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Characteristics and Feasibility of Marketing Texas Grease Wool On a Known Quality Basis

THE AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS
TEXAS AGRICULTURAL EXPERIMENT STATION
R. D. LEWIS, DIRECTOR, COLLEGE STATION, TEXAS

Summary

The domestic wool industry is faced with increased competition from well-prepared foreign wools and man-made fibers. The per capita consumption of wool has remained fairly constant during the past 25 to 30 years, but the per capita consumption of man-made fibers increased from 1 pound in the late 1920's to more than 10 pounds by 1957.

Wool generally has been sold, and is still sold to a large extent, on the basis of a flat price per pound, with little regard to the various quality factors involved. There appears to be a definite trend away from this practice and, as a consequence, core sampling has increased. Other quality factors such as fineness and length need to be determined objectively. Practically all wool is sold in country markets on the basis of a visual appraisal and estimates of shrinkage.

Market prices for Texas wool should equal central market prices after handling and transportation costs are considered. There is considerable variation between central market prices and Texas prices for grease wool. More than one-fourth of all prices compared varied 10 cents or more per clean pound from the calculated price, or true value, of the wools. More than 5 percent of the variations were 20 cents per clean pound or more. Almost 65 percent of these variations were below the price that producers should have received during 1957-59, based on measurement at the three warehouses in this study.

A total of 2.8 million pounds of grease wool was sampled during the 3-year period. The wool produced an average of 45.9 percent clean wool. Only slightly more than 85 percent of all wool

sampled was fine (64's and finer). The average length was 2.8 inches. The average color was slightly above a *B* color, and the average crimps ran 15.5 per inch.

The average size lot was 8,903 pounds. The lots sampled showed an average of 56 bags with an average bag weight of 158 grease pounds.

One-third of the total volume of clean wool sampled and sold brought more than the calculated price; two-thirds sold for less than the calculated price. The wool actually sold for $1,536,722.68, but it should have brought $1,566,074.07. During the 3-year period, 750,000 pounds of wool brought growers $64,120.24 less than it should have brought according to calculated prices. A total of 496,000 pounds brought growers $34,768.85 more than it should have brought according to calculated prices.

Correlations between the calculated price and the actual price indicate that wool sold on a core test alone more nearly approximates the price it should have brought than does that sold on an estimated basis, even in those cases where the core results were known to the warehouse operator.

Correlations between calculated prices and actual prices for wool sold each year at each warehouse were rather low. Correlations between the prices at all warehouses for any 1 year or at any warehouse for all 3 years were considerably higher.

Buying on averages exists and is substantiated by the close correlation obtained on all observations for all years at all warehouses. This situation is highly desirable from the standpoint of the buyer since it enables one who overpays on a particular lot to underpay on another. More lots are bought under the actual price they should have brought than are bought above this price. This relationship holds true on both a poundage and lot basis.

Many benefits are to be derived from an objective classification system. Growers will derive more direct benefits than any others concerned. On the basis of the 3-year sample, growers could reasonably expect to receive more than half a million dollars additional annually for their wools. In Texas, this extra income would pay for the new system and still leave a definite annual increase. Growers also could use such a system profitably as a basis for flock improvement. Information obtained in sampling wool for sale on a descriptive basis will yield valuable information to sheep breeders in the selection of superior breeding animals.

Marketing agencies stand to gain improved information on which to base their sales, for under an objective classification system those lots similar in quality could be assembled for sale at less expense than is now the case.

Buyers probably would pay more for the wools required to meet their particular demand if an objective classification system were in use. Buyers would be able to locate various qualities of wool, however, at much less expense than at present and with much more speed. In addition, more wool could be sold on a description basis, which would eliminate much expense now involved in obtaining wool.

Recommendations

A system of objective wool classification is desirable. Knowledge about the various quality relationships and their value is lacking, but indications are that clean content, length and fineness should at least be included in such a system. Additional characteristics that should be investigated more fully and included if warranted are color, crimp, strength and vegetable matter.

An objective system of classification would be economical. Such a system offers more gain than loss to the wool industry. The system proposed should add more than half a million dollars annually to the income of Texas wool producers. It should cost slightly less and should provide a basis for improved flock productions and, therefore, greater net income from sheep.

The system proposed can be integrated easily into and be financed through the existing system of marketing. Facilities for performing the measurements are available, and with little effort the system could begin in the immediate future.

The National Wool Act of 1954 and its subsequent revisions have involved incentive payments to wool growers based on quality (as reflected by price). The higher the quality, and the price, the more the incentive payment, since the program pays a percentage of the market price. The ultimate aim of wool growers, consequently, should be to improve quality as well as to increase production. A portion of incentive payments, moreover, have been set aside to promote the consumption of sheep and the products of sheep production. The funds so appropriated have been used mainly for advertising. A program aimed directly at improving the quality of wools and flocks would be in order. The system of objective wool classification suggested not only would promote production of higher quality wools but also would provide a basis for it through eventual flock improvements. This dual gain would improve the competitive position of domestic wools.

Contents

Acknowledgments

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Characteristics and Feasibility of Marketing Texas Grease Wool On a Known Quality Basis

*Robert L. Holland, Robert L. Hunt and Stanley P. Davis**

TEXAS LEADS THE NATION IN ANNUAL WOOL PRODUCTION, but between 1951 and 1959 the percent of the total domestic clip produced in the State declined from a high of 21.4 percent in 1959 to 16.1 percent in 1958. Texas wool production accounted for 17.6 percent of the 1959 domestic clip, an increase of 1.5 percent over the State's 1958 production. Texas produced slightly more than 44 million pounds of grease wool in 1959, Table 1. Better range conditions and the National Wool Act of 1954, which provided for an incentive payment to producers of shorn wool, probably caused the increase in 1959.

There was a general decline in the value of the annual grease wool clip in both Texas and the United States between 1951 and 1959, Table 1. The farm value of the 1951 Texas clip to the producer was approximately three times that of the 1959 clip since production was much greater in 1951 than it was in 1959 and the average price per pound was considerably higher. The situation in Texas reflects the general situation in the United States as well, for although the total domestic wool clip of this country in 1959 was slightly above the 10-year average of 1949-58, Table 1, the value of the U. S. domestic wool clip for 1959 was, like that of Texas, only about one-third of the value of the domestic clip for 1951.

One problem now faced by the U. S. wool industry is the inability of domestic wool producers, warehouse operators and wool buyers, using present subjective means, to evaluate consistently and accurately the various quality characteristics of grease wool for marketing and manufacturing purposes. Much wool is sold, therefore, especially by producers, on a flat price basis, which is affected little by individual lot quality. Such pricing offers little inducement to ranchmen to improve either wool quality or preparation (7).

The physical and chemical properties of wool determine its use as a textile fiber. The major physical characteristics of wool are fineness and length of fiber, and actual clean wool. Other factors that determine its commercial value are crimp, color, strength, character and elasticity.

Most wool sales are made on the basis of visual inspection and expert quality assessment (9). Recently, wool technologists also have developed scientific means of measuring objectively some of the important physical properties of wool. They have devised sampling methods and laboratory tests for the determination of fineness, length and clean yield on small wool quantities or samples. These tests may be applied to commercial size lots of wool, but their reliability depends largely on whether the samples selected are truly representative of the lot (9) (13).

