A STUDY OF WORD VS LETTER GRADING OF TURKEYS

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William Clearon Mills, Jr.

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A STUDY OF WORD VS LETTER GRADING OF TURKEYS

By

William Clearon Mills, Jr.

AN ABSTRACT

Submitted to the School of Graduate Studies of Michigan State University of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Department of Poultry Science

1960

Approved L. E. Dawson

AN ABSTRACT

Under the sponsorship of the National Turkey Federation, and the Poultry Science Department, Michigan State University, a study was undertaken to evaluate consumer acceptance of word grades vs letter grades as a system of grade labeling turkeys.

Several pre-tests were conducted at Wayne State University, Detroit, Michigan using the Detroit Preference Panel to get consumer preferences regarding word grades "Prime", "Choice", "Good", and "Commercial" as compared to present U. S. Grades A, B, and C.

The Detroit Preference Panel is selected from a representative group of Detroit residents according to age, education and income. There are from 125 to 150 panel members who come to Wayne State University and evaluate products as to their acceptability or rank them in order of preference. About one-half of the panel members make their rankings in the afternoon and the remaining members make their rankings in the evening.

The first pre-tests consisted of turkeys labeled Grade A, B and C with each turkey labeled according to its actual quality. The word "Prime" was substituted for Grade A, "Choice" for Grade B, "Good" for Grade B, and "Commercial" for Grade C. By alternating the various labels on different turkeys it was evident that the most important factor in determining the acceptability of a turkey was its appearance. From these early pre-tests it was also apparent that word labels or grades were preferred over letter grades when the turkeys were of comparable quality. These preferences were significant at the 1 percent level.

Later preliminary tests comparing groups of turkeys rather than single turkeys revealed similar results. In these tests, when the turkeys labeled with word grade labels were priced two cents per pound higher than the turkeys labeled with letter grades, preference for the turkeys labeled with word grades increased. The results of these tests were significant at the 1 percent level.

The main part of the study consisted of actual sales records of turkeys sold in three grocery stores located in different shopping areas of Lansing, Michigan. Thirteen hundred twenty-four Beltsville Small White turkeys ranging in weight from 6 to 8 pounds were sold during the period March 17-19, 1960.

The three grade labels tested were "Prime", "Choice", and Grade A. The "Prime" labels were put on turkeys with less protruding keel bones and which in general had slightly better conformation than the remaining turkeys which were labeled at random as "Choice" or Grade A. Turkeys labeled "Prime" were priced at 41 cents per pound and the other two grades were priced at 39 cents per pound.

All turkeys were USDA inspected for wholesomeness and were USDA Grade A. Both of these stamps were plainly visible on the breast of each turkey. The only difference in labeling was the colored shipping tag with one of the three grades stamped on each. Each tag was wired to the package at the posterior end of the turkey.

Total sales were: "Prime" - 362, "Choice" - 556, Grade A - 406. Statistical analysis on the expected 1:1:1 sales ratio revealed that the sales were significantly different from the expected ratio at the 1 percent level.

From the results of this study the author concludes that consumers prefer word grade labels "Prime" and/or "Choice" to Grade A; that consumers prefer the word grade label "Good" to Grade B; and that about twenty-five percent of the consumer size turkeys now being sold as Grade A can be selected, labeled as "Prime" and sold at a premium price.

It was also found that the consumer will reject turkeys that lack flesh and those with discolorations due to moderate size flesh bruises. Turkeys in the present high B grade can be labeled "Choice" and the consumer will readily purchase them.

Based on the results of this study, it would be desirable and most profitable to revise the present grade standards of quality as they apply to turkeys to bring them in line with what the consumer considers quality, and to change the present system of ABC grading to a new system embracing the words "Prime", "Choice" and "Good" as grade labels.

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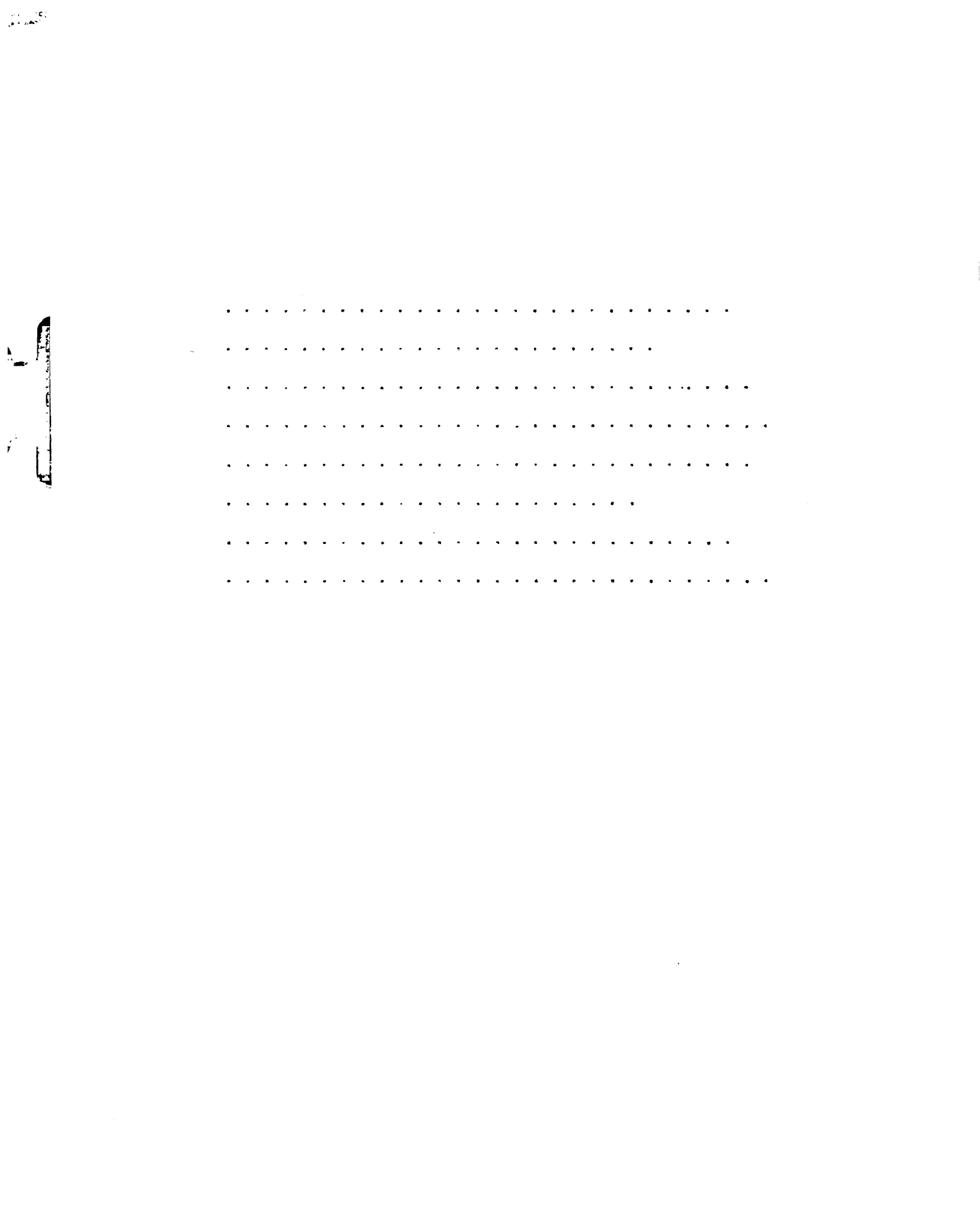

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INTRODUCTION

Within the turkey industry a debate has arisen as to the desirability of mandatory grade labeling of turkeys as well as the advisability of changing the present grade labeling system. Jessie V. Coles (1954) discusses two main obstacles to grade labeling. She states "obstacles to grade labeling include the technical problems of measuring and testing qualities to determine conformity to grade. Another obstacle is that if grades are to be satisfactory they must be based on the qualities that consumers look for in goods".

