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THE DEVELOPMENT OF FEDERAL STANDARDS FOR THE [CERTIFICATION OF FARM PRODUCTS IN THE UNITED STATES]

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THE standardization and certification of farm products by the United States Department of Agriculture roots deeply in the needs of our agriculture. This service traces fundamentally to the desires of producers, dealers, and consumers for a uniform and universal yardstick with which to measure variations in the quality of farm products as a basis for trading in them. Before the advent of federal standards this desire was expressed in the form of local standards or brands set up by individuals, associations, chambers of commerce, and states. It was a period of much confusion growing out of a lack of uniformity in the standards, as well as a lack of uniformity in their application. It was the heyday of the deceptive pack and acrimonious disputes.

The increasing distance between producer and consumer resulting from the specialization of agriculture in areas far removed from markets intensified the problem and added further complications. Difficulties thus experienced in the marketing of farm products did much to shape sentiment in favor of a service of government standards and certification.

Another condition favoring the development of federal standards was the need for measures of quality as a basis for market quotations and information relating to farm products. Without standards it was impossible to make adequate price comparisons between markets or between periods. With the passage of special legislation in 1916 providing a definite appropriation for a market information service, the development of standards became imperative. Even today, in the case of some commodities the standards are used primarily as a basis for market reporting rather than for certifying as to grade.

The financing necessities of agriculture provided additional reasons for federal activity in this field. The passage of the Federal Warehouse Act was brought about in large measure by the condition of the cotton market in 1914. Within a few days following the outbreak of the World War, the cotton exchanges of Liverpool, New York, and New Orleans closed. There was no market for

cotton, although the banks of the North and East had ample resources. A precipitous drop in cotton prices to ruinous levels followed. Northern money could not be attracted to the South and southern banks were not in position to finance southern growers. Warehouse receipts in these circumstances appealed as effective instruments with which to tap sources of credit, but it was soon realized that the receipts then in circulation were of little value outside of the immediate territory in which they were issued. In order to attract capital from the North it was necessary to provide warehouse receipts carrying information that would enable bankers at a distance to appraise the market value of cotton covered by such receipts and that would convince bankers that there was responsibility back of the warehousemen issuing the receipts. Provision was accordingly made in the Federal Warehouse Act for requiring a statement of the grade on the federal warehouse receipt according to federal standards and for supervising the determination of the grades and the operations of the warehousemen.

As early as 1907 the need for federal standards was recognized in the appropriation act covering the work of the Bureau of Plant Industry of the Department of Agriculture and studies were initiated to provide the basis for such standards. The World War and the demand for food conservation and the elimination of waste, however, seem to have given the first substantial impetus to the development of federal standards and certification of farm products. The passage of the Cotton Futures Act in 1914 requiring the use of federal standards in future trading in cotton definitely established the Department of Agriculture in this work. The Grain Standards Act of 1916 required the use of federal standards in interstate commerce when grain was sold on grade. The United States Warehouse Act of 1916 also required that federal grades be shown on warehouse receipts except when depositors of products requested their omission. The Food Products Act of 1917, a war emergency measure for conserving food supplies, provided authority for the establishment of permissive or optional standards and an inspection service on fruits and vegetables as well as other products. These acts, together with the Cotton Standards Act of 1923, requiring the use of federal standards in all cotton transactions based on grade, and the inclusion annually of authority in the appropriation acts of the Department

of Agriculture have given the standardization and inspection service of the Department permanent legislative status.

INFLUENCES SHAPING FEDERAL STANDARDS

It is upon this ground-work of legislation that standards for farm products have been built. The standards themselves, however, are a product of evolution and have been shaped by conditions within and without the industry. It may be well to consider for a moment some of these influences.