Before 1947, U. S. wool marketing had undergone relatively few changes since the earliest days of commercial sheep production. Clips or lots of wool were sold almost entirely on the basis of quality and value estimates. Such estimates were generally visual estimates and they were concerned with clean content, fineness, staple length, variability, color, soundness and other physical properties (10).

Accurate determination of actual value of a grease wool lot by visual estimate, however, has proved extremely difficult. Wool, as it comes from the sheep, contains various impurities: grease, dirt, vegetable matter and moisture. These impurities may constitute as low as 25 percent or as high as 75 percent of the total weight of a grease wool lot. The amount depends on the conditions under which the wool was produced and the type of sheep produced. Thus the actual price per pound for grease wool is influenced largely by the element of clean content, which determines the quality of usable clean wool available (10). Clean content is difficult to estimate accurately by visual techniques alone.

Wool prices also vary considerably year after year and may vary in different areas within any given year. Between 1930 and 1950, average prices per pound for grease wool in the United States varied from a low of 19.5 cents to a high of 62.1 cents and in Texas from 20 cents to 68 cents. Even prices paid in different Texas counties have varied a great deal every year. In 1957, for example, the lowest average price paid for grease wool in any county in Texas, including government payments, was almost 30 cents per pound, and the highest almost 75 cents per pound. These variations exist for several reasons; differences in clean content, variations in wool quality, and variation in amount and type of vegetable matter and other impurities present. The most important quality factor that affects prices are yield, fineness and staple length. Because of style and pattern variations, differences in price also are noted when sales are made at different times of the year (6).

*Respectively, formerly instructor, Department of Agricultural Economics and Sociology, now marketing specialist, Agricultural Marketing Service, U. S. Department of Agriculture; professor, Department of Agricultural Economics and Sociology; and wool and mohair technician, Department of Animal Husbandry.

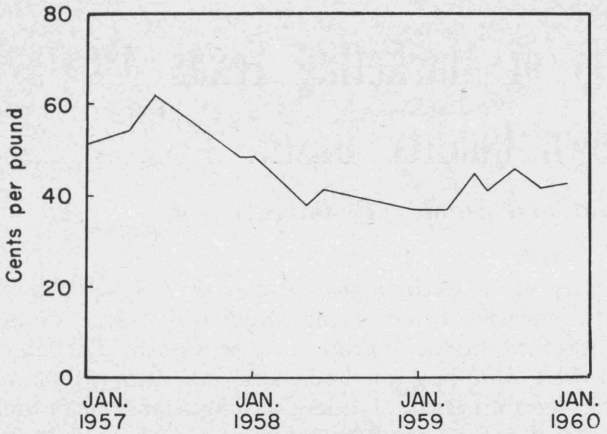

Figure 1. Average midmonth prices received by Texas wool producers for grease wool, January 1957-December 1959. Source: Texas Agricultural Prices, Midmonth Market Price Reports, Crop and Livestock Reporting Service, U. S. Department of Agriculture, Austin, Texas, 1957-59.

The average prices per pound for Texas grease wool for the 3-year period, 1957-59, are plotted in Figure 1. The high prices during the 3-year period occurred during May-September, 1957, and the low prices occurred in late 1958 and early 1959. Prices paid based on incentive payments for individual counties for grease wool during this 3-year period varied almost 200 percent.

Other strong influences on grease wool prices are the marked increases in supplies of man-made fibers and the improvements in the quality of such fibers. Synthetic fibers now are well-prepared for manufacture and are uniform in quality. They also possess characteristics that make them especially desirable for various end uses. In the United States the consumption of man-made fibers in recent years has increased tremendously in comparison with the consumption of wool, Table 2. Mill consumption of man-made fibers averaged approximately 81 percent of the mill consumption of wool during 1934-38, but this figure had jumped to approximately 500 percent by 1958. Mills were consuming about .8 pound of man-made fibers for apparel uses for every pound of wool during 1934-38 (7).

Only 2.4 pounds of synthetic fibers were consumed in 1937, but by 1957 the amount had increased to 11.2 pounds per capita. The most important competitors of U. S. wools are man-made fibers and well-prepared foreign wools.

Objectives

The objectives of this study are:

1. To design and test a procedure describing grease wool to be used as an aid by domestic producers, warehouse operators and buyers to obtain objective measurements of physical wool characteristics.

2. To evaluate the benefits that growers, warehouse operators and buyers may derive from an objective system describing grease wool.

3. To analyze and describe a sample of Texas-produced wools in order to determine their particular physical qualities and advantages.

Methods of Evaluating Grease Wool

Wool has been sold mainly on the basis of a flat price per grease pound. Wool coring has increased in popularity with growers, warehouse operators and buyers as a sampling method to determine the clean wool content of a particular lot of grease wool since 1947 when the government cored a considerable quantity of grease wool on a loan program. Coring is the most accurate means known for laboratory determination of clean wool yield. This procedure has been accepted by the American Society of Testing

TABLE 1. SHORN WOOL PRODUCTION AND VALUE, TEXAS AND THE UNITED STATES, AND PERCENT OF U. S. PRODUCTION PRODUCED IN TEXAS, 1951-59[1]

Year	Texas		United States		Percent of U. S. production produced in Texas
	Production	Value	Production	Value	
	1,000 Pounds	1,000 Dollars	1,000 Pounds	1,000 Dollars	Percent
1951	48,712	48,225	228,091	221,456	21.4
1952	46,277	26,841	233,309	126,327	19.8
1953	43,492	27,400	232,258	127,514	18.7
1954	45,408	25,883	235,807	125,538	19.3
1955	45,137	19,409	234,058	99,813	19.3
1956	43,269	19,471	238,569	105,544	18.1
1957	39,409	22,069	235,509	125,732	16.7
1958	38,716	14,712	240,801	88,949	16.1
1959	44,461	16,184	251,929	91,702	17.6

[1]1958 and 1959 Shorn Wool Production and Income Reports, Agricultural Marketing Service, U. S. Department of Agriculture.

Materials, U. S. Department of Agriculture, Bureau of Customs of the Treasury Department, Wool Associates of the New York Cotton Exchange, Incorporated, and by a large segment of the wool industry. Argentina requires that all wools exported to the United States be cored as a basis for sale, and it is reported that other countries are considering adopting similar procedures (1).

Determination of other quality factors of a particular wool lot have not been perfected as fully as those for the determination of clean wool. "Quality" in this study means all the factors that affect the usefulness of a particular wool lot. Evaluation of fineness, staple length, crimp, color, strength and other characteristics are made almost entirely by visual estimation and inspection. Various research agencies have set forth tentative objective means of evaluating such factors, but none have been approved as standards by the American Society of Testing Materials except tests for yield, length, fineness and strength. Proposed methods for the determination of color and crimp have been developed by the USDA. Standards for length, fineness, strength, color, or crimp, however, have not been accepted to any degree by the industry. Commercial testing companies recently have begun to measure objectively the fineness or grade of a lot from the core sample when requested. "Grade" in this study means fineness only.