Before an intelligent decision can be made regarding mandatory grade labeling, it is necessary to decide what grade label to use. What grade label has the highest psychological significance of quality to the person buying turkeys?

To begin to understand consumer preferences as to grade labels, the National Turkey Federation granted financial assistance to Michigan State University to conduct research in this area.

The purpose of this study was to evaluate turkey grade labels and their quality meaning to the consumer. Are the present grade designations A, B and C best; or, would the word labels "Prime", "Choice", "Good", or "Commercial" be more acceptable to the consumer as quality determinants? Another purpose of the study was to determine how and what the consumer considered to be quality.

This brings up the question of what is quality, and who is to determine quality and its degree of acceptability? Shall the grades

continue to be based on arbitrary technicalities, or shall the grades be built on acceptable attributes as determined by the consumer? There are myriad questions which we could ask that need resolving before we can adequately resolve the question of quality and its designation.

For the purpose of this experiment, the author accepts the following definition of quality. Quality is that combination of attributes that have significance in determining the degree of acceptability of a product by a consumer. By accepting this definition, the author also accepts that the consumer should be the one to determine what is quality, its degree of acceptability, and how such quality is to be labeled.

With these definitions in mind, this experiment was designed to test the hypothesis that the consumer will buy a turkey based primarily upon its appearance, and that she will buy the turkey labeled with the grade label which has the highest perceived quality meaning to her when selecting between turkeys of comparable quality.

REVIEW OF LITERATURE

The trend in Federal grading of turkeys has been toward total grading. In 1958, 708,944,879 pounds of turkey meat was graded by the Federal Government. This represents a 6.7% increase over 1957 and a 551% increase over 1948, (Kempers, 1959).

Effective January 1, 1959, all poultry processing plants concerned with interstate commerce were required to operate under compulsory Federal inspection regulations, and all poultry processed therein and packaged for consumers was required to be labeled by age (young, mature, or old). This law has inspired much debate about the future of compulsory grading of turkeys.

Wilhelm (1959) summarized the opinions of a National Turkey Federation Committee on Mandatory Grade and Sex Labeling in Turkeys stated, "The total objective of the turkey business must be to sell turkeys ... and to obtain this, maximum consumer acceptance is necessary". Wollney (1960) speaking on the subject of grading stated, "Grading, I believe, is primarily intended as a measure of quality. It affords a yardstick by which these features of the product that bear on its acceptability -- and in the case of food products, chiefly its eating quality may be indicated."

Williamson, Bowen and Genovese (1959) in a report on the economic effects of beef grades concluded, "It must be concluded, it seems, that the competitive merchandising advantage of "U. S. Choice" beef has been largely responsible since 1950 for the emphasis given by the food chains to Federal Grades on beef".

Based on a survey of 25 members of the National Association of Food Chains, Wilhelm (1959) reported that 80% of the Beltsville Small White Turkeys were sold by weight only, 73% of the Broad Breasted Bronze Turkeys were sold by weight and sex, and the remainder were sold in various other ways. This seems to indicate that the larger the turkey the more important identification of sex becomes. Of course this could be merely a preference for smaller turkeys regardless of sex, or an attempt to profit from the consumer's perception of hens as being superior in quality.

"All trading, except simple barter, involves price. Price in practically all markets is a common denominator by which are expressed unlike details of size, amount, weight, and quality of products being traded", (Yearbook of Agriculture, 1954). Price then is an American symbol of quality, and any study of grade labeling would be unrealistic without price consideration.

Makens and Dawson (1960) reported that personal inspection was a major determinant in the selection of turkeys, and that grade labels "Prime", "Choice", and "Good" were preferred to letter grade labels A, B, and C. This work was based on results obtained from a consumer preference panel where the consumer was placed in a buying situation without influence of brand names. They also conducted a mail survey of consumers to determine the opinions of a larger segment of the consuming public. Results of the survey were partially contradictory to the results of the preference panel. One important aspect of the mail survey was that the consumers did not have an opportunity to inspect turkeys as the questionnaire was answered in the home. A majority of the consumers

surveyed did not remember if the turkeys where they shopped were labeled as to grade. These consumers probably were more grade conscious than the average since they have received a number of publications regarding foods and food products from the Michigan State University Cooperative Extension Service.

Makens (1960) reported that grade labeling results in discrimination against birds marked B or Choice by members of the Detroit Preference Panel.

Earlier work did not test the preference for word grades when different prices were attached to the various grade labels, and only individual turkeys were used for comparison.

A search of the literature revealed no other work pertaining to word vs letter grades on turkeys.

PROCEDURE

The design of this study was to use the Detroit Preference Panel for preliminary studies or pre-tests in order to gather as much information as possible about consumer attitudes and opinions as well as preferences regarding the use of word grades vs letter grades on turkeys. The Detroit Consumer Preference Panel was selected in the following manner. "Mail questionnaires were sent to about 6500 names obtained from the latest Detroit telephone directory. About 5% of these were returned by the post office for nondelivery. About 20% of the remainder were filled out and returned either from the first or follow up questionnaire.

"The basic questions asked concerned age group, education group, income group, and willingness to come to a display room in Detroit to rate samples of the different products displayed. A majority of those selected for the panel were in the middle income group, and had received a high school education, and were in the 31 to 45 age group", (Larzelere and Gibb, 1956).

There were from 125 to 150 panel members (male and female) who came to Wayne State University and evaluated the turkeys used in this experiment as to their acceptability or ranked them in order of preference. About one-half of the panel members made their rankings in the afternoon, and the remaining members made their rankings in the evening.

Several pre-tests were made at different times to determine the reliability of rankings. The initial pre-tests consisted of Broad Breasted Bronze Turkeys labeled "Prime", "Choice", and "Commercial" to

correspond with Grades A, B, and C, respectively. The various labels were switched between individual turkeys and groups of turkeys in an attempt to arrive at the perceived quality connotation of each word and the type of turkeys the consumer would associate with each word. Both hens and toms were used. In later pre-tests, the word "Good" was used to designate a Grade B turkey for comparisons.

In this phase the consumer merely ranked the turkeys in order of his or her preference. Typewriter symbols %, &, #, *, and () were used to identify the turkeys to eliminate any possible meaning which might have been associated with letters or numbers had they been used in identifying the turkeys. These symbols together with the word or letter grade were placed on cards in front of each turkey. See figures 1 and 2 for examples. The consumer ranked the turkeys in order of preference from most to least acceptable by merely putting the number 1 by the symbol on the panel report card that corresponded to his or her first preference and the number 2 by the symbol that corresponded to his or her second choice, etc. See appendix page 47 for sample panel report card.

