important functions of the marketing process is that of predicting the demand for a commodity or service. Money "on the barrel head" paid for a good or service has long been used as the principal criterion in this problem. The efficiency of this criterion, especially as the sole measure, may not always be as great as some other methods. Money spent by consumers at a given time may not have the same meaning as at some other time because of the dynamics of purchasing power along with other specific conditions affecting consumers at a given time.

The variable to be studied in research must always be isolated. In the existing complex marketing channels, this often is difficult. Customers of retail stores may buy one brand in preference to another, and the retailer would probably never know whether the customers thought they were getting a different product or the same product in a different package. This knowledge may be important to the retailer because it would not be economical to carry both brands if he could more completely understand his customers' values and how they are derived. The impersonal, large, self-service food store makes this more difficult because this type of operation does not provide for familiarity with individual customers—and thus the retailer-customer problems are not "talked-over" the way they can be in smaller service stores.

This report will deal with methods and results of research efforts to learn what kinds of eggs consumers want, their importance, and the consumers' attitudes toward selected services. The two old methods of estimating attitudes of economic importance—(a) money-on-the-barrel-head and (b) talk-over—have been formalized and used in this research. The former has been in the nature of retail store experiments with introduced and controlled variables, whereas the "talk-over" method has taken the form of surveys in which opinions from homemakers in sample households throughout urban areas in West Virginia were recorded. For some variables, both approaches have been used and it has been possible to compare the results from the two methods. Several surveys and retail store experiments conducted during 1951 to 1956 form

the basis for this report. Although the work pertains to eggs, some general shopping opinions and practices which might have bearing on the problems or the results were studied and are being presented.

Importance of Eggs in Choosing a Retail Store in Which to Shop

In a survey of 2,126 households in urban areas of West Virginia the homemaker, or the nearest available substitute at the time of the interview, was asked, "If you split your shopping among several stores, what particular types of food items do you shop for outside your principal store?" Approximately half, 48.6 per cent, of the homemakers stated that they split their shopping among stores or other sources. This varied significantly by income area in which the household was located (See Table 1). When this question was put to the interviewee there had been no mention of eggs. The most frequently mentioned item was eggs, notwithstanding the fact that costs of eggs might be only about 2 or 3 per cent of her food costs. (See Table 2). Ten per cent of the homemakers reported that they sought eggs outside their regular store.

The relatively large number of homemakers who stated that they are willing to go to another source for eggs suggests that consumer preference studies on eggs at the retail level might be both practical and fruitful. Evidently there are associated with eggs attributes or services that bring about differentiation of product to the consumers, and their differentiation as a whole is of economic importance. The fact that shoppers will go to a different store to seek these services and attributes indicates that there is enough sensitivity in the demand to promise some results from preference studies. Two factors need to be determined—(1) what the important attributes or services are, and (2) the economics of marketing in terms of these attributes.

TABLE 1. HOMEMAKERS IN DIFFERENT URBAN INCOME AREAS CLASSED BY WHETHER THEY GO OUTSIDE THEIR REGULAR FOOD MARKET TO SHOP FOR ANY SPECIFIC FOOD ITEMS

TYPE OF SHOPPING STATED BY HOMEMAKERS	LOW AND MEDIUM-LOW INCOME AREAS*		INCOME AREA ABOVE MEDIUM-LOW		ALL INCOME AREAS	
	No.	%	No.	%	No.	%
Do not go outside regular food store for certain items	353	58.2	739	48.7	1092	51.1
Go outside regular food store for certain items	254	41.8	780	51.3	1034	48.6
Total	607		1519		2126	

*This income-area group accounts for approximately 30 per cent of the total households.

TABLE 2. ITEM A HOMEMAKER STATED SHE WAS MOST LIKELY TO SEEK AT A PLACE OTHER THAN HER REGULAR FOOD STORE BY INCOME AREA IN WHICH THE DWELLING IS LOCATED

INCOME AREA IN WHICH THE DWELLING IS LOCATED	PERCENTAGE OF THE HOMEMAKERS WHO STATED THEY WOULD GO ELSEWHERE FOR				
	NOTHING	EGGS	MEAT	BAKED GOODS	PRODUCE
Low	59	7	7	9	5
Medium Low	57	10	7	8	3
Medium	47	10	11	9	7
Medium High	46	13	6	9	8
High	50	12	11	4	4
All Areas*	51	10	9	8	6

*The total includes all households surveyed, whereas the figures by income areas above are for those definitely assigned to income areas. Some areas, especially in smaller cities, contained such mixture of households that income designation would seem to be of little meaning. Delineations of income areas were made by consulting what appeared to be the best-informed local people. This varied somewhat among the cities but in general the personnel of fire departments, usually very free to cooperate, were very well informed on an area basis. A comparison of actual statements of income in response to the questionnaire with the area delineations showed fairly high agreement.

Who Makes Food Decisions for the Household

Regardless of how consumers' economic attitudes are to be studied, a gain in efficiency of research might be made if it is possible to use some one individual in a household as spokesman for the whole household. Some criticism has been levied against survey methods because only one member (respondent to interview) of the household is interviewed, and yet in the analyses of the survey, the household, rather than respondent, is treated as the observation unit.¹

Also, criticism has been made against the controlled sales experiments because only the actual shopper has opportunity to react—especially on a first-impulse basis. It has been argued further that if the shopper is “under orders” from home there may be very little opportunity to respond to a retail store experiment—especially an experiment of short duration.

Making out the food shopping list evidently is usually the responsibility of the wife in the West Virginia urban household. Table 3 shows that she made the list 94 per cent of the time. If the wife did the shopping, she had made the shopping list 99 per cent of the time. Less than 4 per cent of the households reported that they never used shopping lists.

Not only is the wife in the household the ideal respondent to opinions on food from the standpoint of making out shopping lists, but she is also the one most likely to do the shopping. According to statements from 4,881 West Virginia urban households, the wife usually

¹Sarle, Charles F., in “Research on the Dynamics of the Farm Managerial Decision Process,” *Journal of Farm Economics*, Vol. XXXVIII, No. 1 February, 1956, stresses the difference between a “responding individual” and a “responding unit,” which would include more than one individual.