Practically no wool is sold on a description basis in Texas or in the United States except in the case of well-known special clips and in the relatively few cases when special relationships exist between buyers and sellers. Practically all wool is sold by visual appraisal and inspection. Buyers examine and place a value on a particular wool lot. Then by discussion between buyer and seller, a price per pound that is satisfactory to both parties is agreed on. The sale may be made on a clean basis, in which case either the wool is cored and the percentage of clean wool used in determining the grease price or the clean yield is estimated and the sale completed on an estimated clean basis.

Other quality factors are determined by purely subjective means with the exception of yield and to a much lesser extent, fineness. This procedure places the producer in a weak position since he has neither the experience nor the knowledge necessary to evaluate properly a particular wool lot. The producer's bargaining position is weakened also because usually the buyer, rather than the grower or his representative, obtains a core analysis for yield determination.

Outstanding research work on the physical characteristics of grease wool was completed by Elroy M. Pohle and his associates and reported by the USDA in its Market Research Reports 211 (9) and 256 (8). These reports compared visual appraisal with actual mill results. Pohle and his associates concluded that:

(1) Use of the 1.25-inch core to analyze yield is much more accurate than visual estimates and also more accurate than either the smaller 3/8-inch tube or the larger 2-and-3-inch tubes.

(2) Objective testing of grease wool offers a much more consistent and precise method to determine grade than visual classifications.

(3) Length determinations for grease wool can be made rather accurately either by visual or purely objective means.

Rather high correlations were obtained in this same project between visual and objective appraisal of crimp and color. Techniques used to measure both of these characteristics, however, are neither purely visual nor purely objective; actually they combine the two.

TABLE 2. PER-CAPITA CONSUMPTION IN THE UNITED STATES OF WOOL, COTTON, SYNTHETICS AND TOTAL FIBER CONSUMPTION, 1927-57[1]

Year	Wool[2]	Cotton	Synthetics[3]	Total wool, cotton and synthetics
	Pounds			
1927	3.0	30.2	.8	34.0
1932	1.8	19.7	1.2	22.7
1937	3.0	28.3	2.4	33.7
1942	4.5	41.8	4.8	51.1
1947	4.8	32.4	7.3	44.5
1952	3.0	28.5	9.3	40.8
1957	2.2	23.7	11.2	37.1

[1]Agricultural Statistics, 1957, USDA.
[2]Clean basis, total of apparel and carpet types.
[3]Includes cellulose and noncellulose fibers.

Procedures for Obtaining Information

The proposed research was discussed with warehouse operators at three locations in Texas, during the early spring of 1957. Warehouses at which samples were taken are identified as warehouses A, B and C because of considerable variation in both quality of wool handled and prices in different warehouses. Methods of classifying samples and financing local work and time factors were discussed with the warehouse operators. Agreements were made concerning the collector of the samples, dates for sampling, years for which the samples would be taken, number of samples to be taken, and type of information to be collected.

Approximately 100 lots were to be sampled each year during 1957-59 under this agreement. Core samples were taken with the 1.25-inch tube. Samples were taken for length and crimp measurements just before the core sampling, but on the same pattern used for coring. In every case the warehouse operator secured the approval of the grower before taking samples of any particular wool lot. All core samples

and length samples were taken by the writer or by someone that he had trained and supervised.

After analyses of length, fineness, yield, color and crimp were made in the laboratory, the results were mailed both to the grower and to the warehouse operator for their use in marketing the wool. Sixty-one samples were processed at the USDA Wool Laboratory of Denver, Colorado, in 1957 and 50 samples were processed at the Wool Laboratory of the Texas Agricultural Experiment Station in College Station, Texas. In 1958 and 1959 all samples were analyzed at the Texas Agricultural Experiment Station Wool Laboratory at College Station. When the wool was sold, the warehouse operator recorded on a copy of the report the sale price, date and terms and forwarded the copy to the writer for analysis. The analysis of the samples included determinations on clean content, fineness, length, color and crimp. Since no accepted standards were available for determinations of crimp or color, methods used to analyze crimp and color were those employed by the USDA, and they are still in an experimental stage of development.

Methods and Basis for the System

Prerequisites

Adequate standards for the description of wool quality characteristics are necessary before any system describing grease wool can be adopted. Since the standards should reflect the changes necessary to meet the circumstances of each particular situation, they should not be rigid. Standard methods by ASTM are presently available to determine clean wool content, fiber fineness and fiber length—the major economic characteristics of wool. Proposed or tentative standard methods are available for determining strength and vegetable matter. There are no standard methods and no proposed or tentative methods for determining color and crimp, but at present, work is under way for developing a proposed set of standard methods to measure color and crimp. The standards or measurement terms for each quality characteristic should be such that significant differences can be determined. There are no reasons why the standards for the measurement of quality elements cannot be developed further and refined at the same time that a system of grease wool classification is developed.

Whether buyers, growers, warehouse operators and others accept a grease wool classification system depends on: (1) confidence in the system, (2) competent and unbiased agency operators and (3) provision of a method to guarantee measurements by wool merchandisers, who have developed and used their own system. Dependability of the evaluations, current market evaluations and usefulness of the classification system should be considered also.

Both wool for sampling and personnel needed to take samples should be available if objective sampling is to be done. To obtain samples, personnel competent to take them should be available soon after shearing. Samples might be drawn from large flocks at the shearing location, but it would be necessary to sample small clips at the warehouse or at other concentration points in order to combine several small clips to obtain a lot sufficiently large to sample. Small lots should be combined with lots of similar quality. Some exactness might be sacrificed, but any steps toward a more objective sampling technique would be an improvement over present methods.

Evaluation of quality elements in individual wool lots vary slightly even under almost perfect conditions. These variations, under normal conditions, reasonably may be expected to be small and to some extent self-compensating. Where the variations appear extreme, some recourse should be available to the seller or purchaser. Unless a standard recourse is allowed, double testing and abuse of the whole program may result.

Samples should be taken carefully to be representative. Lots that are uniform in quality characteristics offer no real problem but lots that are not uniform pose various problems. Sampling proficiency might be affected by competence, training and supervision of the sampler, the equipment available and methods used in sampling and the care and identification of samples with individual lots. These factors may necessitate the use of a qualified sampler, licensed and supervised by a competent agency (7).

It should be understood that the proposed method is not to replace the present system of wool buying. Instead it is hoped that this system will supplement present methods and supply objective data needed to market grease wool on a known quality basis.

Procedure Used in Analysis

Data were collected on sale dates, terms of sale and prices paid for all lots of grease wool sampled and sold before January 1, 1960. All 1957-58 wools had been sold by that date, but only approximately 50 percent of those at warehouse A and 75 percent at warehouse C in 1959 had been sold by January 1, 1960. Almost all wool sampled in 1959 at warehouse B had been sold.

Each lot was evaluated and priced on the sale date on the basis of data obtained by objective laboratory measurements for fineness, length and clean content. No adjustments for color or crimp characteristics were made since these factors are not considered explicitly in any known market quotation for wool. All prices were calculated on a clean basis and delivered at Boston for comparative purposes. Market news reports issued weekly by the Livestock Division of the Agricultural Marketing Service were used to arrive at the theoretical market value of the wools on the sale date. The comparisons made on the basis of wool lots sampled and sold, although not perfect,

approximate a realistic situation. Quality differences between the actual and the theoretical imperfections in market news reporting and in the quality determination are assumed to be self-equilibrating. All sales are first sales or primary sales by the producer.