Naturally, the standards reflect variations in agricultural commodities themselves. Farm products as contrasted with most products of industry present a wide range in qualities, because of varietal, environmental, and seasonal influences. In our extension efforts to eliminate undesirable varieties in agriculture, we have something akin perhaps to the "simplified commercial practice" of industry, but the process of eliminating undesirable varieties and undesirable qualities of the products of agriculture is a slow one at best and standards must be developed for agricultural products as they come from the soil in all their variation. Emphasis on quality factors, accordingly, will necessarily vary with the commodity. Foreign material, for example, is more readily removed from beans than from wheat; it is therefore given a different emphasis in the standards for beans than in the standards for wheat. Furthermore, farm commodities change with production practices. A class of wheat as grown today contains less admixture of other wheats than was true some years ago. This makes it possible and desirable to reduce the admixture of other wheats previously allowed under the standards. Aside from the variations in nature, some agricultural products lend themselves to mixing—a condition that is reflected in the efforts to formulate standards that permit desirable mixing but discourage objectionable mixing.

On the other hand, the demand for agricultural products is far from uniform. The preferences and requirements of consumers may vary materially from market to market, as well as from period to period. The Boston market, recent studies show, pays a substantial premium for green asparagus, while Springfield consumers, 100 miles or so away, disclose no like preference for color in this vegetable. The standards, admittedly, can not accommodate themselves to all gradations and shifts in consumer requirements, but

they seek to cover as far as practicable the major variations in market demand.

Then, too, changes in industrial technique or in methods of marketing may greatly alter the importance of quality factors or quality standards. As a result of revolutionary developments in methods of milling, hard wheat which previously sold at a discount now sells at premiums. In earlier times, before the development of modern transportation and cold storage facilities, cheeses were kept in curing rooms at factories until well cured. Today large dealers have facilities for holding cheese during the curing and ripening processes and both fresh and ripened cheeses find their way to the wholesale and consumer markets.

Nor should the fact be overlooked that the progress attained in research and standardization technique has a marked bearing on the formulation of the standards. The improved colorimeter, for example, permits the definition and measurement of the color factor with an accuracy never before possible. Progress in the field of price analysis is now making it possible to measure quantitatively the market importance of certain quality factors. But perhaps sufficient has been said to emphasize the fact that the development of standards for agricultural commodities presents peculiarly complex and difficult problems and that such standards must evolve with changes in the commodities and in the industry as well as with advances in technical knowledge.

GENERAL PRINCIPLES UNDERLYING FEDERAL STANDARDS FOR FARM PRODUCTS

Certain broad principles have come to be recognized as fundamental in the development of federal standards. In the first place such standards cover significant gradations in quality. The standards established for trading in agricultural commodities therefore are not the minimum standards of the pure food legislation and are not directly comparable with the commercial standards of industry. Instead, they cover all segments of the supply and afford a basis for trading in all qualities of the product.

The standards in the main reflect the normal spreads in the market value of a commodity. It is contemplated that steps between grades on the average will correlate fairly closely with the price differentials that obtain in the market. Until quite recently,

however, there has been no adequate measure of the price significance of separate quality factors; in fact, some quality factors affecting prices may not yield to statistical measurements. Observation and judgment, therefore, must be employed in measuring the market significance of quality factors while more adequate measurements are being devised.

On the other hand, we cannot expect the relationship between the grades and market price differentials to remain constant. The price spreads between grades of a product frequently are influenced by the relative supply of the product that falls within each of the grades. But apart from the influence of variations in the supply upon price differentials, it is apparent that these differentials are not always based upon differences in the intrinsic or objective value of the product. In other words, premiums and discounts may reflect buyers' opinions as to value which do not always correspond to intrinsic value. Prior to the adoption of federal standards, for instance, "pea-green color" was the factor of quality in alfalfa hay which commanded a premium. Studies have disclosed that the feed value of alfalfa hay correlates more closely with its leafiness, and the factor of leafiness therefore is given greater emphasis than color in the standards. The influence of the standards and the educational work accompanying their introduction is reflected, it is believed, in the steadily increasing premiums paid for "leafy" as compared with "pea-green" alfalfa.