TABLE 3. WHO MAKES OUT THE SHOPPING LIST WHEN DIFFERENT MEMBERS OF THE HOUSEHOLD DO THE FOOD SHOPPING

PERSON WHO GOES TO THE STORE TO DO THE ACTUAL SHOPPING	PERSON WHO MAKES OUT THE SHOPPING LIST				
	WIFE	HUSBAND	HUSBAND AND WIFE	OTHERS	TOTAL
	%	%	%	%	%
Wife	99.1	.1	.1	.7	100
Husband	75.9	20.0	1.7	2.4	100
Wife and Husband	58.8	1.2	37.6	2.4	100
Others	57.5	1.7	.0	40.8	100
All combined	94.0	2.2	1.6	2.2	100
Number of households	4,559	108	76	107	4,850*

*Thirty-one respondents stated that they never used shopping lists.

did the food shopping in 81.8 per cent of the households. (See Table 4). This, of course, may be quite different for rural households. If the husband and wife made out the shopping list together, the odds were about 2 to 1 that if only one would go to the store, it would be the husband; however, 81 per cent of the time they both went in this case.

Although the wife usually makes out the shopping list and also does the shopping, it does not follow that she shops on the basis of her personal preferences. This also tends to be the case for other members of the household when they shop for food. The different food tastes of a family must usually be considered by the person who makes the food decisions for the family.

Comparisons of Survey and Survey Results with Experimental Results

EGG CARTONS

A matched-lot experiment was run in a retail store to determine the relative preferences for 2x6 vs. 3x4 egg cartons. (See Figure 1 for carton types.)

TABLE 4. WHO DOES THE FOOD SHOPPING WHEN DIFFERENT MEMBERS OF THE HOUSEHOLD HAVE MADE UP THE SHOPPING LIST

PERSON WHO MAKES OUT THE SHOPPING LIST	PERSON WHO GOES TO THE STORE TO DO THE ACTUAL SHOPPING				
	WIFE	HUSBAND	HUSBAND AND WIFE	OTHERS	TOTAL
	%	%	%	%	%
Wife	86.8	8.1	2.2	2.9	100
Husband	4.6	89.8	1.8	3.8	100
Wife and Husband	5.3	10.5	84.2	.0	100
Others	8.3	4.2	.0	87.5	100
All combined	81.8	9.9	3.5	4.8	100
Number of households	3,993	485	170	233	4,881

FIGURE 1. Types of cartons used in survey and retail experiment. Number 2 is a 2 x 6 carton—meaning there are two six-egg rows. The others are 3 x 4 cartons. This picture was exhibited in the survey as an aid to understanding carton types.

In this experiment all sizes and grades of eggs were offered matched—or in either the 3x4 or the 2x6 carton. Both cartons 1 and 3 (See figure 1) were used in the experiment but not concurrently. Carton 3 was definitely the least wanted—on the other hand, it was least expensive. No price difference was associated with type of carton in either the experiment or in the survey. Carton 2 was preferred at a rate of 8 to 1 over carton 1 or 3 in the experiment. Carton 3 was used considerably more in the experiment than was Carton 1. Shortly after the experiment was completed, 360 of the households that received eggs from the experiment were visited to learn, among other facts, how their verbally expressed preferences would compare with their response to the experiment.

Names and addresses of shoppers were obtained in the store experiment immediately after they purchased eggs from the matched-lot display. These names became the basis for a house-to-house survey. An effort was made to interview the person who had actually done the shopping in the experiment, but in 128 instances (35 per cent) the respondent to the survey was not the same person who had shopped in the experiment. In 299 (83 per cent) of the households the response in the survey to choosing between egg cartons was the same as it was in the experiment. In the households where the person interviewed was the

shopper in the experiment there was 84.5 per cent agreement between survey response and experiment response. Survey respondents other than the respondent to the experiment, in households having received purchases from the experiment, showed virtually the same agreement between survey and experiment response as survey respondents who had been experiment respondents. This indicates that, if the opinion deals with a simple, commonplace, visual concept, the opinion of an adult member of the household likely to be found home is probably as valid as the opinion of the homemaker. Evidently, as Johnson and Smith asserted,² a survey does not "exclude from consideration all who influence the respondent directly, or indirectly either as models, ego ideals, or a members of reference groups." The amount of consideration will probably vary with the nature of the query.

One of the resulting problems in analysis is that of classification. Simple classes of only respondents, rather than of factors in the reference groups represented by the respondents would not yield the maximum amount of information inherent in the data. Multiple cross-classifications between respondents, reference groups, and the variable under study would be required. This would be true for both survey data and data from controlled experiments.

MEDIUM VS. LARGE EGGS

LOCAL EXPERIMENT VS. STATE-WIDE SURVEY

Medium and Large eggs were sold in a 6x6 latin-square controlled experiment in the dominant retail store in one small city. In this experiment price relationships between Medium and Large eggs—Medium at 70, 75, 80, 85, 90, and 95 per cent of Large—were randomized on one ordinate and the six days of the week on the other ordinate. This resulted in daily changes of the price relationship between the two sizes. To safeguard against leakage of information which might cause shopper—especially attendants, clerks, and their friends—to wait and buy their choice on a low-price day, the design of the experiment was known only to the researcher in charge. The price of Large varied according to actual market conditions from 49 to 67 cents per dozen. Positions of Medium and Large in the display were interchanged twice daily. Although this was a 36-day design, the experiment was run six extra days to correct for and avoid results of what appeared to be experimental errors—for example, not having the matched-lots the full day because of unfilled egg orders by the wholesale supplier. About 13 thousand retail egg transactions were studied in this experiment.

Results of this experiment are summarized in the bar chart shown as part of Figure 2. As the price of Medium was increased relatively to

²Johnson, Glenn L., and Joel Smith, "A Rejoinder," *Journal of Farm Economics*, Vol. XXXVIII, No. 1, February, 1956, p. 165.

FIGURE 2. Percentages of total dozens of eggs experimentally sold represented by Medium and Large eggs and percentage of respondents to a survey who would buy Medium eggs under six different relationships between the prices of Medium and Large eggs.

the price of Large there was a definite decrease in the sales of Medium relative to the sales of Large. With the price of Medium at 70 per cent of the price of Large, just under two-thirds (64.4 per cent) of the dozens sold were Medium. With the price of Medium at 95 per cent of Large, the Mediums accounted for 39.2 per cent of the dozens sold.