It is obvious that large price differences would result in a shifting of selections. However, from the theoretical economic standpoint, when two turkeys are of the same sex, of equal size, fleshing and finish and apparent quality, any price increase of one over the other should result in the lower priced turkey being selected. This should not hold true if one grade label has a perceived higher quality meaning than another label. The author was primarily concerned with the significance of grade labels and not price.

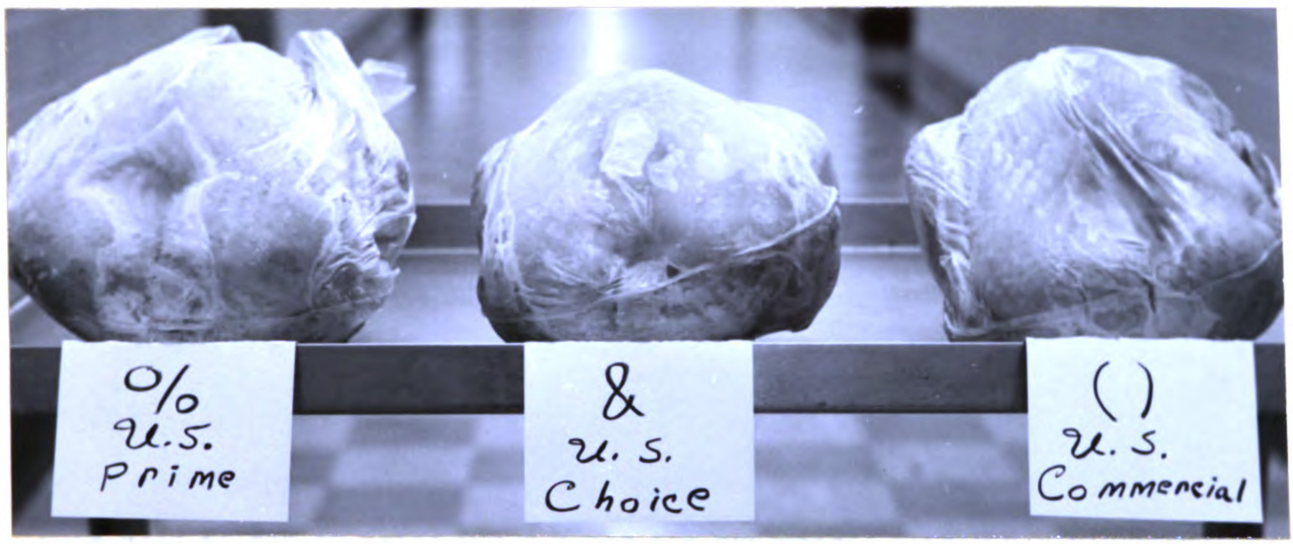

Figure I. Illustration of Individual Turkeys Identified for the Detroit Preference Panel

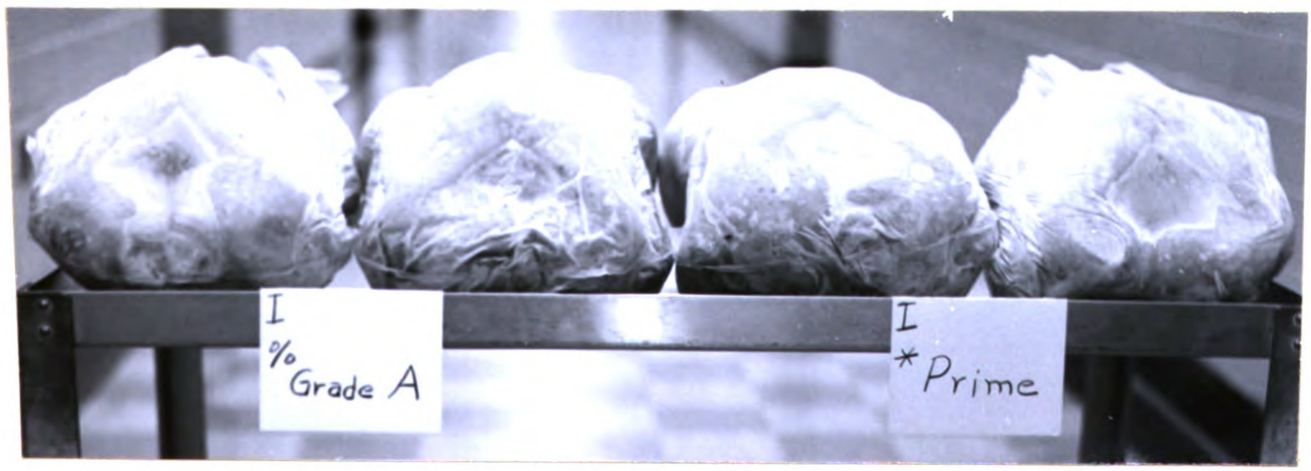

Figure II. Illustration of Turkeys Identified by Groups for the Detroit Preference Panel

Price differences of three cents per pound between grades were used in the May 1959 pre-tests to observe the possible effect of price on selection. Three cents per pound was used since at that time the price difference between Grade A and Grade B was three cents per pound and different grades were being used for comparisons.

The Detroit retail price of forty-five cents per pound for Grade A turkeys was used as a base price in the final pre-tests in February 1960 where in most cases turkeys of comparable quality were being used to evaluate significance of grade labels. Price differences were used to see if price would alter the consumers' previously expressed preference for word grade labels where no price had been used. See figures III and IV.

The final phase of the study was a sales experiment designed to test the validity of the preferences indicated by the Detroit Preference Panel. To determine this validity, actual sales records of turkeys from three grocery stores located in different shopping areas of Lansing, Michigan, were obtained and analyzed. Since space was a limiting factor (space was not available to test all combinations previously used), turkeys labeled Grade A, "Prime", and "Choice" were used in this test.

The timing of the sales test was excellent because we were able to take advantage of a planned pre-Easter turkey sale. In this way many more observations were obtained in a shorter time than would have been possible otherwise.

The "Prime" label was placed on the turkeys with less protruding keel bones and which in general were of slightly better conformation

Figure III. Illustration of Turkeys Identified for the Detroit Preference Panel

Figure IV. Illustration of Turkeys Identified and Priced for the Detroit Preference Panel

than the turkeys labeled Grade A or "Choice". The grade A and "Choice" labels were put on the remaining turkeys at random as needed to fill the sales area. See figure V for illustration of sales display. The actual labeling was done by the store personnel who knew nothing about the study except that the labels were to be wired onto the turkeys as needed to restock the sales area.

All turkeys used in the sales trial were Commercial Beltsville Small White Turkeys weighing from 6 to 8 pounds. All were USDA inspected for wholesomeness and were USDA Grade A. Both the wholesomeness and the USDA Grade A labels were plainly visible on the breast of each turkey. The only difference in labeling was the colored shipping tags (see appendix page 46 for tags used) which were wired to the posterior end of the package. See figure VI for illustration. In previous studies at Michigan State University, MacNeil, Larzelere, and Dawson, (1958) consumers have shown a preference for poultry meat packaged in green cartons or containers. For this reason the green tag and arrow on point of sale poster was used for the Grade A label in order to give every advantage to these turkeys. This tag carried the grade label, store imprint, the net weight, price per pound and the total price of the turkey. See figure VI.