Thus for some commodities standards are formulated that express the relative food, feed, processing or manufacturing utility of the product. Such standards, even though they may not always correlate closely with price differentials, assist in bringing about a better adjustment between prices and variations in quality.

A still further requirement of the federal standards is stability from year to year. They are not shifted from season to season depending upon the quality of the crop. On the other hand, the standards are not static but are flexible in the sense that they are adjusted from time to time to significant longer-time changes in the character of the product and in market requirements, and to progress in technique.

The standards are uniform within reasonable limits throughout the country. Federal standards are national in scope and cannot vary from region to region. They therefore cover characteristics common to products grown in all major regions and do not re-

flect the characteristics that are peculiar to products in only limited areas, except where differences in the quality of a product are so marked as to differentiate them as separate classes of the product.

In the standardization work of the Department of Agriculture it is deemed important that the standards be thoroughly practicable in the buying and selling of farm products. Established trade practices are reflected in the grades as far as possible, and every reasonable effort is made to secure the adoption of the standards by the industry. Although the federal standards in many cases have replaced the private standards or brands previously prevalent in the industry, the experience of the trade with private standards has played no small part in the development of the federal standards.

STRUCTURE OF THE FEDERAL STANDARDS

A consideration of the structure of the federal standards would lead us into a technical field with which it would be impracticable to deal at this time. The factors selected to represent quality naturally vary with the commodity. Cotton is graded primarily on the basis of color and freedom from trash, while length of staple is dealt with separately. Grain is graded on numerous factors of quality, among which test weight, moisture content, foreign material, damage, and the various factors of condition, such as coolness, heating, sweetness, sourness, and so forth, are of fundamental importance. The wool standards are at the other extreme and at the present time are based on only one factor, the diameter of the fiber. It is well to observe here, that standardization has not progressed equally in regard to all commodities. For some products, much remains to be done before all significant factors of quality can be adequately appraised and given their place in the grades.

The emphasis placed upon quality factors likewise varies with the commodity. Color, for instance, is more important as a factor in the market value of hay than of wheat. Even in hay, color is regarded as a more important index of quality in timothy than in alfalfa hay. In the case of some factors it is possible to apply accurate measurements, as of the moisture of grain and the color of hay. In the case of other commodities, such as livestock, the present resort must be to purely descriptive terms. For some com-

modities, moreover, the quality factors are weighted in arriving at the grade, whereas in others this is not so feasible.

The points at which the upper and lower limits of grades are placed likewise differ with commodities. The limits of a grade must be wide enough apart to avoid technicalities that impair their practical use. On the other hand, if the limits are not reasonably narrow, significant differences in quality between commodities near the bottom and those near the top limits of the grade will result. Naturally the success of a grade in reflecting the market value of a product will depend upon the completeness with which it deals with the factors influencing price and upon the range of quality permitted within it. It will thus be seen that in the formulation of grades each commodity presents a problem by itself.

PROGRESS IN MORE ACCURATE MEASUREMENTS OF QUALITY FACTORS

The quantitative measurement of quality factors in agricultural commodities presents unusual difficulties, and researches to date have not developed mechanical or chemical tests with which to measure all factors of quality. In fact, the standards are still more or less empirical, and grading according to them, to a large extent, rests upon the expertness of the grader.

It is an encouraging fact, however, that greater definiteness in the specifications of the standards and in certification according to them is gradually being attained. This is the result of research. Ten years ago only a few mechanical and chemical tests were used successfully by the Department of Agriculture in measuring quality factors; today such tests are constantly increasing in number and efficiency. Ten years ago such tests were applied in the case of only three or four commodities as compared with many commodities today.

Where previously it was necessary to describe in general terms a factor of quality in a commodity, it is now possible to give that factor specific value in the standards. Three of the factors of quality in grain—moisture content, test weight, and cleanliness—lend themselves to determination by chemical and mechanical tests. A new device for determining the moisture content of grain, based on the principle of measuring the resistance to an

electric current as it passes through a body of grain, is in process of development and promises to replace the old method commercially. The new method requires only thirty seconds for a determination as compared with forty minutes under the old method.