Medium eggs, with a minimum per-dozen weight requirement of 24 ounces, averaged about 22 ounces. Large eggs, with a minimum requirement of 24 ounces, averaged about 25.5 ounces. Thus Medium weighed slightly more than 86 per cent of Large. Atwood and Weakley found that the ratio of yolk to egg white is slightly higher in smaller eggs than in larger ones.¹ The association between this ratio and egg size is so low, however, that the nutritional values of eggs of different weights are practically in direct straight-line relation to the weight. From this it follows that the nutritional value of the Medium egg would be about 86

¹Atwood, Horace, and Charles Edward Weakley, Jr., *Certain Characteristics of Hen Eggs*, W. Va. Univ. Agr. Exp. Sta. Bul. No. 166, September, 1917.

per cent of the value of the Large egg. Market value of the Medium, if entirely rational and based on nutrition only, would also be 86 per cent of the Large.

The bar-chart part of Figure 2 represents results from the controlled retail experiment, whereas the ogive curves represent comparable survey results. The upper ogive curve gives data from 13 systematically selected urban areas of West Virginia. Within these areas 4,572 interviews were made in households selected at random. In the store experiment the price of Large ranged from 49 to 67 cents per dozen. In the survey the question was asked, "If you could buy 'Large' eggs for 56 cents a dozen, how much do you think a dozen 'Medium' eggs should sell for?" This was next repeated for Large at 48 cents and then for Large at 72 cents. Responses from the three levels were pooled and the ogive curve constructed as an indifference curve between Medium and Large.⁴ Note that the survey results were in the same direction as the experiment results, but there was a great difference between the two types of results. The survey results indicated much greater price responsiveness than the experiment results. On the basis of nutritional value, the respondents' opinions of values were more rational than were the customers' price-response behavior.

LOCAL EXPERIMENT VS. SURVEY OF CUSTOMERS TO EXPERIMENT

In the retail experiment on Medium vs. Large eggs the name, address of the purchaser, what was purchased, and under what matched-lot choice, were recorded for each purchase. In all, about 5,500 customers cooperated—there being essentially no refusal to cooperate. No incentive, other than explaining the research objectives and that the University was conducting the experiment, was used to obtain this cooperation. Customers sometimes objected to giving their names more than once, but a very short explanation virtually always brought full cooperation.

A sample of the customers to the experiment was selected to become part of the State-wide survey and at the same time furnish data for comparing opinions (expressed in the survey) with the response behavior in the retail experiment. A total of 986 customers were interviewed. The lower ogive curve in Figure 1 represents the opinions of these people, and thus the results of this part of the survey. The opinion results from the survey were more price-sensitive than the behavior results of the experiment.

⁴It was hoped that this three-level approach might reveal the thought process of the homemaker insofar as she would think of a *relative* value, an absolute difference, or something else. It perhaps did this for the individual, but the results did not warrant any generalizations for prediction purposes. Ideally, the survey respondent should have had opportunity to select either Medium or Large (opinionwise) at the same relative prices as existed when she was responding to the store experiment, but a pre-test indicated that the survey would have been too fatiguing to the survey respondent and the analysis quite cumbersome.

Because this store had hitherto put very little emphasis on marketing Medium eggs, it seemed that the Large egg would have a built-up advantage, compared with stores having given more equal emphasis to the two sizes. The indifference curve for customers to the experiment is about the same as that for the pooled areas, indicating about the same cross elasticity for Medium and Large eggs. Whether the experiment fairly represents what would have happened in a State-wide experiment has not been determined, but the similarity of the two indifference curves tends to support the inference that the urban area chosen for the experiment might represent the urban areas of the State. If there had been a closer relationship between opinion and behavior, greater credence could have been given to this inference.

Approximately \$6,000 more net income could be earned in the retail store in which the experiment was performed by handling Medium eggs, granted the following hypotheses: (a) no effect on store's total egg volume from handling Medium; (b) no effect on wholesale prices of eggs; (c) expense of handling a dozen Medium eggs the same as handling a dozen Large; (d) no extra costs due to handling two classes of eggs rather than only one; (e) and that the experiment is representative of what would happen in the long run in the store. Because some of the customers definitely sought Medium eggs it is probable that the volume of sales of eggs was increased by offering the Medium egg along with the Large. The net income from this probably more than offset any extra costs of handling the additional egg size. Actually, the volume of egg sales did increase while Medium eggs were being offered, but the controls or checks in the experiment were inadequate to determine whether the increase was due to the extra offering or to some other cause.

SHELL COLOR OF EGGS

SURVEYS AND EXPERIMENTS IN PARKERSBURG

Parkersburg, West Virginia, population about 40,000, was included as part of two state-wide surveys of homemakers' opinions on egg shell color. Two local surveys of opinions on shell color were also made in Parkersburg. Although there is a considerable difference in the results of the four surveys, it is of some interest to note that the two surveys made in 1953 agreed fairly well (see Table 5). These surveys were made by the same interviewer using the same questionnaire in each case. The sample for survey C covered the same sample area as the random sample (survey B) of 1952. Customers in a controlled retail experiment on shell color were sampled for survey D. The similarity between surveys C and D indicates that the customers in the experiment—at least opinionwise—were typical of those in the general trade area.

TABLE 5. PREFERENCES FOR SHELL COLORS OF EGGS BY HOMEMAKERS IN PARKERSBURG, WEST VIRGINIA, AS INDICATED IN FOUR SURVEYS

SAMPLING BASIS OF SURVEY	NUMBER OF HOUSEHOLDS SURVEYED	PER CENT OF RESPONDENTS WHO CHOSE THE FOLLOWING SHELL COLOR OF EGGS		
		BROWN	WHITE	NO DIFFERENCE
A. Random survey made in 1951	484	30	31	39
B. Random re-survey made in 1952	154	25	53	22
C. Re-visits, in 1953, to a random sample of respondents to 1952 survey	162	22	22	56
D. Customers identified in the store experiment reported in Table 6	144	23	17	60
Total of surveys	944	27	31	42

In the store experiment eggs were sold in three matched lots—brown, white, and mixed. Relative positions of the three lots were randomized twice daily and sales inventories taken for each change of position. The experiment was run for eight weeks with brown and white always priced alike, and the first four weeks mixed colors, priced the same as the unicolor lots. The next two weeks unicolor were priced 1 cent above mixed, and the last two weeks unicolor were priced 2 cents above mixed.