Need for Market Classification System

Range of price variation is the most important single factor that indicates a need for a market classification system for grease wool. The most important price variations are caused by various physical properties and by place of sale.

Increased information about end uses and more reliable estimates of future needs will be necessary to make any system of describing grease wool significantly helpful to the industry. More and better market news also is essential to any system designed to improve marketing of grease wool in Texas or in the United States. Moreover, growers should be able to obtain and use such information if a system of market classification for grease wool is to be valuable to them.

Actually, market prices for grease wool in Texas should equal prices in Boston after adjustments for transportation and handling costs are made. Differences for each lot were obtained by subtracting the price actually paid for the lot from the calculated prices. Plus values indicate that the particular lot actually brought more than the calculated price; minus values indicate that the lot brought less than the calculated value. Only 52 lots of a total of 332, or 15.7 percent of all lots observed, varied less than 1 cent per pound. A total of 25 lots was split for sale purposes; sale information was complete on 307 sampled lots. Twelve lots varied a minus 1 cent per pound; 27 lots varied plus 1 cent per pound; the calculated and the actual price were equal on only 13 lots on a clean basis, delivered at Boston. A total of 94, or 28.3 percent of all lots, showed variation of 10 cents or more per clean pound. Twenty-two, or 6.6 percent of all lots, varied 20 cents or more per clean pound. Sixty-three percent of all variations of at least 10 cents per pound of clean wool was negative, and the lots sold for less than they should have brought on the basis of the calculated price. The average variation for lots which sold for less than the calculated prices was 8.5 cents per clean pound, and 7 cents per pound for those which sold for more than the calculated price. A total of 126 lots, or 38.9

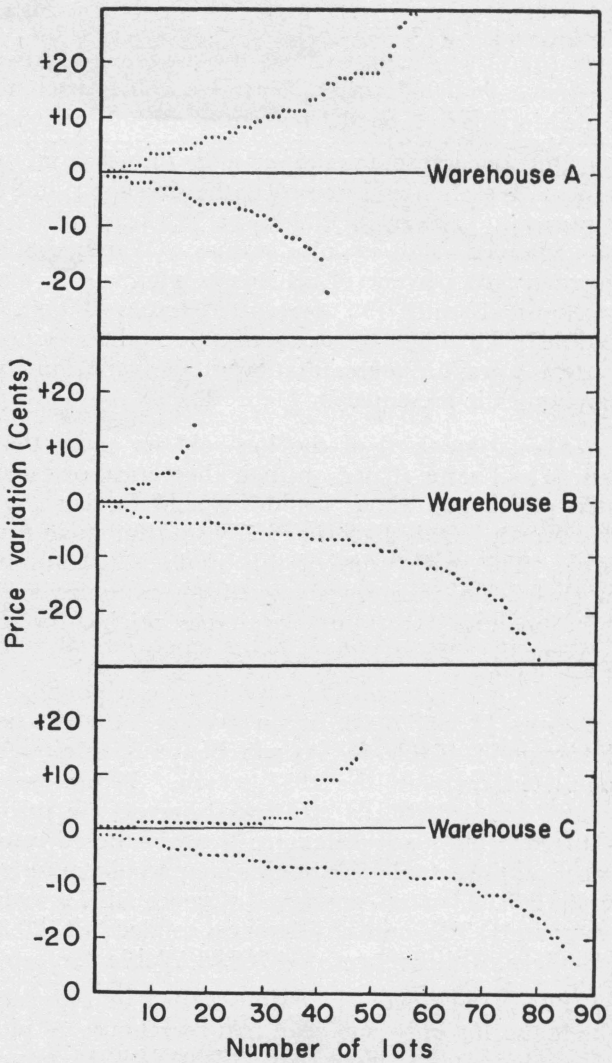

Figure 2. Difference above and below the calculated price for wool lots sold by three warehouses for 3-year period, 1957-59.

TABLE 3. TOTAL AND AVERAGE PER POUND VALUE[1] OF WOOL FOR EACH WAREHOUSE FOR EACH YEAR, FOR ALL WAREHOUSES AND FOR ALL YEARS FOR WOOL SAMPLED AND SOLD AT THE THREE LOCATIONS, CLEAN BASIS, DELIVERED, BOSTON, 1957-59

Warehouse	1957		1958		1959		1957-59	
	Total value	Average per pound value	Total value	Average per pound value	Total value	Average per pound value	Total value	Average per pound value
	Dollars							
A	231,110.53	1.26	259,267.32	1.13	164.019.49	1.30	654,397.34	1.22
B	158,291.97	1.55	166,373.51	1.12	176,680.20	1.21	501,345.68	1.27
C	105,313.61	1.20	128,441.73	1.12	147,224.32	1.25	380,979.66	1.19
All warehouses	494,716.11	1.33	554,082.56	1.13	487,924.01	1.25	1,536,722.68	1.23

[1]Clean basis.

percent of all lots observed, reflected plus values, or more than they were worth on the day of sale, based on their calculated price. Negative values were recorded for 206 lots, or 61.1 percent of all lots observed.

Only one warehouse showed more plus than minus values. Warehouse A recorded the greatest number of plus values, 57 of its 97 lots, or 58.8 percent of all lots observed, showed plus values. Warehouse C recorded 36.8 percent of all lots as plus values, and warehouse B only 19.2 percent. Houses B and C recorded 63.2 and 80.8 percent negative values, respectively. A graphic representation of the variations by warehouses is presented in Figure 2.

About one-third of the lots sold for more than their actual value (based on their theoretical or calculated price), and about two-thirds sold for less than their worth. Only 13 lots actually sold for their true value. The major aim of this study is to propose an evaluation program designed to minimize such variation and thus insure equitable pricing for all concerned.

The total value of the 1,254,078 clean pounds of wool was $1,536,722.68, or an average of $1.23 per clean pound, Table 3. At warehouse B, sales were completed early in the 1957 season. Before warehouses A and C sold, a substantial decrease in prices occurred. The total difference between the adjusted price and the actual price on this same wool amounted to $98,899.09, or an average difference of 7.9 cents per pound. The minus differences totaled $64,120.24 and the plus differences, $34,768,85, Table 4.

Plus values exceeded minus values at only one warehouse for only one year. At warehouse A plus values amounted to more than $17,000 in 1957, minus values to less than $2,000. At all other warehouses and for all 3 years, 1957-59, the minus values exceeded the plus values. Total minus values for 1957 were less than total plus values, mainly because of the effect of the sales at warehouse A. Of a total of 332 lots observed, 126 reflected plus values and 206 reflected minus values.