The "Prime" turkeys were priced at 41¢ per pound since some selection based on general conformation had been made. The Grade A and "Choice" turkeys were priced at 39¢ per pound. Price being a symbol and a nexus of quality it was thought that these turkeys would sell in a 1:1:1 ratio. The sales data were analyzed by the Chi Square test using this as the expected sales ratio.

Figure V. Display of Experimentally Labeled Turkeys in Okemos Store

Figure VI. Illustration of Turkeys as Labeled in Sales Test

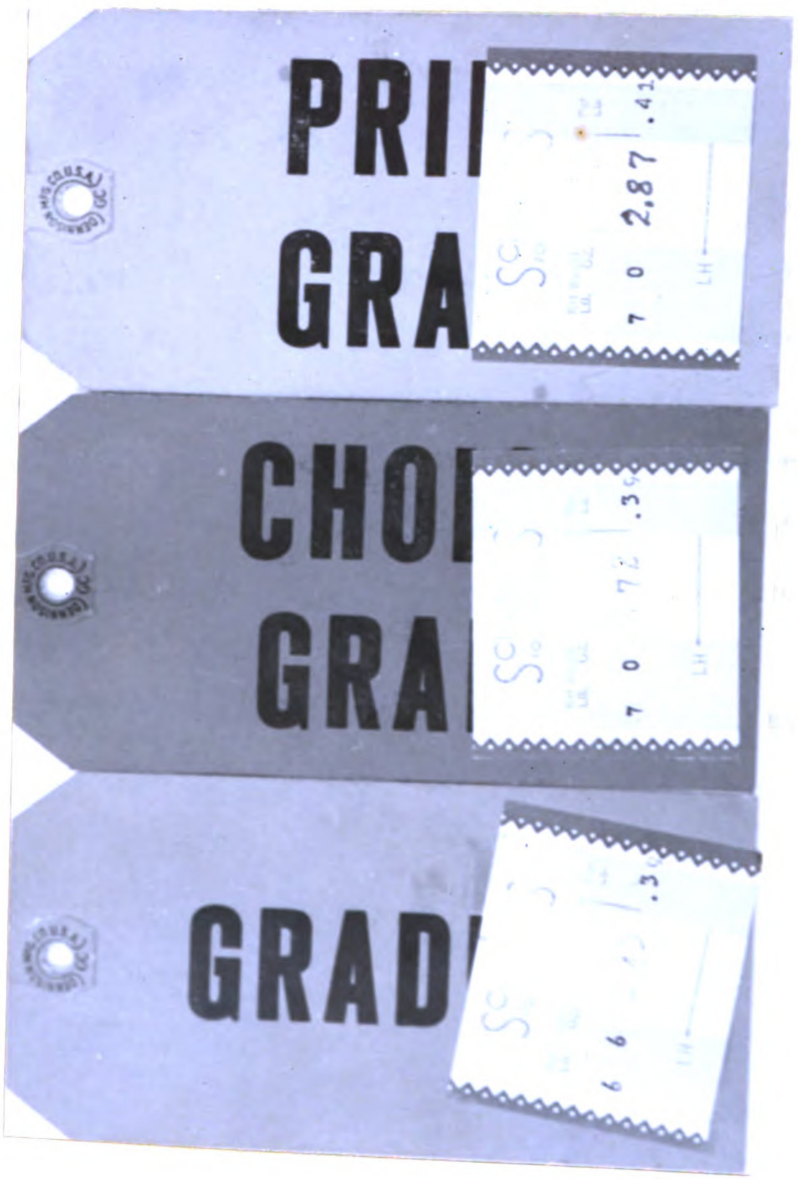

Figure VII. Illustration of Price Labeling Used in Sales Test

Fifteen hundred turkeys were available for the study during the period March 17 - 19, 1960. At the end of the sales period the unused labels of the different types were counted to determine the number of each grade designation sold. This number was compared with the number of unsold turkeys as a double check.

The statistical analysis of the results of the Detroit Preference Panel where more than two samples were compared was by computing the coefficient of concordance. The levels of the coefficients were tested for significance by the Chi Square statistic, (Kendall, 1955). See appendix page 43 for computation.

The statistical analysis of the results of the February 1960 Panel where only two samples were compared was by use of the Chi Square statistic, (Snedecor, 1956). See appendix page 44 for computation.

The sales trial was also analyzed by the Chi Square statistic. See appendix page 45 for computation.

RESULTS

In order to evaluate the relative quality meaning of various words as grade labels for turkeys a series of tests was conducted to observe the relative preference for the words U. S. Prime, U. S. Choice, and U. S. Commercial as grade labels.

The turkeys in this class were labeled as to quality represented. The turkey labeled U. S. Prime was high A quality; U. S. Choice was B quality due to a breast bruise; U. S. Commercial was B quality due to pin feathers, a small breast bruise, and torn package, otherwise it was A quality. Results are shown in Tables 1 and 2.

Table 1. Influence of Grade Label and Price on Preference for Turkeys by the Detroit Preference Panel. Afternoon, May, 1959.

Symbol	Grade label	Cents per pound	% 1st place	Rank 1	2	3
				Persons		
%	U.S. Prime	39	68.8	33	8	7
&	U.S. Choice	36	4.2	2	33	13
()	U.S. Commercial	33	27.1	13	8	27

Table 2. Influence of Grade Label and Price on Preference for Turkeys by the Detroit Preference Panel. Evening, May, 1959.

Symbol	Grade label*	Cents per pound	% 1st place	Rank 1	2	3
				Persons		
%	U.S. Prime	39	47.6	39	28	15
&	U.S. Choice	36	46.3	38	37	6
()	U.S. Commercial	33	6.1	5	16	59

*The labels on the U. S. Choice and the U. S. Commercial turkeys were reversed in the evening; no other changes were made.

The data show a marked increase in preference for the label "U. S. Choice" over the label "U. S. Commercial" as evidenced by the increased numbers who selected this label over the number who selected the "U. S. Commercial" label in the afternoon, and also by the wide differences in the second and third preferences of the two birds.

The data also support the original hypothesis that the consumer will buy a turkey based primarily on appearance, and that she will select the turkey labeled with the grade label that has the highest quality meaning to her.

The panel rejected the bird with the breast bruise (U. S. Choice in the afternoon and U. S. Commercial in the evening). This rejection because of moderate size breast bruise was evidenced throughout the project.

The data were subjected to a statistical analysis (coefficient of concordance) which showed the panel members were in significant agreement at the 1 percent level. This means that the panel members had a community of preference in their evaluation of the series of samples. This does not mean that there is necessarily a significant difference between any two samples within a series.

In another series of tests turkey hens were labeled with a variety of grade labels to observe indicated preferences. The turkeys labeled U. S. Grade A and U. S. Prime were high A quality; those labeled U. S. Grade B and U. S. Choice were high B quality. The results of this series are shown in Tables 3 and 4.

Table 3. Influence of Grade Label and Price on Preference for Turkeys by the Detroit Preference Panel. Afternoon, May, 1959.