Results of the experiment are summarized in Table 6. If there had been a perfect correlation between opinion and behavior, the percentages

TABLE 6. SALES OF BROWN, WHITE OR MIXED COLOR EGGS, IN PARKERSBURG EXPERIMENT, JULY AND AUGUST, 1953

PRICE RELATIONSHIP	PERCENTAGE OF TOTAL EGGS SOLD THAT WERE:		
	BROWN	WHITE	MIXED
All three lots same	34.3	41.2	24.5
Both brown and white one cent above mixed	29.4	36.4	34.2
Both brown and white two cents above mixed	29.5	35.8	34.7
All price relationships	32.4	39.2	28.4

on the first line of Table 6, "All three lots same," would agree with the percentages for survey D in Table 5. Actually the correlation is quite low. Saunders,¹ in a Portland, Maine, study also found a rather low relationship between an experiment and a survey. In the three-store Portland experiment, 68 per cent of the sales were of brown and 32

¹Saunders, Richard, *What Homemakers and Retailers Think about Egg Shell Color*, Maine Agr. Exp. Sta. Bul. No. 544, January, 1956.

per cent white, whereas the Portland survey of homemaker opinion showed that 80 per cent preferred brown, 3 per cent preferred white, and 17 per cent stated no preference. If the 17 per cent were divided on a 50-50 basis, this would result in 88.5 per cent brown and 11.5 per cent white to compare with the experimental results.

Although both the Maine and the West Virginia experiments showed a low general correlation between opinion and behavior, there was one point of agreement between the two methods in West Virginia. In the experiment there was a significant (chi-square) shift in the relative sales as a result of pricing unicolored eggs 1 cent higher than mixed colors compared with pricing all three lots the same. This is evident from Table 6. In survey D there was a similar but greater shift—with the three lots priced the same the percentages would be brown 23, white 17, and mixed 60 (see Table 5), but with a 1-cent premium for the unicolor over mixed the approximate percentages would be brown 3, white 6, and mixed 91. The experiment and the survey are in further agreement in that no further shift was experienced in either method by increasing the price differential from 1 to 2 cents. In order to study the relationship more completely, higher price differentials should be used in the experiment. Indications from both the experiment and the survey are, however, that some would-be preference is eliminated by a small price differential. Both surveys C and D indicated that additional increments in the price differential would successively have less effect in shifting demand. Evans and Marsh⁶ found this same type of demand response to increases in price premiums for tree-ripe peaches over hard-mature peaches. Premiums for redness of apples (unpublished work by Homer C. Evans) also brought the same type of response. The survey further indicated that a small percentage of people will tenaciously adhere to their preference and pay what may seem to be an unreasonably high price differential. This needs experimental verification.

SUCCESSIVE SURVEYS ON SHELL COLOR

Opinion surveys of homemakers' preferences for shell color of eggs were begun in 1951. In that year nearly 5 thousand households were visited with a questionnaire which, listed among others, the following question, "Which do you prefer: White or brown eggs?" This survey dealt exclusively with eggs and a few socio-economic questions for stratifying the respondents. In 1952 a survey was made of homemakers' opinions regarding poultry products, with primary emphasis on poultry meat. In this survey the question was asked, "What color eggs do you like best?" Figures 3 and 4 show relationships between income, education, and shell-color preferences from the two surveys. In Parkersburg two additional

⁶EVANS, Homer C., and Ray S. Marsh, *Consumers' Reaction to Price of Tree-Ripe Peaches*, W. Va. Univ. Agr. Exp. Sta. Circ. 95, May 1955.

FIGURE 3. Preferences for shell color of eggs by homemakers of various levels of education and family income—West Virginia cities, 1951.

surveys were made in 1953, in which was asked, "What color eggs do you prefer?" It was possible to make comparisons of results from the two earlier surveys for seven urban areas of West Virginia and for all four surveys for Parkersburg. (See Table 7.)

In Huntington, population about 100,000, results from the two surveys are in almost perfect agreement. The results for Wheeling, popula-

FIGURE 4. Preferences for shell color of eggs by homemakers of various levels of education and family income—West Virginia cities, 1952.

ion about 70,000, vary considerably between the two surveys. Results in other cities fell between these two extremes. In general, the comparison of the results from these two surveys—which were based on what seemed to be adequate random samples—are quite disappointing because of the lack of agreement. Reasons for this must be somewhat speculative. Some of it may, of course, be the result of differences in the survey procedures and crews. However, it is probable that much of the lack of agreement may be the result of changed conditions, rather than the result of not having gotten unbiased representative sampling at the time of the surveys.

TABLE 7. PERCENTAGES OF HOMEMAKERS STATING PREFERENCES FOR SHELL COLOR OF EGGS IN CERTAIN WEST VIRGINIA CITIES IN SUCCESSIVE SURVEYS

CITY AND SURVEY	NUMBER OF PEOPLE RESPONDING	PER CENT OF RESPONDENTS STATING PREFERENCE FOR:		
		WHITE	BROWN	NO DIFFERENCE
Beckley				
1951	273	45	19	36
1952	149	43	26	31
Clarksburg				
1951	521	30	35	35
1952	310	52	11	27
Huntington				
1951	509	42	25	33
1952	299	43	24	33
Martinsburg				
1951	135	18	52	30
1952	150	11	31	58
Parkersburg				
1951	484	31	30	39
1952	154	53	25	22
1953*	162	22	22	56
1953†	141	23	17	60
Weston				
1951	50	34	36	30
1952	55	40	40	20
Wheeling				
1951	509	36	15	49
1952	248	52	26	22

*This was the same sample area as that used for the 1952 survey.

†This was a sample of customers who bought eggs in a controlled retail experiment conducted in 1953.