Those lots that sold for more than the average calculated value brought $275.94 more than their true value per lot. Lots that sold for less than the average calculated value brought $311.26 per lot less than their true value. At warehouse A lots which brought less than average calculated value sold for an average price of $479.85 per lot, while at warehouse B and C the average values per lot which sold for less than calculated value were $338.86 and $207.18, respectively. On lots which sold for more than the average calculated value, the averages per lot were $471.64, $239.49 and $66.73 per lot at warehouses A, B and C, respectively. The overall average lot value for the 3-year period was $4,628.68. The average lot values by warehouses were $6,746.36, $5,064.09 and $2,801.32 at warehouses A, B and C, respectively.

On the basis of clean pounds, a total of approximately 758,000 pounds sold for less than the calculated value, and 466,000 pounds sold for more than the calculated value. Only 50,000 pounds sold for the actual calculated value, Table 5. Expressed in percentages of all lots observed, 60.4 percent sold for less than the calculated value, 35.6 percent for more than the calculated value, and only 4 percent for the actual calculated price.

Relationships Between Calculated Price and Price Paid

There are two possible relations between the calculated price for a product and the price actually paid. Any comparisons made are useless, if the calculated price does not reflect the true value or something very near the true value, for it is assumed that since the best available means for arriving at the calculated price have been used, they reasonably approximate the true value of the product. Secondly, if the calculated prices do reflect the true value, then obviously they are very useful in the analysis of a market situation.

If the calculated price and the price paid for each lot of wool in this study had been identical or

TABLE 4. SUMS OF PLUS AND MINUS DIFFERENCES MULTIPLIED BY THE NUMBER OF CLEAN POUNDS OF WOOL, FOR EACH WAREHOUSE FOR EACH YEAR, FOR ALL WAREHOUSES AND FOR ALL YEARS FOR WOOL SAMPLED AND SOLD AT THE THREE LOCATIONS, 1957-59

Warehouse	1957		1958		1959		1957-59	
	Sum of plus values[1]	Sum of minus values[2]	Sum of plus values[1]	Sum of minus values[2]	Sum of plus values[1]	Sum of minus values[2]	Sum of plus values[1]	Sum of minus values[2]
	Dollars							
A	17,107.84	1,930.51	4,949.37	9,367.50	4,826.00	7,895.99	26,883.21	19,194.00
B	739.44	11,257.46	3,216.15	8,148.53	593.29	7,702.75	4,548.88	27,108.74
C	1,550.59	2,047.27	1,550.79	4,225.13	235.38	11,545.10	3,336.76	17,817.50
All warehouses	19,397.87	15,235.24	9,716.31	21,741.16	5,654.67	27,143.84	34,768.85	64,120.24

[1]Sum of plus values multiplied by the number of clean pounds for those lots with plus values for differences between calculated and actual price.

[2]Sum of minus values multiplied by the number of clean pounds for those lots with minus values for differences between calculated and actual price.

TABLE 5. AMOUNT OF WOOL[1] WHICH SOLD FOR THE CALCULATED PRICE OR MORE AND WOOL WHICH SOLD FOR LESS, FOR EACH WAREHOUSE, FOR EACH YEAR, FOR ALL WAREHOUSES AND FOR ALL YEARS FOR WOOL SAMPLED AND SOLD AT THE THREE LOCATIONS IN TEXAS, 1957-59

Warehouse	1957		1958		1959		1957-59	
	Sold for calculated price or more	Sold for less than calculated price	Sold for calculated price or more	Sold for less than calculated price	Sold for calculated price or more	Sold for less than calculated price	Sold for calculated price or more	Sold for less than calculated price
	Pounds							
A	162,920	20,359	77,595	151,164	69,971	56,011	310,486	227,534
B	14,717	87,232	30,154	118,043	26,298	119,203	71,169	324,478
C	54,306	33,807	57,671	56,714	2,553	115,360	114,530	205,881
All warehouses	231,943	141,398	165,420	325,921	98,822	290,574	496,185	757,893

[1]Clean basis.

nearly identical, the correlation between the two would have been 1 or nearly 1. Conversely, the more pronounced the variations, the smaller are the correlations between the two. Likewise the more imperfections that exist in the marketing system, the smaller are the correlations between the prices actually received and the prices that should have been received.

The correlation between the calculated price and the price actually paid for wool lots sampled at the three warehouses for each of the 3 years in which samples were taken is shown in Table 6.

The highest correlation coefficient obtained for any one warehouse during any one year was .75 on wools sold at warehouse B in 1957. The lowest obtained was .24 at warehouse A in 1959. The latter was not considered significant because of the small number of observations during 1959. Only one other correlation, that at warehouse B in 1958, was not considered significant.

Fairly close correlations were obtained between the two prices when all observations for any particular year or warehouse were compared. Two obvious exceptions exist: in 1958 all correlations of observations were fairly low, probably because of a very unstable market situation; and an unusually low correlation existed for the 3 years when combined at warehouse A. The latter was probably due to a large carryover of 1957 wools which were marketed late in the 1958 marketing year.

The correlation of .82, obtained when all observations were correlated, supports the thesis that buying on averages exists under the present system of marketing wool, Figure 3. Buying on averages is highly desirable because it enables the buyer who overpays on a particular lot to underpay on other lots. The present technique of subjective evaluations of clips causes some clips to be overvalued while others are undervalued. Even so, present subjective evaluations would be quite acceptable to the buyer since the average value paid at the close of a buying season would be near the average value obtained, although extreme differences would exist among individual producers. On the average, the value purchased usually is less than the value obtained. This expectation is substantiated further by the fact that more of the wool sampled under this study sold for less than the calculated value, as determined by objective means, than sold for more than the calculated value.

A considerable number of lots tested and sold during these 3 years at all warehouses, were sold on a clean basis, delivered in Boston. In most instances the clean yield was determined by core testing. A total of 115 lots were sold on this basis, 32 of them in 1957, 45 in 1958 and 38 in 1959.

By correlating price paid and calculated price, very high significant correlations were obtained by years. Correlation between calculated price and price paid for lots sold in Boston on a clean basis was .95 in 1957. Correlations for 1958 and 1959 were .94 and .81, respectively. The correlation for all 3 years was .92, which is highly significant at the 95 percent level, Figure 4.

It is also significant that the differences between the two prices are considerably smaller on the average for those lots which sold on a clean basis. On the average, growers received nearest the true price for wool sold on a clean basis, delivered in Boston. Most lots were probably sold on a core test since this is a general practice in the area studied, although there is no definite figure or way available to determine the exact number.

TABLE 6. CORRELATION BETWEEN CALCULATED PRICE AND PRICE PAID FOR EACH WAREHOUSE, EACH YEAR, ALL YEARS AND ALL WAREHOUSES FOR WOOL SAMPLED AND SOLD AT THREE LOCATIONS, 1957-59

Warehouse	1957	1958	1959	1957-59
A	.61	.29	.24[1]	.36
B	.75	.27[1]	.41	.90
C	.54	.68	.48	.49
All warehouses	.88	.32	.42	.82

[1]Not significant at the 95 percent level.

Benefits of Objective Classification System

Overall Benefits

"Something is radically wrong with either the quality of wool we produce, our method of preparing it for market or the way in which we sell it. It may be a combination of all three, but better marketing methods must be devised which will reflect values to each grower according to the quality of his produce before the incentive is given to grow better wool and pack it in the best possible manner" (12).