Symbol	Grade label	Cents per pound	% 1st place	Rank 1	2	3	4
				Persons			
%	U.S. Grade A Hen	39	8.3	4	18	18	8
&	U.S. Grade B Hen	36	6.3	3	5	5	35
()	U.S. Prime Hen	39	58.3	28	9	6	5
*	U.S. Choice Hen	36	27.1	13	16	19	-

These data show that the turkey labeled U. S. Prime was preferred over the turkey labeled U. S. Grade A. It also shows that U. S. Choice was preferred over U. S. Grade B as a grade label for turkeys, and that a higher percentage of the panel members preferred a high B quality turkey labeled U. S. Choice than preferred a high A quality turkey labeled U. S. Grade A when the price difference was 3 cents per pound. It is interesting to note that no panel member ranked the turkey labeled U. S. Choice as fourth on the preference rank.

Agreement was significant at the 1 percent level using the coefficient of concordance statistic and Chi Square test.

Table 4. Influence of Grade Label and Price on Preference for Turkeys by the Detroit Preference Panel. Evening, May, 1959.

Symbol	Grade label	Cents per pound	% 1st place	Rank 1	2	3	4
				Persons			
%	U.S. Grade A Hen	39	4.9	4	20	37	21
&	U.S. Grade B Hen	36	9.8	8	7	14	53
()	U.S. Prime Hen	39	48.8	40	17	18	7
*	U.S. Choice Hen	36	36.6	30	38	13	1

All labels remained on the same birds in the evening. It is interesting to note the selection of the turkey labeled U. S. Choice as second preference in both afternoon and evening sections of the panel. Again this turkey was of high B quality and only one panel member ranked it in fourth place. This indicates that the perceived meaning of the U. S. Choice label is higher than the U. S. Grade A label. Such selections by the panel members support the original hypothesis.

Rankings in Table 4 are in significant agreement at the 1 percent level.

In order to determine the acceptance of similar grade labels on both hens and toms, a series of tests was set up using both sexes. The hens used in this test were of comparable quality. The tom labeled U. S. Grade A was slightly red, and the tom labeled U. S. Prime was in a bag which was torn at the wing and tail. Other factors such as fleshing, finish, and conformation were comparable.

Results are shown in Tables 5 and 6.

Table 5. Influence of Grade Label and Price on Preference for Turkeys by the Detroit Preference Panel. Afternoon, May, 1959.

Symbol	Grade label	Cents per pound	% 1st place	Rank 1	2	3	4
				Persons			
*	U.S. Grade A Tom	36	12.5	6	5	15	22
%	U.S. Grade A Hen	39	27.1	13	21	6	7
&	U.S. Prime Tom	36	10.4	5	8	20	15
()	U.S. Prime Hen	39	54.2	26	14	7	1

The data show that the preference for toms is less than for hens, and that the percent of first preference for the toms was in

favor of the U. S. Grade A. However, when the total rankings for the toms are considered, preference was for the U. S. Prime Tom.

Table 6. Influence of Grade Label and Price on Preference for Turkeys by the Detroit Preference Panel. Evening, May, 1959.

Symbol	Grade label	Cents per pound	% 1st place	Rank			
				1	2	3	4
				Persons			
*	U.S. Grade A Tom	36	8.5	7	6	26	42
%	U.S. Grade A Hen	39	17.1	14	42	13	23
&	U.S. Prime Tom	36	15.9	13	13	32	23
()	U.S. Prime Hen	39	63.4	52	19	9	1

Labels remained on same birds in the evening. Total rankings as well as the percentages of first preference were in agreement during the evening section of the panel. When results from both afternoon and evening panels are averaged together, the first preference is for the turkeys labeled U. S. Prime. The slight redness may have had some effect on the appearance of the U. S. Grade A tom due to the light differences between the afternoon and night rankings.

The data also show that hens are more preferred by consumers than are toms. Rankings were in significant agreement at the 1 percent level.

In June, 1959 another series of tests was conducted with the same Preference Panel. A different group of turkeys was used to test the same grade labels and to determine the reliability of the results of the first panel tests.

During this series of tests some of the labels were switched from one turkey to another to further test the general hypothesis that

the consumer will buy a turkey based primarily upon appearance and that she will buy the turkey with the grade label which has the highest perceived quality meaning to her provided the turkeys are of the same quality. The results of the first series are shown in Tables 7 and 8.

Table 7. Influence of Grade Label on Preference for Turkeys by the Detroit Preference Panel. Afternoon, June, 1959.

Symbol	Grade label*	% 1st place	Rank 1	2	3
			Persons		
%	U. S. Prime	53.3	24	12	9
&	U. S. Choice	42.2	19	18	8
()	U. S. Commercial	4.4	2	16	27

*The turkey labeled U. S. Prime was a top A quality turkey; the turkey labeled U. S. Choice was of A quality except for small bruises; the turkey labeled U. S. Commercial was lacking in flesh.

Table 8. Influence of Grade Label on Preference for Turkeys by the Detroit Preference Panel. Evening, June, 1959.

Symbol	Grade label	% 1st place	Rank 1	2	3
			Persons		
%	U. S. Prime	59.7	40	17	10
&	U. S. Choice	32.8	22	31	14
()	U. S. Commercial	7.5	5	19	43

No changes were made in labeling from the afternoon section of the panel. Rankings, both afternoon and evening, were in significant agreement at the 1 percent level and support the general hypothesis.

To determine if preference changes when labels are switched to different turkeys, a class of turkey hens was set up using birds of

different quality. Turkeys labeled U. S. Prime and U. S. Grade A were high A quality. Turkeys labeled U. S. Grade B and U. S. Choice were low A or high B quality. The results are shown in Tables 9 and 10.

Table 9. Influence of Grade Label on Preference for Turkeys by the Detroit Preference Panel. Afternoon, June, 1959.

Symbol	Grade label	% 1st place	Rank			
			1	2	3	4
			Persons			
%	U. S. Grade A	51.1	23	8	12	2
()	U. S. Prime	35.6	16	19	6	4
&	U. S. Choice	6.7	3	17	24	1
*	U. S. Grade B	6.7	3	2	2	38

While the percentage of first preference between the Grade A and Prime is large, when the total rankings of these two turkeys are analyzed there is no significant difference between them. There were no differences in the percentage of first preference between the Choice and Grade B, but when these two rankings are analyzed there is a significant difference in favor of the turkey labeled Choice.

Rankings as a group are in significant agreement at the 1 percent level.

Table 10 shows the results when the labels were switched. The turkey listed in Table 9 as Grade A is now labeled Prime and the turkey listed in Table 9 as Prime is now labeled Grade A. Likewise the labels between the Choice and Grade B turkeys were reversed.

Table 10. Influence of Grade Label on Preference for Turkeys by the Detroit Preference Panel. Evening, June, 1959.

Symbol	Grade label	% 1st place	Rank 1	2	3	4
			Persons			
()	U. S. Prime	55.2	37	16	7	7
%	U. S. Grade A	26.9	18	23	22	4
*	U. S. Grade B	11.9	8	10	19	30
&	U. S. Choice	9.0	6	18	20	23

Results show strong preference for the turkey labeled Prime. This indicates that the panel members perceived the first turkey listed in Table 9 and 10 to be more desirable. This perceived superior quality was not significant in Table 9, but is significant in Table 10 when the turkey was labeled U. S. Prime which is in agreement with the original hypothesis.

The same was true for the turkey labeled U. S. Choice as shown in Table 9 and Grade B in Table 10. This selection of the turkey perceived to be of superior quality strongly supports the general hypothesis.