Indications from the surveys are that the preference for shell color of eggs is, for the great majority of people, only of a very mild nature. In two Parkersburg surveys made in 1953, 130 of 306 respondents expressed a preference for one of the unicolor choices. Upon being asked how much they would be willing to pay for their choice (the greater amount over either the other unicolor choice or over mixed color) only 51, or 17 per cent, of the respondents stated a willingness to pay an premium for their choice. This means that 83 per cent do not have very strong preferences, and minor—if general—disturbances in supplies in retail channels may have significant effects on preferences. It seems to be a general opinion that there is a relatively strong preference for brown eggs in New England. In Saunders' study it was found that although 80 per cent of the Portland sample of homemakers stated they prefer brown eggs, all of them stated that they would buy white eggs if brown eggs were not available in the store in which they traded.⁷ This, as the West Virginia studies indicate, is only a rather mild preference.

In the 1953 Parkersburg surveys the respondents were asked how much more they were willing to pay for their preference than for either

⁷Saunders, Richard, *op. cit.*

of the other two possibilities. It is interesting to note that, regardless of whether brown or white was the preference, those who were willing to pay more for unicolor eggs evidently would take mixed color before they would take the non-preferred color.

CONSUMER RESPONSES TO VARIATIONS IN WEIGHTS OF INDIVIDUAL EGGS

Present regulations in some states require rigid sizing for the individual eggs within a dozen before the retailer can use the size label of US Consumer Grade. In several states only one egg per dozen is allowed to deviate as much as one-twelfth of an ounce below the minimum average weight allowed for the weight class. This has a profound effect on marketing channels—the narrow tolerance being adverse to small-scale, non-mechanized, direct marketing. In order to test the consuming public reaction to degrees of uniformity within a dozen of eggs, it was decided that surveys would be made and eggs containing various degrees of iniformity within the dozen would be offered for sale in matched-lot experiments.

THE STATEWIDE SURVEY—WEIGHTS OF INDIVIDUAL EGGS

A total of 4,829 households were visited in the 1951 survey in West Virginia cities. The respondent to the interview, usually the homemaker, was asked to choose one of two dozen eggs in an exhibit, carried by the interviewer. Actually these eggs had been drawn and were only shells, but this was not made known to the respondent. Before they had been drawn both dozens weighed 25 ounces, but there was a difference in the variation of the weights of individual eggs. The ratio of the standard deviations (of the two dozens exhibited) varied from .22 to .85. For example, if one dozen had a standard deviation of 2.87 (actually in one-twelfth ounces) and the other dozen exhibited had a standard deviation of .63, the ratio was indicated as $.63/2.87=.22$. Table 8 shows the number

TABLE 8. HOMEMAKERS' CHOICES BETWEEN DOZENS OF EGGS CONTAINING DIFFERENT RELATIONSHIPS OF VARIATIONS IN SIZES OF INDIVIDUAL EGGS

RATIO OF THE STANDARD DEVIATION OF THE WEIGHTS OF EGGS IN THE MORE UNIFORM DOZEN OVER THE STANDARD DEVIATION OF EGGS IN THE LESS UNI- FORM DOZEN	NUMBER OF RESPONDENTS	PERCENTAGE OF THE RESPONDENTS CHOOSING:		
		MORE UNIFORM DOZEN	LESS UNIFORM DOZEN	NO CHOICE BETWEEN DOZENS
%				
0-85	130	30.5	11.6	27.9
2-75	447	43.1	35.7	21.2
0-61	707	46.4	39.2	13.4
5-53	1221	48.9	30.1	21.0
2-39	1173	53.7	29.2	17.1
2-28	711	60.5	27.1	12.4
Total	4829	49.2	32.1	18.4

of respondents making choices at different levels of ratios. There was a direct relationship between the differences of the standard deviations and the percentage of respondents who chose the more uniform eggs. There was no definite "breaking point" at which there was a preponderant shift to the more uniform.

Respondents were asked to give the reason for their choice. Although the regression was significant, their reasons were relatively illogical and insignificant as a whole. It seems that there must have been a subconscious reaction to uniformity.

TWO TYPES OF EXPERIMENTS ON PREFERENCE FOR WEIGHT UNIFORMITY OF EGGS

EXPERIMENT I

A matched-lot retail store experiment was designed in which individual eggs of different sizes within the dozen were offered for sale. The variation of egg sizes within the dozen was controlled in a manner that the *most* uniformly-sized lots were more uniform than could be expected with good mechanical sizing, whereas the least uniform contained considerably more variation than was found in nest-run eggs.

In order to control the variations within the dozen, a rather precise mechanical size grader was set at a 2-ounce interval giving five different weight classes. Eggs weighing more than 30 ounces per dozen and less than 20 ounces per dozen were "sight" sorted and tested on hand scales and rejected from the experiment. Doing this "sight" and "hand" work was not as tedious as might be expected because these were the extreme classes with relatively few eggs.

Table 9 shows the sizing limits used in sorting the five different weight classes and the average weight used for variance calculation. The midpoint of each weight class taken off the size (actually weight) grader was used to calculate the standard deviation of egg sizes within the dozen—that is, all eggs in a weight class were assumed to have the median weight of the class. For example, the eggs falling into the first

TABLE 9. EGG SIZES IN OUNCES PER DOZEN RESULTING FROM THE SIZING SORT

LOWER LIMIT*	UPPER LIMIT*	AVERAGE USED FOR VARIANCE CALCULATION
<i>Ounces per dozen</i>	<i>Ounces per dozen</i>	<i>Ounces per dozen</i>
28	30	29
26	28	27
24	26	25
22	24	23
20	22	21

*The lower limit of one class is the same as the upper limit of the next lower class because it was a single scaling point on the mechanical grader. Thus, theoretically, an egg weighing at the rate of 28 ounces per dozen (or actually $2\frac{1}{2}$ ounces) may fall into either the 28-30 class or the 26-28 class.

channel of the sizing machine ranged from 28 to 30 ounces per dozen but were all assumed to be 29-ounce eggs.

Table 10 shows the standard deviations which result from various selections out of a 4-channel egg-sizing machine. The standard deviation of ten of the 29-oz. eggs and two 27-oz. eggs is .73. The reverse order—ten 27-oz. and two 29-oz. would result in the same standard deviation. Also, ten 27-oz. eggs and two 25-oz. eggs would result in the same standard deviations. Likewise, any other consecutive sort of the same standard deviation will give similar results. Through the flexibility in the use of sorts in computing the standard deviations, a considerably greater range in sorting can be used than is shown in the table.