The industry will benefit appreciably through an objective classification system for grease wool. Such a system would permit more accurate communication among different areas. Wool production has been primarily a periphery enterprise. Wool consumption, on the other hand, is greatest near the population centers. Wool probably is transported over longer distances than any other important commodity. Because of its relatively high value per pound, however, it can be transported these long distances and still yield a profit to the producer (11). An objective classification system will facilitate this movement at less cost to the industry.

Grower Benefits

Growers should obtain more benefits from an objective classification system for grease wool than any other group concerned with marketing it. Wool producers who lack experience in evaluating grease wool quantity and quality characteristics need objective evaluations of their wool before making decisions regarding the marketing of their clips, and each clip should be marketed on its own merits if true market values are to be obtained consistently. Growers would receive benefits not only from the marketing standpoint, but such information also would provide a sound basis for flock improvement and the other desirable production practices.

In 1958, on the basis of the shrinkage data obtained at the three warehouses heretofore mentioned and the application of these data to the total production in Texas, it was calculated that 18.7 million pounds of clean wool were produced in the State. The Texas clip for 1958 had a value of 21.1 million dollars based on average prices received at warehouses where the wool was sampled. On the assumption that all Texas wool sold and that it was sold in a similar manner to that sampled, 11.4 million pounds probably sold for less than it should have during the year. The average negative value of 8.5 cents per clean pound indicates that Texas producers actually received in 1958 about a million dollars less for their wool than they should have received. On the other hand, the average plus value of 7 cents per clean pound indicates that Texas producers received $500,000 more than they should have received. Hence it appears that Texas producers lost a total of $500,000 on the 1958 wool clip because of underpricing.

Approximately 60 percent of all wool sold could be sold to better advantage if an objective system of grease wool classification were available. More than 60 percent of all wool growers probably sell for less than true value because larger clips tend to account for the largest percentage of total pounds selling for more than their true value. About 60 percent of the wool marketed in 1958 actually sold for less than true value.

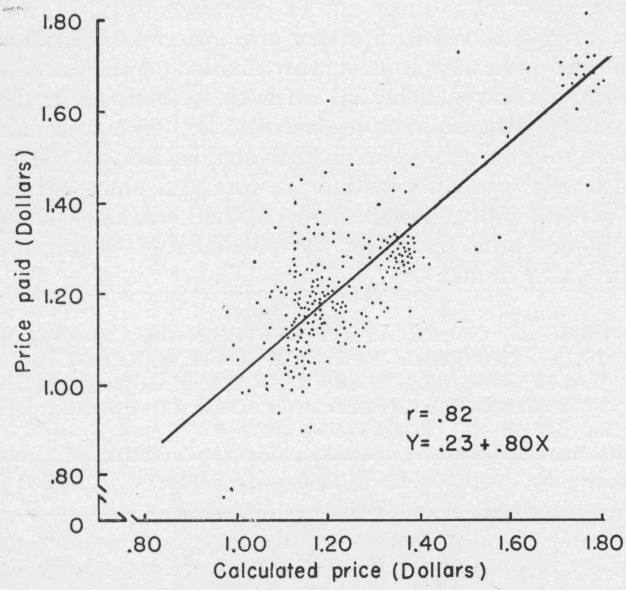

Figure 3. Correlation between calculated price and price paid for wool sampled and sold at warehouses A, B and C, 1957-59.

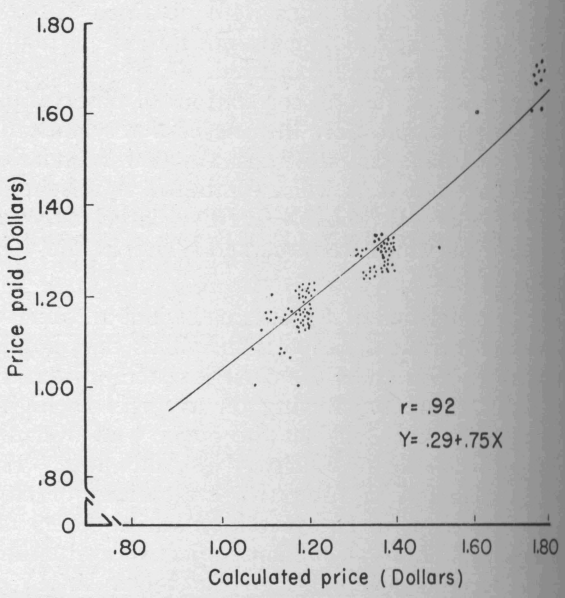

Figure 4. Correlation between calculated price and price paid for wool sampled at warehouses A, B and C that sold on a clean basis, delivered Boston, 1957-59.

Growers are slower than buyers to recognize changes in yields. Buyers generally adjust their estimates of shrinkages before too many clips are purchased. Growers and warehouse operators, however, are less aware of year-to-year changes in yields.

Other quality factors of wool also vary according to range conditions, amount of feeding, weather and breeding. Growers and warehouse operators appear frequently to be unaware of these changes. Hence an objective classification system would further provide growers with an objective historical record on which decisions could be made on the general management of individual flocks.

An objective classification system thus would provide growers before selling, with measurements that indicate both quality and quantity elements of the clips and possible year-to-year changes.

Marketing Agency Benefits

An objective classification system performs a major service for the marketing agency by taking over the responsibility for estimating the quality and quantity of the clips. The marketing agency pertains only to those firms which operate as commission agents for the producer. The marketing agency that purchases directly from the grower is assumed to be a buyer. Warehouses or other marketing agencies act in behalf of the grower and in many cases complete the sale without consulting with the grower. In some cases, the grower may reserve the right to approve the price before sale. In others the grower may set a minimum price and order sale at that price or higher at the discretion of the marketing agency.

Prices obtained by a given agency must correspond closely with prices obtained by other nearby agencies in order to establish and maintain the marketing agency's business volume. Growers will change agencies if too low prices are received from any particular marketing agency and buyers will tend to shy away from the marketing agency if prices demanded are consistently higher than the true value.

It is therefore to the best interests of the marketing agencies to obtain as nearly as possible prices reflecting the true values of the wool sold. With accurate market quotations and the information supplied by an objective classification system, marketing agencies can obtain prices nearer the true value of the wool handled than would otherwise be possible.

Much of the guesswork of marketing agency personnel can be eliminated by using an objective measurement for yield, length, fineness, color and crimp. Not only is guesswork eliminated, but justification for marketing a particular wool lot at any particular time can be made, if necessary. Since the most common difficulty that arises between growers and their marketing agencies results from the prices received, this system would help maintain true values of the wool handled. Consequently, grower-marketing agency relationships would improve.

Buyer Benefits

Wool buyers will still be needed in addition to objective wool descriptions, since it will still be necessary to locate lots of varying characteristics desired for specific uses. The classifications data should aid buyer and seller to arrive at an equitable value of the wool. Acquaintance with laboratory wool reports should help locate wools at various sources by telephone and save time and travel. Such reports would allow buyer and seller to pay for wool on a quality basis because of actual tests made by an impartial third party.