Both the Federal Department of Agriculture and the state departments of agriculture have employed technical tests for some years in measuring certain quality factors in fruits. The saccharimeter is used in determining the sugar content of grapes in accordance with the standards. The sugar acid test for maturity of citrus fruits and the specific gravity test for maturity of cantaloupes are employed by several states in the enforcement of state laws prohibiting the shipment of immature fruit. In the examination and grading of canned fruits and vegetables a pressure gauge is used to ascertain the "vacuum condition" of the can, the density of sirups is tested with hydrometers, brine solutions are tested with salinometers, and penetrometers are used in determining the consistency of such products as canned pumpkin. With the colorimeter it is now possible to measure with satisfactory definiteness gradations of color in hay, cotton and honey. The development of an improved cotton-fiber sorting machine permits the measurement of the uniformity of fiber lengths with a high degree of accuracy. With the bundle fiber test the strength of cotton fibers can also be ascertained.

Additional tests, such as a mechanical device to measure the maturity of canned corn, the fruit pressure tester to determine the maturity of plums, apples, and pears, are now in process of development. Studies in the field of price analysis are showing us how better to evaluate quality factors from a market point of view. Studies of the palatability of such products as meat are expected to help establish the relationship that exists between external evidences of quality and the quality of the product itself.

The tendency throughout is to substitute, wherever possible, accurate technical tests for human judgment in the appraisal of quality factors, but it admittedly will be difficult to devise technical tests with which to measure quantitatively such factors of quality as flavor and odor. Furthermore, the tests must be of a simple and practical nature if they are to serve in the commercial certifying of commodities. But even though the difficulties to overcome may be numerous, the possibilities in this field are well-

nigh limitless. Encouraging progress, moreover, is being made on this type of research.

LIMITATIONS OF THE FEDERAL STANDARDS

It is freely recognized, of course, that the federal standards have their limitations. Because of their very nature it can not fairly be expected that they would meet all requirements of producers, consumers, and dealers. Some hold that the standards are couched in too general terms; that they are too purely descriptive and do not afford an adequate basis for measuring variations in quality. There is merit in this suggestion but the difficulty inheres in the product itself, and the limitations of our knowledge. There is at present no known method of measuring quantitatively many quality factors and there is therefore no alternative in these instances to descriptive terms based on observation and judgment. Fortunately, researches are yielding more and more accurate measures of quality factors.

Some of the present grades, it has been found, do not adequately reflect market values, but in general there is a reasonably close correlation between the grades and market prices. The price studies of quality factors now under way are yielding valuable information in this connection. Although confined to but a few markets, these studies are showing that the grades for some products are satisfactory for those markets, whereas the grades for other products are less adequate. Some adjustments in grades have already been made as a result of these studies.

It has been suggested that the margin between the upper and lower limits of some grades is too wide and that they do not adequately reflect qualities peculiar to the products of various regions. The purpose of national grades is to serve the entire industry; this makes it impracticable to narrow the grade limits to the point where they cover all gradations in quality. It is believed that the characteristics of a commodity that are peculiar to a region and that have market value may well be covered in additional comments, made by those locally interested, to supplement the federal grades.

Perhaps it may be found, as some have suggested, that different sets of standards may prove desirable at different stages in marketing. Special consumer grades specifying qualities with-

in narrower limits may be found more practicable for the consumer at retail than are the present grades so largely used in wholesale transactions. It is worthy of observation that at least some of the federal standards lend themselves to successful use in retail channels. This is true of the standards for butter, cheese, poultry, eggs, and meat. In general, the question of consumer grades is one of the many standardization problems still awaiting solution.