The standard deviations found in Table 10 were arranged into four different groups as follows:

.0 to749—Group I
 .75 to 1.199—Group II
 1.50 to 2.249—Group III
 2.25 to 2.99 —Group IV

TABLE 10. THE STANDARD DEVIATIONS OF VARIOUS EGG SORTS USING UP TO FIVE INDIVIDUAL EGG SIZES IN A DOZEN

STANDARD DEVIATION (IN ONE-TWELFTH OUNCES)	NUMBER OF EGGS IN DIFFERENT WEIGHT CLASSES PER DOZEN				
	29-oz. Doz.	27-oz. Doz.	25-oz. Doz.	23-oz. Doz.	21-oz. Doz.
	<i>Any with twelve eggs in a group</i>				
.00					
.57	11	1			
.73	10	2			
.87	3	9			
.09	11	0	1		
.93	8	4			
.98	7	5			
.00	6	6			
.30	6	5	1		
.18	6	4	2		
.50	10	0	2		
.63	4	4	4		
.70	6	3	3		
.73	9	0	3		
.89	4	0	8		
.98	7	0	5		
.60	5	4	3		
1.00	6	0	6		
1.23	5	3	2		
1.17	4	3	3	1	
1.16	5	4	4	1	
1.24	3	3	3	3	
1.50	3	2	4	3	1
1.90	3	3	2	4	2
1.98	4	2	2	4	2

This grouping of the standard deviations made it possible to sort nest-run eggs into dozens portraying various degrees of uniformity in the dozen. For instance, in Group I there would be very uniformly sized eggs and in Group IV there would be eggs showing more variation than would be expected in nest-run eggs.

In order to determine what sorts could be used most advantageously in sorting nest-run eggs into four groups with a controlled number of eggs in each group, a case of eggs was sorted into the five individual size channels as mentioned previously. A count of the number of eggs in each channel was taken and then the sorts necessary to obtain the results desired were decided upon. No great difficulty was encountered in selecting standard deviations to fit the specification of the four groups. If the coefficient of variation, rather than standard deviation, had been the criterion, the procedure would have been much more difficult. Occasionally in sorting the lot for the day a few eggs were left over in each group and thus did not become part of the experiment.

Each day the dozen price of eggs was set by the retailer. The price was then converted to a comparable price by weight. Each dozen of eggs was then weighed and the weight and price of the carton of eggs was stamped on it.

A display sign was shown above the eggs stating "Grade A eggs for sale ———¢ per pound." Unfortunately many customers were impressed only by the fact that eggs were being sold by the pound and paid no attention to the variations in size.

The four different size groupings of eggs were displayed matched lot on a table in distinctly separate groups with two cartons in each group open for the inspection of the shopper. At all times there was an attendant available to answer questions pertaining to the quality of the eggs and why they were being sold in that manner. The attendant also wrote down comments made by customers. The groups were rotated in their display position on the table several times during the day. An equal number of eggs was kept in each group. Any disorder in the arrangement of the eggs caused by the customer was corrected immediately so that at all times each shopper had an equal opportunity to make a selection. No significant difference was found in the difference of amount of sales of the four groups of eggs. Evidently even such large deviations as in Group IV did not discourage people from buying.

EXPERIMENT II

In Experiment I it was at least learned that customers made an effort to avoid large variations of individual egg weights within the dozen. The next logical step seemed to be one of determining whether

customers would actually *seek* to have variations in the weights of individual eggs within the dozen. This became the problem for Experiment II.

Four egg weights were made available on an individual-egg, free-choice basis. The egg supply was obtained by sorting eggs into 24-, 26-, 27-, and 28-ounce groups and putting bulk eggs of each weight in adjoining boxes. The weight of each egg selected by the customer was recorded by the attendant. In only 1 per cent of the purchases were eggs selected from all four weights. In 3 per cent were eggs selected from three weights, in 19 per cent from two weights, while 77 per cent of the purchases were from only one weight. This experiment entailed effort on the part of the customer to sort variation *into* the purchase. It did not overcome the consumer lethargy in this. Another experiment might better be designed somewhat differently so as to weigh the individual eggs *after* they have been chosen by the customer.

In both of these experiments, as they were designed, it was necessary to sell the eggs by weight. Presumably the total dozen weight could have been held to a constant in Experiment I (as was done for the survey), but it was found that sorting to both specifically prescribed standard deviations and average weight concurrently presents an extremely tedious problem. For practicable purposes it could be overcome by allowing limit tolerances in the standard deviations and specifying combinations which would stay within the limits.

The survey indicated a statistically significant regression in the relation between consumer preference and the standard deviation of individual egg weights. The regression did not, however, have enough slope to make it of much economic importance and, for practical purposes, agreed with the experiments in supporting the stand that the tolerances in the variation of individual egg weights are much too narrow, from a consumer standpoint, in most of the grading standards now being used. If further work is done on this, the coefficient of variation probably should be used to evaluate consumer demand for uniformity of individual egg sizes.

Some Socio-economic Factors Related to Egg Preference

Different preferences for eggs may exist for different classes of people because cultural factors have affected these classes differently. To determine these differences would be important both from the standpoint of designing research and making applications of research results.

EDUCATION AND INCOME RELATED TO PREFERENCE FOR SHELL COLOR

Figures 3 and 4 give results from the State-wide surveys of 1951 and 1952. In both surveys there was an inverse correlation between the

amount of formal education and the preference for brown eggs—that is, a smaller percentage of the respondents having more formal education preferred brown eggs than of those with less formal education. Both surveys showed that as the level of education increased, the preference shifted away from brown to both “no difference” and to white eggs. In the 1952 survey the shift was heavier toward white with more formal education. Reasons for this type of shift with education are speculative but it is doubtful that people have been taught to want white rather than brown eggs. Indifference to shell color probably should logically increase with the amount of formal education, but this should be through the reduction of preference for both unicolors instead of only brown. It is probable that formal education and preference for shell color are related to a third but unknown factor.

Both surveys gave comparable results between preference for shell color and income of the responding family. As incomes increase, the preference for white eggs increases and does so virtually entirely at the expense of brown.

Both education and income were alternately held constant to study the association with color preference. A correlation was found between income and education, and the principal reason for the relation between income and preference was this correlation plus the correlation between education and preference.