Proposed System

Method and Procedure

All clips would be sampled in the system of grease wool classification. Samples would be taken by means of techniques and methods approved by the American Society for Testing Materials as standards for core-testing grease wool. Sampling patterns would include cores from every bag on a specific pattern, Figure 5. A minimum of 100 cores would be drawn from each lot. In cases where more than 100 bags were in the lot, one would be taken from each bag. Before coring, a staple length sample of wool would be drawn according to methods approved by the ASTM for determining the grease wool length. Core samples and staple samples should be properly identi-

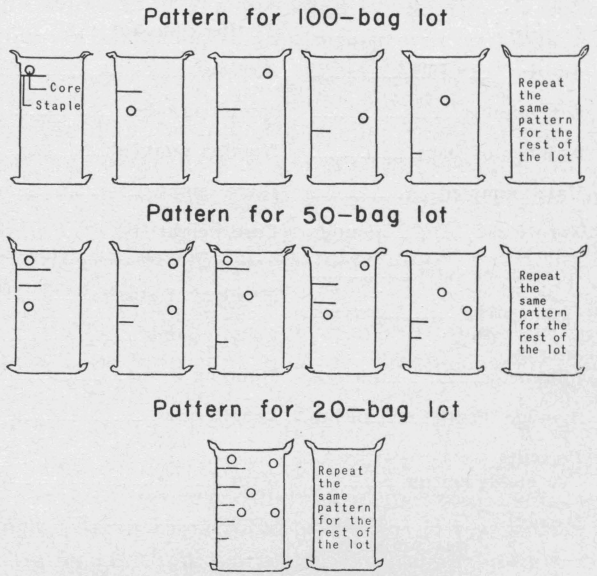

Figure 5. Sampling pattern to be used to core every bag and staple pattern. Pattern for 10-bag lot would be the same as for 20-bag lot except both the front and back of the bag would be cored. Other size lots would be cored using a similar pattern to obtain at least 100 cores for each lot. Staples would be drawn from the seam side of the bag, within 6 inches of the seam, before coring.

fied, placed in proper containers and forwarded to a public wool testing laboratory. Two such laboratories are operating in Texas. The analysis carried on at the laboratory should include an analysis of clean wool, fineness, length, vegetable matter and strength by methods adopted as standards by the ASTM. Measurement of crimp and color should be made using methods now being developed by the USDA. The most up-to-date series in each case would be used. Information on the various quality elements would be returned to the producer and warehousemen on a form such as that shown in Figure 6. This form should also include a short explanation of the various measurements on the back. Information concerning the grower, warehouse, sampler, testing agency, addresses, date, lot number, number of bags, place sampled, weight of the lot at coring, number of staples and the weight of samples would be recorded on the form at coring time. This form would be included with the sample and would remain with it until the sample was destroyed or disposed of by properly authorized personnel.

An array of staples used to determine the length of the grease wool could be made available at additional cost when the grower's wool is delivered to the marketing agency.

WOOL ANALYSIS REPORT

Producer.....	**Handler**.....
Address.....	**Address**.....
.....	.....
Sampler.....	**Testing company**.....
Address.....	**Address**.....
Lot number.....	**Sample number**.....
Number of bags.....	**Number sampled**.....
Date sampled.....	**Place sampled**.....
Net weight.....**pounds**	**Core weight** .....**pounds** .....**ounces**
Number of cores.....	
Clean yield[1].....**percent**	**Number of staples**.....
	Clean pounds.....
Average diameter.....**microns**	**Spinning count**.....
Average length.....**inches**	**Length class**.....
Percent vegetable matter.....	**Type**.....
Strength .....**pounds per square inch**	**Crimp**.....**per inch**
Histogram of staples requested	**Yes**..... **No**.....

[1]**Simple explanations would be included on the back of each form.**

Figure 6. Sample report form to be used to record information for a particular wool lot sampled.

Cost and Payment Considerations

Four methods of financing such a grease wool classification system are examined. The methods are: (1) grower payment, (2) buyer payment, (3) combination of grower and buyer payment and (4) public payment through Federal appropriations, or assessment of the incentive payment.

Grower payment or buyer payment or a combination of grower and buyer payment will result ultimately in the grower's paying the classification cost. This would happen because the buyer merely would transfer his portion of the cost to the grower in the form of a reduced price offer for the wool concerned. The main point in favor of this first payment method is that the growers receive the most benefits from this system and thus should pay for its cost. Arguments against this method of payment center around the cost of the service. It would cost about the same to test a large wool lot as a small one, thus small growers would be less likely to use the classification service. A grower-payment program could be handled easily in Texas through the warehouse system. An additional amount for testing could be deducted after the final settlement.

Federal appropriations for a wool-testing and classification system might appear as an equitable solution in view of the aid offered other agricultural producers through the Smith-Doxey Act on Cotton Classification and the Tobacco Grading Service. However, a more desirable method appears available. In 1954, Congress passed the National Wool Act, which provides an incentive payment to wool producers. Funds collected from tariffs since that time have been used to defray the expenses of the Act. Such funds could be used to provide a wool-classification service, but some slight changes would be necessary. First, those portions of the Act that pertain to unshorn lambs should be abandoned because the wool on lambs will be shorn or pulled. Second, payments should be made on pulled and shorn wool only. Under the present law there is a provision whereby 1 cent per pound is deducted from incentive payments to growers for promotional purposes. Some similar amount also could be deducted to defray the expenses of a classification service. The effect would be to further the broad intentions of the National Wool Act of 1954, and those who would benefit most also would pay the most in the long run.

The estimated cost per grower for a complete classification as proposed would be about $40 to $45, depending on whether the staple samples were mounted and returned to each individual grower at his request.

Approximately 21,000 wool producers in Texas received payments in 1956 under the National Wool Act of 1954. Of this number, 8,500 produced lots under 1,000 pounds, grease basis, and 15,000 producers produced average lots of less than 2,000 pounds per

lot (5). In other words, approximately 25 percent of Texas growers produce 70 percent of the wool.

It is estimated that there would be about 12,000 lots in the State after lots were combined for sampling purposes. The cost per sample estimate of $46 multiplied by 12,000 lots equals $550,000, or a classification cost of 1.2 cents per pound for all wool produced in the State in 1959. In years when production falls below the amount necessary to finance the system, direct payment could be made from tariff funds collected on imported wool by the Treasury Department. This situation would happen only in years of extreme prolonged drouth, when the same number of lots, but fewer pounds of wool would be tested. Payments could be handled by the county Agricultural Stabilization and Conservation offices.

Considerations of Time and Convenience

Any classification system should satisfy certain time requirements to be successful. The need to have results of laboratory analysis back in the grower's hands within 3 (not more than 4) days after sampling is very important. It is important also to provide for processing individual lots even more quickly when the need arises. A major problem for the laboratories would be to secure trained people to perform the analyses. Sampling is done usually on a part-time basis, and perhaps much laboratory work could also be done on a part-time basis since it is routine work. However, since supervisory personnel would need to be employed on a year-round basis, they could recruit and train samplers and laboratory personnel during the off-season.