ADOPTION AND USE OF FEDERAL STANDARDS

After all, the best test of the practicability of the standards is the use to which they are being put. The federal standards have not as yet completely established themselves in all parts of our agriculture. By some groups their adoption and use is even vigorously opposed. But it must be remembered that the standardization program of the Department of Agriculture has been in progress for the brief period of only fifteen years. In that short time federal standards have been widely adopted for use in this country and even in many foreign lands.

Some of the federal standards are mandatory and their use is required in interstate transactions based on grade. This is true of the standards for both cotton and grain. Federal standards must also be used on federal warehouse receipts except where depositors request that grade certification be omitted. On the other hand, all other federal standards are of a strictly permissive character and their use is wholly voluntary, except that certain states have made the use of certain federal standards obligatory under specified conditions.

Since 1914, standards for practically every agricultural commodity have been issued. Within each commodity may be several classes or types for which separate sets of standards have been provided. In many cases these standards have been adopted as official standards by states, exchanges, and associations. Ten years ago, for example, thirteen states had their own grades for barrelled apples; today only five have such grades. Under a special agreement, reached in 1923, with the European cotton exchanges, the grade standards for cotton were issued as Universal Standards. The standards for grain and other commodities are also receiving recognition in many foreign lands.

Perhaps the most concrete evidence of the usefulness of the

federal standards will be found in the records of the inspection service. Certification under the standards is made in large part by inspectors licensed by the Department of Agriculture. Unfortunately a common basis for comparing certification of the various commodities is not available. The certification of grain and cotton according to federal standards is mandatory when the commodity is sold according to grade; for other commodities certification is wholly voluntary. Under these mandatory requirements a total of 1,353,800 carloads of grain were inspected in 1918-1919; ten years later (1928-1929) these inspections had mounted to 1,916,940 carloads, an increase of 42 per cent. Similar data covering inspections by licensees are not available for cotton, but the increased distribution of type samples and the growing number of licensed cotton classers are indicative of the growing use of federal standards in the merchandising of cotton.

The record of inspections under the purely permissive standards is a varied one. In all commodities there has been substantial progress, in the volume of products inspected, although in the majority of cases the inspections account for only a small percentage of the commercial supply, ranging from less than one per cent in meats to as high as 80 per cent in the case of potatoes. For a group of products as a whole, the use of the permissive standards is perhaps most marked in fruits and vegetables. In 1918, the inspection of fruits and vegetables covered slightly over 6,000 carloads; by the current year the quantity inspected amounted to over 288,000 carloads, representing better than 25 per cent of the carlot movement for the entire country. The use of standards by the fruit and vegetable industry has expanded markedly at shipping points; 94 per cent of the certificates issued during the current year were based on federal grades, and 85 per cent of all inspections were made at shipping point. This growing use of inspections at shipping points forcefully illustrates the value that shippers attach to the service. When this is coupled with the further fact that the inspections are made for a fee and that the shipping point inspection is practically self-supporting it becomes evident that this service is selling itself.

The desire for standardization and certification of farm products recently has taken some new directions. Cannerymen expressed a wish to purchase vegetables from producers on the basis of grades, and canning-tomato grades were accordingly issued in 1926. This

year 57 canners, located in ten states, indicated their intention of contracting with their growers for the 1930 crop on the basis of federal grades.

Standards for canned fruits and vegetables are fast becoming an important factor in the financing of the canning industry. More recently the demand has materially broadened to cover their use in the buying and selling of canned foods. Under present legislation, however, the use of federal standards for canned fruits and vegetables is limited to products stored in federally licensed warehouses. The growing demand for this service on canned products for merchandising purposes is illustrated by the stipulation of a large chain grocery company that all canned tomatoes purchased for its account have to be shipped to federally licensed warehouses, the avowed purpose being to have the goods inspected on the basis of federal standards.

ECONOMIC VALUE OF FEDERAL STANDARDS AND CERTIFICATION

In the short span of a decade and a half, federal standardization and certification of farm products have become integral parts of our agricultural structure. It now remains to perfect this service. With all the shortcomings of present standards, the advantages of national, uniform, and reasonably definite standards over the old hodge-podge of local, vague, and conflicting trade standards and brands are apparent, and producers, dealers, and consumers are recognizing to an increasing degree the benefits accruing from their use.