EDUCATION AND ESTIMATES OF RELATIVE EGG WEIGHTS

In the State-wide survey respondents were told that Medium eggs were required to weigh at least 21 ounces per dozen and were then asked how much they thought a dozen Large eggs must weigh. The replies were classified by the amount of formal education of the respondent. It was found that reluctance to estimate varied directly with the amount of formal education.

The correct answer would have been 24 ounces. Those who had not attended high school averaged closer to the correct answer than did those who had a greater amount of formal education (see Table II). Women averaged significantly closer to the correct answer than did men.

The variance of these weight estimates seems to be related to the amount of formal education. When the variance is calculated around the true value there seems to be no association with the amount of formal education, but the variance (standard deviation) around the sample mean for the respondent class shows a general decrease in variance with a greater amount of formal education. A further feature seems to exist in the variances in that those who quit school—elementary, high, or college—had a greater variance of estimates than did those who completed these levels of schooling.

TABLE II. EDUCATION OF WIFE RESPONDENT VS. ESTIMATED MINIMUM WEIGHT REQUIREMENT OF LARGE AS COMPARED WITH THE REQUIRED WEIGHT OF 21 OUNCES FOR MEDIUM

EDUCATION OF HOMEMAKER	AVERAGE ESTIMATE OF A DOZEN LARGE EGGS	STANDARD DEVIATION AROUND TRUE VALUE	STANDARD DEVIATION AROUND SAMPLE MEAN
	<i>Ounces</i>	<i>Ounces</i>	<i>Ounces</i>
None or some grammar	25.53	3.39	3.06
Completed grammar	25.70	3.46	3.02
Some high school	26.19	3.95	3.27
Finished high school	25.95	3.43	2.79
Some college	26.24	3.90	3.20
College degree	26.00	3.57	2.95
Graduate work	26.06	3.26	2.48
All homemakers	25.96	3.62	3.04
Husbands of home- makers*	25.59	4.04	3.08

*These were not the husbands of "All homemakers" but were rather husbands of homemakers not available for interview.

EDUCATION AND ESTIMATES OF RELATIVE VALUES OF MEDIUM AND LARGE EGGS

Despite the fact that those with a greater amount of formal education did a poorer job of estimating the relative *weights* of eggs, their estimates of relative *values* of Medium and Large eggs were better than those of people with less formal education. Table 12 shows that a larger percentage of those with more education were essentially correct in their estimates. Those with more education tended to over-estimate the value of Medium, whereas those with less education tended to under-estimate Medium.

INCOME AND ECONOMY AS MOTIVATION

Upon being asked why they chose eggs of a certain weight class, a great majority of the people indicated that they did not try to be

TABLE 12. FORMAL EDUCATION OF HOMEMAKERS AND THEIR IDEAS OF PRICING MEDIUM EGGS RELATIVE TO LARGE EGGS

AMOUNT OF FORMAL EDUCATION OF THE HOMEMAKER RESPONDENT	PER CENT OF HOMEMAKERS WHOSE PRICE ESTIMATES OF MEDIUM EGGS WERE IN THE FOLLOWING RELATIONSHIPS TO THE PRICE OF LARGE EGGS			
	MEDIUM TOO LOW (NOT 70% OF LARGE)	MED. SLIGHTLY LOW (75 OR 80% OF LARGE)	ESSENTIALLY CORRECT (85 OR 90% OF LARGE)	MEDIUM TOO HIGH (95% OR MORE OF LARGE)
None or some grammar	14.0	18.3	49.8	17.9
Completed grammar	8.1	17.0	53.2	21.7
Some high school	6.2	16.3	52.9	24.6
Completed high school	3.8	13.8	57.5	24.9
Some college	3.3	11.4	62.2	23.1
Completed college	2.1	9.2	64.8	23.9
Graduate work	1.5	8.8	64.0	25.7

economical in their decision as to what egg size they would buy (see Table 13). Only about one-sixth of the homemakers indicated that they tried to be economical. This varied significantly with income—about 20 per cent of those with less than \$3,000 family income annually and about 15 per cent of those with \$3,000 or more annually indicated economy of some kind as a reason for their choice.

EDUCATION AND AGE RELATED TO PREFERENCE FOR SHELL COLOR

As would be expected from the trend toward more formal education younger homemakers had more formal education than older homemakers. The effect of homemaker's age upon the association between education and color preference was investigated. The results of this are shown in Table 14.

As already noted, the preference for shell color was associated with education. It evidently was not associated with the age of the respondent. The preference for brown definitely decreased with amount of formal education, but when education was held constant no effect seemed to arise from age. Figure 5 shows the general relationship between education and shell-color preference.

Amount of Eggs Used by Household Affected Relative Valuation of Medium and Large Eggs

It might be expected that the amount of effort put forth in an economic valuation would be directly related to the economic importance of the results of the valuation. This expectation was borne out in studying judgments of relative values of Medium and Large eggs. The resulting values, based on purchases in a matched-lot experiment, were definitely associated with the number of dozen used per week by the household (see Table 15).

As a rule the more eggs a household used the more likely it was to purchase Medium rather than Large eggs. Not only were the more-egg using households likely to purchase more Medium but they were also likely to do so by responding to favorable price relationships to a greater degree than the less-egg using households. Households using 5 dozen eggs per week made 80.1 per cent of their purchases Medium while Medium was priced favorably at 70, 75 or 80 per cent of Large. Under price conditions not so favorable to Medium (Medium at 85, 90, or 9 per cent of Large), this same group of households made only 50.9 per cent of their purchases Medium. Smaller users of eggs did not shift their response to prices. The 1-dozen households, for example, made 50.1 per cent of their purchases Medium under prices favoring Medium

TABLE 13. ECONOMIC REASONS COMPARED WITH OTHER REASONS FOR CHOOSING EGGS OF A CERTAIN WEIGHT CLASS STATED BY HOMEMAKERS IN TWO FAMILY CLASSES IN WEST VIRGINIA CITIES IN 1951

INCOME OF THE FAMILY	NUMBER OF HOUSEHOLDS	ECONOMIC REASONS, SUCH AS CHEAPER OR BETTER BUY	OTHER REASONS, SUCH AS HABIT, AVAILABLE, ETC.
Less than \$3,000	1,697	% 19.7	% 80.3
1,000 or more	2,052	15.4	84.6
Total	3,749	17.4	82.6