Another series of tests using both hens and toms was tested. In this class the labels were reversed between the afternoon and evening sections of the panel. The hens were comparable A quality, and the toms were comparable A quality. The results are shown in Tables 11 and 12.

Table 11. Influence of Grade Label on Preference for Turkeys by the Detroit Preference Panel. Afternoon, June, 1959.

Symbol	Grade label	% 1st place	Rank 1	2	3	4
			Persons			
%	U. S. Grade A Hen	22.2	10	23	5	7
()	U. S. Prime Hen	42.2	19	9	12	5
&	U. S. Prime Tom	26.7	12	7	17	9
*	U. S. Grade A Tom	6.7	3	6	12	24

The turkeys labeled U. S. Prime ranked high in percentage of first preference. The rankings of this class are in significant agreement at the 1 percent level.

For the evening evaluation of this same class the labels were reversed between the hens and between the toms. No other changes were made. The results of this change are seen in Table 12.

Table 12. Influence of Grade Label on Preference for Turkeys by the Detroit Preference Panel. Evening, June, 1959.

Symbol	Grade label	% 1st place	Rank 1	2	3	4
			Persons			
()	U. S. Prime Hen	53.7	36	18	8	5
%	U. S. Grade A Hen	22.4	15	31	14	7
*	U. S. Grade A Tom	16.4	11	4	21	31
&	U. S. Prime Tom	9.0	6	16	24	21

In the afternoon (Table 11) one hen was preferred most often. In the evening, with the labels being reversed, another hen was preferred and in each case it was the hen labeled U. S. Prime.

The difference between the rankings of the toms in the afternoon (Table 11) was significant, however, in the evening section the difference was not significant. This indicates that one of the toms was perceived to be of better quality and that the label U. S. Prime was most preferred as evidenced by the change in significance.

The results of both of these sections of the panel support the original hypothesis. Rankings are in significant agreement at the 1 percent level.

Two classes of turkeys were retested in October. In this series the turkeys labeled U. S. Prime and U. S. Grade A were of comparable A quality, and the turkeys labeled U. S. Grade B and U. S. Choice were of comparable B.quality. The results are shown in Tables 13 and 14.

Table 13. Influence of Grade Label on Preference for Turkeys by the Detroit Preference Panel. Afternoon, October, 1959.

Symbol	Grade label	% 1st place	Rank			
			1	2	3	4
			Persons			
()	U. S. Prime	59.3	35	17	4	3
*	U. S. Grade A	28.8	17	22	19	1
%	U. S. Grade B	3.4	2	6	13	38
&	U. S. Choice	8.5	5	16	23	15

The preference for the turkey labeled U. S. Prime is obvious at first glance. However, the preference for the turkey labeled U. S. Choice when compared to the Grade B becomes most obvious when you note the number of people ranking the turkey labeled U. S. Choice as second or third.

The results of this test support the original hypothesis, and the rankings are in significant agreement at the 1 percent level.

Table 14. Influence of Grade Label on Preference for Turkeys by the Detroit Preference Panel. Evening, October, 1959.

Symbol	Grade label	% 1st place	Rank 1	2	3	4
			Persons			
()	U. S. Prime	69.0	40	10	4	4
*	U. S. Grade A	13.8	8	29	17	4
%	U. S. Grade B	3.4	2	7	21	28
&	U. S. Choice	13.8	8	12	16	21

No changes were made in labeling the turkeys from those in Table 13. Rankings by this group of panel members are the same as the rankings in Table 13. There is significant agreement of rankings at the 1 percent level.

Another test using both hens and toms was conducted at the same time. The hens were comparable A quality and the toms were comparable A quality. The results are shown in Tables 15 and 16.

Table 15. Influence of Grade Label on Preference for Turkeys by the Detroit Preference Panel. Afternoon, October, 1959.

Symbol	Grade label	% 1st place	Rank 1	2	3	4
			Persons			
()	U. S. Grade A Hen	22.0	13	23	13	10
*	U. S. Prime Hen	44.1	26	16	9	8
%	U. S. Grade A Tom	28.8	17	13	13	16
&	U. S. Prime Tom	10.1	6	9	23	21

Rankings are in significant agreement at the 1 percent level.

Table 16. Influence of Grade Label on Preference for Turkeys by the Detroit Preference Panel. Evening, October, 1959.

Symbol	Grade label	% 1st place	Rank			
			1	2	3	4
			Persons			
()	U. S. Grade A Hen	24.6	14	19	17	7
*	U. S. Prime Hen	52.6	30	7	11	9
%	U. S. Grade A Tom	15.8	9	17	17	14
&	U. S. Prime Tom	7.0	4	14	12	27

Labels remained on same birds in the evening. The panel members failed to rank the turkey labeled U. S. Prime Tom over the turkey labeled U. S. Grade A. This indicates that the panel members perceived the U. S. Grade A Tom to be of superior quality as compared to the turkey labeled U. S. Prime Tom. This action supports the original hypothesis. Again rankings were in significant agreement at the 1 percent level.

In previous tests the panel members had been ranking individual turkeys in order of preference. One seldom finds in grocery stores a selection of turkeys that do not vary in some way. The panel members were now asked to select their preference from turkeys where some variation existed similar to what one finds in grocery stores. Each class of turkeys consisted of two groups of two turkeys each, and each group contained some variation; but, the variation within one group (in the author's opinion) did not exceed the variation within the other group in the same class.

The first class was set up to evaluate preference of turkeys of the same quality using two different grade labels, and to get some idea of the quality connotation of the grade labels Prime and Grade A when applied to groups of turkeys. The turkeys in this series were of comparable A quality with the only difference being the grade label and price per pound.

Table 17. Influence of Price and Grade Label on Preference for Turkeys by the Detroit Preference Panel. February, 1960.

Class		Label	Cents per pound	% 1st place	Label	Cents per pound	% 1st place	% no choice*
I	A[1]	Prime	...	84.7	Grade A	...	11.8	3.4
I	E[2]	Prime	45	81.0	Grade A	45	15.2	3.8
III	A	Prime	...	71.2	Grade A	...	23.7	5.1
III	E	Prime	47	84.8	Grade A	45	12.7	2.5

1 A = Afternoon - 59 panel members

2 E = Evening - 79 panel members

*The cards of two panel members in both the afternoon and evening sections were unusable. At times one or two panel members were unable to arrive at a decision of first choice which explains the variation in percent no choice.

In each class the turkeys labeled Prime were preferred over those labeled Grade A. This preference for Prime increased when the price was increased 2¢ per pound over the Grade A price.

The results are significantly different at the 1 percent level using the Chi Square statistic. See Appendix page 43 for computation.

A class of turkeys was set up to test the theory that the best turkeys now being offered as A quality can be selected, labeled as "Prime" and sold at a premium price when the remaining A quality turkeys are labeled as "Choice". The results of this test are shown in Table 18.

Table 18. Influence of Grade Label and Price on Preference for Turkeys by the Detroit Preference Panel. February, 1960.