For the first time in our history the country as a whole has a common language in which to express gradations in the quality of farm products. Federal standards provided this language. This was a fundamental step in agricultural marketing. The standards supplied an indispensable basis for price quotations the country over, and made possible a comprehensive nation-wide market information service reaching all major markets. These Siamese Twins—federal standards and market news—have brought widely separated buyers and sellers closer together. They have helped the farmer to obtain the price to which the quality of his products and the condition of the market entitle him. The flat, average price paid to the producer for his product, irrespective of its quality, is not a thing of the past, but its heyday is passing.

This double service has helped to make the farmers' market

world-wide. The area over which demand can operate sensitively and quickly has been vastly broadened. The distant buyer can purchase on the basis of grade and be reassured, within narrow limits, as to the characteristics of the product he buys. Under such conditions every product, according to its quality, is helped to find its most advantageous market.

The guarantees of quality afforded by an impartial national service of standards and certification not only broaden the market, but reduce the merchandising risk incident to undesirable or fraudulent deliveries on contracts. Such risks are usually covered in the prices offered by the buyer, and this levy upon the dollar of the producer and consumer will be materially reduced, it is believed, with the general adoption of the federal certification service.

Needless to say, federal standards and certification have greatly facilitated future trading in agricultural commodities. In future trading the buyer can not choose the particular seller with whom he will trade; his protection therefore must be in the accurate certification of the product under standards that adequately describe it. This protection is a necessary safeguard to future prices, for without it the disposition of the buyers would be to "run from the delivery," and thus withdraw support on the buying side and create pressure on the selling side.

It is the general observation of those associated with the inspection service that federal standards and certification have facilitated a meeting of minds between buyer and seller and placed the ethics of the market place on a higher level. Where the service is regularly used, deception and fraud by either buyer or seller are more difficult. Pernicious practices, such as undergrading and unjustified rejections, which have been all too common in the merchandising of some products, thrive less well in the spot light of federal inspection. But unfortunately, education and service alone seem unable to purge the industry of some mal-practices and resort must be had to regulatory legislation, such as the Perishable Agricultural Commodities Act, passed in the recent session of Congress, which requires the licensing of carlot dealers in fresh fruits and vegetables and the supervision of certain transactions in that trade. In the administration of this far-reaching piece of legislation—and this accounts for the introduction of this thought—an effective arm of the Department of Agriculture will be its standardization and inspection service.

The reflection to producers of price differentials according to quality is registering an influence upon agricultural production, though perhaps not as rapidly as we should like. But farmers are sensitive to the price incentive—in fact one is led to wonder at times if they are sensitive in their production plans to anything else. The shifts, for example, that have taken place in the production of fruit and vegetable varieties indicate that farmers are responsive to price differentials and seek to produce what the public wants to buy.

But the all-important element in the standardization program—grades on which individual consumers can buy—in my opinion has been passed over all too lightly. What chance does the housewife with her limited knowledge of the factors affecting quality have before a slab of red meat or a shelf of tin cans covered with colorful and beautifully embossed labels that tell nothing? And yet what guides to quality have we supplied her? A limited number, yes. The stamping of meat cuts, the tagging of turkeys, and the certificate in the pound of butter, constitute a partial response to this demand, but we must go much farther. Until the individual consumer thinks in terms of qualities and buys on the basis of grades that signify quality, there can not be the most sensitive adjustment of price to quality.

The Department of Agriculture is devoting a substantial part of its resources to the development of standards for farm products. To some it may even appear that standardization has become somewhat of a fetish with the Department. Be that as it may, federal standards are a means to practical ends. Without them the basic facts of the markets could not be had in comparable and understandable form. Without them merchandising farm products on the basis of quality would be seriously crippled. And without them the basic materials of economic research would lose much of their meaning and usefulness.