TABLE 14. AGE AND FORMAL EDUCATION OF HOMEMAKERS AND STATED PREFERENCES FOR SHELL COLOR OF EGGS, WEST VIRGINIA, 1951

AGE OF HOMEMAKER AND COLOR PREFERENCES STATED	AMOUNT OF FORMAL EDUCATION					
	NONE OR SOME GRAMMAR	COMPLETED GRAMMAR	SOME HIGH SCHOOL	COMPLETED HIGH SCHOOL	SOME COLLEGE	COLLEGE DEGREE & MORE
or less	% *	%	%	%	%	%
White	X	25	37	39	39	36
Brown	X	45	21	20	14	14
No difference	X	30	42	41	47	50
to 40						
White	36	33	38	43	35	32
Brown	44	36	30	18	18	15
No difference	20	31	32	39	47	53
to 50						
White	35	34	33	34	32	38
Brown	43	33	25	24	19	14
No difference	22	33	42	42	49	48
to 60						
White	21	29	32	38	37	36
Brown	58	32	31	24	25	13
No difference	21	39	37	38	38	51
and over						
White	30	23	28	23	37	X
Brown	45	43	35	26	24	X
No difference	25	34	37	51	39	X

*This percentage pertains to the number of homemakers responding to the question. Where the X's occur there were too few to have any significance.

TABLE 15. RELATIVE SALES OF MEDIUM AND LARGE EGGS FOR TWO PRICE RELATIONSHIPS BETWEEN MEDIUM AND LARGE BY HOUSEHOLDS USING DIFFERENT AMOUNTS OF EGGS PER WEEK

NUMBER OF EGGS PURCHASED BY HOUSEHOLD PER WEEK	PURCHASES WITH PRICE OF MEDIUM EITHER 70, 75, OR 80 PER CENT OF PRICE OF LARGE				PURCHASES WITH PRICE OF MEDIUM EITHER 85, 90 OR 95 PER CENT OF PRICE OF LARGE			
	MEDIUM		LARGE		MEDIUM		LARGE	
	DOZEN	%	DOZEN	%	DOZEN	%	DOZEN	%
199	199	50.4	196	49.6	212	43.4	276	56.6
565	565	52.0	522	48.0	501	43.3	656	56.7
319	319	63.8	181	36.2	297	48.8	311	51.2
154	154	58.8	108	41.2	108	14.8	133	55.2
164	164	80.4	40	19.6	59	50.9	57	49.1
Total	1401	57.2	1047	42.8	1177	45.1	1433	54.9

FIGURE 5. Preferences for shell color of eggs stated by homemakers with different amounts of formal education.

whereas they made 43.4 per cent of their purchases Medium and prices not so favorable to Medium. The results indicate that few people are involved in establishing the cross-elasticity of demand that might, in first analysis, be reasoned from the shift in purchases affected by relative changes in prices. This might be very important in the interpretation of results from controlled retail experiments.

Premiums for Egg Quality Affected by Beliefs of Consumers

In the State-wide survey on egg preferences the respondents were asked how much more they were willing to pay for Grade A than for Grade B eggs. Eighty-two per cent of the homemakers were willing to pay some price premium for Grade A. The average difference homemakers were willing to pay was 4.48 cents per dozen (see Table 16).

TABLE 16. HOMEMAKERS, BELIEFS REGARDING EGG GRADES AND THE AMOUNT OF PREMIUM THEY WOULD PAY FOR A DOZEN GRADE A EGGS OVER A DOZEN GRADE B EGGS

BELIEFS IN THE DIFFERENCE BETWEEN GRADE A AND GRADE B	HOMEMAKERS HOLDING THE VIEW EXPRESSED IN FIRST COLUMN		AVERAGE NUMBER OF CENTS PREMIUM GROUP IS WILLING TO PAY PER DOZEN FOR GRADE A OVER GRADE B EGGS
	NUMBER	PER CENT OF TOTAL	
No difference in quality between Grade A and Grade B	1,288	28.2	2.85
There is a difference in the quality	3,185	69.7	5.16
Grade A fresher, tastier, or better for	1,388	30.4	5.60
Grade A are larger	502	11.0	4.84
Grade A stands up better	113	2.5	5.87
Grade A more food value in Grade A	15	.3	4.73
Don't know what the difference is	1,167	25.5	4.72
Don't know whether there is a difference ..	97	2.1	3.69
Total	4,570*	100.0	4.48

*The total is made of the three italic-face numbers. Note that there are five sub-classes of those who believe there is a difference in quality.

All homemakers are not, of course, willing to pay the same amount premium. With complete information on the homemakers it would be logical that the difference in amount, if the amount is a rational one, would be associated with some condition or conditions. There were 1,288 homemakers, 28.2 per cent of the total, who believed there is no difference in quality between Grade A and Grade B. These were, on the average, willing to pay only 2.85 cents per dozen premium. The 69.7 per cent of the homemakers who believed there is a difference in quality were willing to pay an average of 5.16 cents per dozen premium for Grade A. Of those who believed there is a difference in quality, the 2.5 per cent who believed Grade A eggs stand up better were probably better informed than were the other groups—at least this evidenced the principal manifest difference between the two egg grades. This group

averaged the highest premium for Grade A. The variance within the groups has been studied⁸ but, from the standpoint of reaching consumers with proper motivations, needs to be studied further.

Weight-basis vs. Dozen-basis of Pricing Eggs

Several weight-basis experiments have been run in West Virginia. One of these, designed to study not only preference but also the acceptance trend was run for a period of 16 months. In this study weight basis sales increased to 6 per cent of total egg sales rather soon, but then the trend leveled off. In this experiment it was necessary for the customer to select eggs and go to the meat counter to have them weighed. Evidently this was either too much bother or not otherwise acceptable to customers. Other weight-basis experiments in which total dozens were weighed and priced before they were put in the display case showed a high customer acceptance. The retailer objected somewhat to customer handling and disturbing of eggs in the display. It is doubtful, once the customers have become accustomed to this method that they would disturb a display of this type of offering more than they would one of weight-classed eggs sold by the dozen.

⁸Nybrotten, Norman. "Ogive Curves in a Demand Analysis," *Journal of Farm Economics*, August, 1955, W. Va. Coll. Agr. Exp. Sta. Scientific Paper No. 508.