Class	Label	Cents per pound	% 1st place	Label	Cents per pound	% 1st place	% no choice
VA[1]	Prime	...	44.1	Choice	...	52.5	3.4
VE[2]	Prime	47	45.6	Choice	45	51.9	2.5

[1]A = Afternoon - 59 panel members

[2]E = Evening - 79 panel members

The data indicate that the consumer perceives the word "Prime" and "Choice" as being practically equal in their quality connotation. The differences are not significant at the 5 percent level.

Over 45 percent of the panel members preferred the turkeys labeled Prime at 2¢ per pound higher than the turkeys labeled Choice. The data indicate that a selected portion of turkeys now being marketed as Grade A can be sold at higher prices when they are labeled Prime and the remaining A quality turkeys are labeled Choice. Price studies would be needed to further test these results and to determine the amount of premium one could expect.

Two classes were set up to determine whether consumers would purchase turkeys labeled Choice that were B quality because of small bruises, small areas of missing skin, processing defects, and a few scattered pin feathers. These turkeys were A quality flesh and finish. The turkeys within these two classes were comparable B quality.

Table 19. Influence of Price and Grade Label on Preference for Turkeys by the Detroit Preference Panel. February, 1960.

Class		Label	Cents per pound	% 1st place	Label	Cents per pound	% 1st place	% no choice
II	A[1]	Choice	...	89.8	Grade B	...	6.7	3.4
II	E[2]	Choice	41	89.9	Grade B	41	5.1	5.0
IV	A	Choice	...	89.8	Grade B	...	5.1	5.1
IV	E	Choice	43	96.2	Grade B	41	1.3	2.5

[1] A = Afternoon - 59 panel members

[2] E = Evening - 79 panel members

The results indicate that consumers will accept Grade B turkeys of good flesh and finish but with minor defects when such turkeys are labeled Choice. This acceptance is conclusively shown by the vast majority selecting the turkeys labeled Choice as compared to similar turkeys labeled Grade B. Preference for the turkeys labeled Choice increased by 5.4 percent when priced 2¢ per pound higher than those labeled Grade B.

The differences between Choice and Grade B labeled turkeys are significant at the 1 percent level.

Previous tests showed that consumers prefer the grade label Choice to Grade B. The following classes were set up to determine the relative quality meaning of the grade label Good vs Grade B when they are compared to the grade label Choice.

In this test the turkeys labeled Choice were A quality. The turkeys labeled Good and Grade B were comparable B quality due to small breast bruises, pin feathers and damaged package materials. Results are shown in Table 20.

Table 20. Influence of Grade Label and Price on Preference for Turkeys by the Detroit Preference Panel. February, 1960.

Class	Label	Cents per pound	% 1st place	Label	Cents per pound	% 1st place	% no choice
VI A[1]	Choice	...	79.7	Good	...	17.0	3.4
VI E[2]	Choice	45	65.8	Good	43	31.6	2.5
VII A	Choice	...	78.0	Grade B	...	15.2	6.8
VII E	Choice	45	78.5	Grade B	43	18.9	2.5

[1] A = Afternoon - 59 panel members

[2] E = Evening - 79 panel members

The data show that with the use of the grade label Good 31.6 percent of the panel members ranked these turkeys as first preference when the price difference was 2¢ per pound; whereas, only 18.9 percent of the panel members selected the turkeys labeled Grade B as their first preference with the same price difference. Results show that the grade label Good is more acceptable than the label Grade B.

The data also show that when there was a price difference, the percentage selecting turkeys labeled Choice decreased when compared with those turkeys labeled Good; whereas, when comparable turkeys labeled Choice are compared to turkeys labeled Grade B, the percentage preferring Choice increased slightly when the price difference was 2¢ per pound.

There was a significant difference at the 1 percent level between the number of persons selecting Choice and those selecting either Good or Grade B.

It was established by this time that the panel members preferred the word grade labels to the letter grade labels. To determine to some extent if the use of these word grade labels could narrow the price spread between Grade A and Grade B turkeys, two classes were set up where the turkeys labeled Grade A and Choice were comparable A quality, and the turkeys labeled Good and Grade B were comparable B quality with moderate size flesh bruises on the posterior end of the keel bone and with B quality finish.

Results of this test are shown in Table 21.

Table 21. Influence of Grade Label and Price on Preference for Turkeys by the Detroit Preference Panel. February, 1960

Class	Label	Cents per pound	% 1st place	Label	Cents per pound	% 1st place	% no choice
VIII A[1]	Grade A	...	81.4	Grade B	...	13.6	5.1
VIII E[2]	Grade A	45	75.9	Grade B	41	21.5	2.5
IX A	Choice	...	79.7	Good	...	17.0	3.4
IX E	Choice	45	88.6	Good	43	8.9	2.5

[1]A = Afternoon - 59 panel members

[2]E = Evening - 79 panel members

The data show that only when the price spread is about 4¢ per pound will the consumer accept birds with moderate flesh bruises, and then only about 21 percent will select them. In this test narrowing the price spread resulted in an increased preference for the turkeys labeled Choice. This was probably due to the price spread of the turkeys labeled Choice and Good, and to the objection of the breast bruises. This was not totally unexpected since price is a symbol and nexus of quality to most consumers.

The main part of the study consisted of actual sales records of turkeys from three grocery stores located in different shopping areas of Lansing, Michigan. Space was not available to test all the comparisons previously made with the Detroit Preference Panel. Since only 1,500 Beltsville Small White Turkeys were available for the sales study, only grade labels Prime, Choice and Grade A were used.

All turkeys in the sales trial ranged in weight from 6 to 8 pounds. All turkeys were USDA inspected for wholesomeness and were USDA Grade A. Both the wholesomeness and the USDA Grade A labels were plainly visible on the breast of each turkey. The only difference in labeling was the colored shipping tag which was wired to the package at the posterior of the turkey. The tag carried the store imprint, grade label, net weight, price per pound and total price per turkey.

The turkeys labeled Prime were priced at forty-one cents per pound and the turkeys labeled Choice and Grade A were priced at thirty-nine cents per pound.

The results of this sales experiment are shown in Tables 22 and 23.

Table 22. Influence of Grade Label and Price on Turkey Sales, Lansing, Michigan. March, 1960.

Store[1]	Number sold				% of total sales
	Prime	Choice	Grade A	Total	
Cedar	120	178	124	422	31.9
Saginaw	144	248	158	550	41.5
Okemos	98	130	124	352	26.6

[1]Schmidt's independent retail grocery chain in Lansing, Michigan

This table shows the distribution of sales in each of the three stores used in the study.

Table 23. Summary of Turkey Sales, Lansing, Michigan. March, 1960.

Label	Number sold	% of total sales
Prime	362	27.3
Choice	556	42.0
Grade A	406	30.7
Total	1324	100.0

This table shows the number of turkeys of each grade label sold.

An analysis of these results by the Chi Square test for significance revealed significant differences in sales between the grade labels at the 1 percent level. This analysis was based on the hypothesis that the turkeys would be purchased in a 1:1:1 ratio. This hypothesis was rejected and it was concluded that grade labels had significance in influencing purchases.

DISCUSSION OF RESULTS

Grades were originally developed to facilitate trade by producers and distributors for trading in wholesale quantities and terminal market transactions. More recently they have become increasingly useful to retailers in buying and merchandising products and to consumers in buying.

One of the main problems of establishing grade standards and using grades is that such standards must be based on the qualities consumers look for and recognize as being quality determinants of a particular product. This study was an attempt to determine what consumers look for in determining quality of turkeys and how such quality should be labeled.

Value and quality of a product are what the individual perceives as value and quality, nothing more. Who is to say that a turkey that has been classified as B quality because of some missing skin, a broken bone, or one that is lacking in finish is not a high quality turkey? There is no known difference in the nutritive value of turkeys that do not conform to the present arbitrary standards of A quality as compared to those turkeys that do conform to these standards. Certainly the consumer did not reject such turkeys in this study when these turkeys were labeled with word grade labels, but they did reject them when they were labeled with Grade B - a term that by its definition implies something of inferior quality.

It was found that lack of flesh and discoloration from bruises were the two most important defects that were unacceptable by the consumer.

It was also found that word grades Prime, Choice, and Good were grade labels that were perceived to represent high quality and these labels were proved conclusively to be more acceptable than labels Grade A and Grade B.

Tests using the Detroit Preference Panel were in agreement that word grade labels were a more acceptable means of identifying turkey quality. This was also proved in the sales test by 1324 consumers who bought turkeys with their own money. The sales test is even more conclusive when it is remembered that 69% of the purchasers during this test actually bought turkeys labeled either Prime or Choice when the USDA Grade A label was plainly visible on the package of each turkey offered for sale. These purchases proved that the hypothesis that the turkeys would be purchased in a 1:1:1 ratio was incorrect. This means that the grade labels used significantly influenced purchases of turkeys. See Figure VIII.

The series of tests conducted with the Detroit Preference Panel also showed that the consumer purchases turkey based mainly on the appearance of the turkey as evidenced by the continued selection of a particular turkey even when the label was changed. In each case where this happened it was noted that the word labels Prime and Choice influenced the rankings, in some cases changing the significance of the differences between the two turkeys being compared.

Such action on the part of the panel members and in the subsequent sales test prove that the original hypothesis that the

Figure VIII. Unidentified Shopper Making Purchase During Sales Test

consumer will purchase a turkey based primarily on its appearance and that the consumer will purchase the turkey labeled with the grade label that has the highest perceived quality connotation when the turkeys are of comparable quality is correct.

While it is not the purpose of the author to editoralize, it does seem inconsistant not to mention the potential value of this study to the turkey industry.

The turkey industry cannot afford to let their opinions regarding grade labeling stagnate and become resistant to change in face of a changing food marketing era. To do so invites competing products to continually prosper at the expense of the entire turkey industry.

There seems to be some "magic" associated with the terms "Prime" and "Choice" as symbols of quality, and those engaged in the production, merchandising and retailing of turkeys would profit substantially by taking advantage of these silent salesmen. The results of this study would also apply to the marketing of cooked items as well as parts. The economic potential which would result from the revision of the present grade standards of quality and adopting the word grade labels used in this study is tremendous.

SUMMARY AND CONCLUSIONS

Under the sponsorship of the National Turkey Federation a study was undertaken to evaluate consumer preference of word grades vs letter grades of turkeys. Several pre-tests were conducted at Wayne State University in Detroit using the Detroit Preference Panel to get consumer reaction to word grades "Prime", "Choice", "Good", and "Commercial" in comparison to Grades A, B, and C.

Later actual sales of turkeys were conducted in three grocery stores located in different shopping areas of Lansing, Michigan.

From the results of this study several conclusions can be drawn.

The consumer prefers word grades "Prime", and/or "Choice" to Grade A. Sixty-nine percent of the sales were of the "Prime" and "Choice" grades while only thirty-one percent was of Grade A. The data further show that about twenty-five percent of the consumer size (4-14 pounds) with the best conformation can be sold at a premium price when labeled "Prime".

Since the sales trial gave validity to the results of the Preference Panel, it is concluded that the consumer prefers the word grade "Good" to letter Grade B.

It was found that the consumer will reject turkeys that lack flesh and those with moderate discolorations due to bruises.

This rejection of bruised turkeys held true with the use of the preferred "Choice" label.

This study revealed that a major revision of the turkey standards of quality is needed to take advantage of the more liberal opinions which consumers have as to what represents acceptable quality and how such quality should be labeled. Consumers demonstrated during this study that they do not like and will not buy turkeys labeled Grade B. They do like and will buy the same turkeys if they are labeled Choice or Good.

Based on the results of this study, it would be desirable and profitable to change from letter grading of turkeys to the use of word grades, and that this change would be readily acceptable by the consumers. Such a revision of the present grade standards would be profitable to producers, distributors, and retailers and at the same time give to the consumers a turkey labeled in such a manner that is more acceptable and has more meaning.

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APPENDIX

1. Computation of the Coefficient of Concordance

Table 1. Influence of grade label and price on preference for Turkeys by the Detroit Preference Panel. Afternoon, May 1959

Symbol	Grade label	Cents per pound	% 1st place	Rank 1	Rank 2	Rank 3
%	U. S. Prime	39	68.8	33	8	7
&	U. S. Choice	36	4.2	2	33	13
()	U. S. Commercial	33	27.1	13	8	27

Symbol	Rank times number within each rank totaled
%	70
&	107
()	110

$$\bar{x} = \frac{\text{ranks of all samples}}{\text{number of ranks}}$$

$$\bar{x} = \frac{287}{3}$$

$$\bar{x} = 95.6667$$

M = persons making rankings 48

N = samples 3

Symbol	$- \bar{x} =$	d	d^2
70	- 95.667	-25.667	658.795
107	- 95.667	11.333	128.437
110	- 95.667	14.333	205.435
			992.667 sum of actual deviations

$$W = \frac{12\,(d^2)}{M^2(N^3-N)} = \frac{11912}{55296} = .2154$$

$$X^2 = M(n-1)W$$
$$48(2)(.2154)$$
$$20.6784*$$

*Significant at the 1% level

2. Computation of Chi Square for class 1A table 17

Class	Label	number selecting*	% 1st choice
I A	Prime	50	84.7
I A	Grade A	7	11.8

* 2 panel members made no selection

$$X^2 = \frac{\sum (f_i - F_i)^2}{F}$$

X^2 = Chi Square

f_i = Observed frequency

F_i = Expected frequency

$$X^2 = \frac{(50-29.5)^2 + (7-29.5)^2}{59}$$

$$= \frac{926.5}{59}$$

$$= 15.70*$$

*Significant at the 1% level

3. Computation of Chi Square for sales test

Label	number sold	% of total sales
Prime	362	27.3
Choice	556	42.0
Grade A	406	30.7
	1324	100.0

$$X^2 = \frac{\leq (f_i - F_i)^2}{F}$$

Expected sales ratio

1:1:1

$$= \frac{(447.33-362)^2 + (556-447.33)^2 + (447.33-406)^2}{447.33}$$

$$= \frac{20787}{447.33}$$

$$= 46.50*$$

*Significant at the 1% level

. 4. Labels used to identify grades during sales test

MICHIGAN STATE UNIVERSITY
Consumer's Opinion of Produce Quality

TURKEYS

I. * _____
% _____

II. ( ) _____
_____

III. & _____
% _____

IV. ( ) _____
* _____

V. # _____
% _____

VI. * _____
& _____

VII. ( ) _____
% _____

VIII. # _____
& _____

IX. % _____
* _____ *

Name _____ Comments _____

_____

5. Sample panel report card