Wool could be sampled either when delivered to the warehouse or after it is sold and ready to be moved from the warehouse. The preferable time would be immediately on delivery since reweighing and rehandling would thus be eliminated. Delay in settlement would occur if testing were not completed before sale and the overall operation would tend to be inconvenient and unduly expensive for the warehouse operator. Furthermore, the seller would not have the information in time to line up his wools for sale or to sell them on the basis of known quality.

Handling would not be slowed down if the wool was cored as it moved into the warehouse. Only a few seconds are required to core a bag by this procedure. A warehouse operator might want to add a fraction of a cent to his handling charge but this is unlikely since such a service would provide a real basis for improvement of wool marketing in that particular warehouse. It could save the warehouse time in displaying wools in the long run.

It is extremely inconvenient for warehouse operators to core after the wool has been placed in stacks for storage since the wool must be removed from the stack, cored, weighed and restacked. A crew of seven laborers, one weigher and one sampler can core about 25,000 pounds of wool in 4 hours after it is stored. The same crew can weigh, core and stack about 75,000 pounds in 4 hours as the wool moves into storage, since the coring does not slow up the overall storage operation.

Each warehouse would need to arrange for the service of an official sampler. However, one individual could do the sampling for several warehouses if they were located in one community. Otherwise, he might do the sampling in several communities if they were not too far apart.

Arguments Against Proposed System

Everyone associated with the production, marketing and consumption of wool would benefit to some degree by a classification system for grease wool. Some, however, would benefit more than others, and there would in all probability be some objection to the system here proposed.

The traditions-and-customs aspects of wool marketing would serve as the basis for much of such opposition. Buyers who travel through the wool-producing areas in season, evaluating and bidding on wool in the old traditional manner are part of a long-established custom. This system, however, is decreasing in importance as old producers, warehouse operators and buyers are replaced by younger men since the younger men are more inclined to desire more objective measurements of quality and yield. In addition, as more older men retire, less opposition to a new grease wool classification system can be expected. Growing familiarity with objective measurements also encourages the breakdown of the old method. Buyers, warehouse operators and growers who understand the proposed system find it acceptable. The strongest opposition will be from old members of the buying trade. They will have to realize that the system would not replace personnel but would aid in wool evaluation. Wool lot examination and confirmation of sales still probably would be made in person, with a few exceptions. More and more wool probably could be purchased on a description basis alone as buyers place more confidence in the classification system.

Marketing agency objections to such a system would arise from additional trouble and expense, but such objections could be overcome easily once advantages were demonstrated.

The charges made for services by Texas warehouse operators are different from those made anywhere else in the United States (4). The system of charging a flat rate per pound is outmoded and should be replaced by a system under which charges are based on services rendered. Texas operators should charge a percentage of gross returns based on services rendered in warehousing wool. A charge of 2 percent of gross sales would yield slightly more revenue to warehouse operators and would enable them to pro-

vide more efficient services toward marketing wool on a quality basis.

Market Information

A good system of market news that reflects actual market situations must be available to the producer if a classification system is to function properly. The producer can use the information to compare his particular wool lot with similar lots mentioned in the current market reports. Today's market information is inadequate for the proper functioning of a classification system. More accurate and timely reports, wider dissemination of market news, and a uniform basis for reporting, designed to provide information necessary under the proposed classification system, is needed.

Description of Wools Sampled and Sold at Three Locations

A major aim of this study was to accumulate by means of objective measurements enough physical data to permit generalization about the quality characteristics of Texas wools. This report represents initial work on this project and marks the beginning of studies which should eventually result in a more equitable system for marketing Texas wools.

Although the wools sampled and reported on in the following pages represents only a comparatively small tonnage, they are characteristic of most Texas wools.

Number of Lots Sampled and Sold

Table 7 presents a summary of the lots sampled and sold at all warehouses at which samples were taken during the 3-year sampling period. In 1957 a total of 111 lots was sampled, but information on only 105 of these was used. In 1958, 112 lots were sampled, and information on 110 of these was used. In 1959, 143 lots were sampled, but information on only 92 of these was used. Over the 3-year sampling period a total of 366 lots was sampled, and information on 307 of them was used. Ten lot samples were taken at locations other than the three warehouses concerned in this study; six of the ten were taken in 1957 and four in 1959; information on these lot samples was not used. Samples from two lots were eliminated from the 1958 lot data because of lot size, and 47 lots not sold at the end of 1959 were carried over as 1960 data.

Yield, Clean Content

During this study a total of 2,733,000 pounds of grease wool which yielded 45.9 percent, or 1,254,000 clean pounds of wool, was sampled and sold, Table 8. An analysis of slightly more than 875,000 pounds of grease wool in 1957 indicated a yield of 42.5 percent clean wool. During 1958, an analysis of slightly more than 1,000,000 pounds indicated a yield of 48.2 percent clean wool. The difference in clean wool yield between the 2 years was 5.7 percent. This value, if it had gone entirely to the buyer in 1958, would have cost growers about 7 cents per pound on shrinkage alone. In 1959, average yield was 46.6 percent clean wool from 835,000 pounds of grease wool. This was a smaller yield than that of 1958 but larger than that of 1957.

Yield differences were not significant at the three locations at which samples were taken. Average yields by warehouses for the 3 years were 45.2, 46.4 and 46.5 percent clean wool at warehouses A, B and C, respectively.

The maximum amount of grease wool samples at any warehouse during a given year was 480,000 pounds, sampled in 1958 at warehouse A. The minimum amount was 205,000 pounds, sampled at warehouse C in 1957. Slightly more than 1,100,000 pounds were sampled during the 3 years at warehouse A and 690,000 pounds at warehouse C. A total of 852,000 pounds was sampled at warehouse B.

By years, all warehouses sampled 879,000, 1,019,000 and 835,000 pounds of grease wool in 1957-59, respectively, for a total of 2,700,000 pounds at all warehouses for the 3 years.

The percentage of clean wool by lot varies sharply. The highest yield was 57.3 percent, and the lowest was 31.6 percent. Both high and low yields by lots occurred in 1958, the high at warehouse C and the low at warehouse A.

TABLE 7. NUMBER OF CORE SAMPLES TAKEN AND NUMBER OF LOTS SOLD FOR EACH WAREHOUSE, FOR EACH YEAR, FOR ALL YEARS AND FOR ALL WAREHOUSES, 1957-59

Warehouse	1957		1958		1959		1957-59	
	Sampled	Sold	Sampled	Sold	Sampled	Sold	Sampled	Sold
	Number							
A	33	33	34	34	37	16	104	83
B	34	34	37	35	34	30	105	99
C	38	38	41	41	68	46	147	125
D					4		4	
E	6						6	
All warehouses	111	105	112	110	143	92	366	307

Fineness

Two important quality characteristics that determine the usefulness of a particular lot of wool are fineness, or grade and staple length. Fineness of fiber, coupled with staple length, determine largely the uses for a particular lot of wool.

The majority of Texas wools are generally considered to be fine—that is, 64's or finer, or to have an average fiber diameter of less than 22 microns with no more than 7 percent of the fibers exceeding 30.1 microns and no more than 1 percent over 40.1 microns.

Of wool measured in this study and sold, 86.4 percent was finer than 22 microns. The remaining 13.6 percent ranged in fineness from 22.1 to 24.6 microns in diameter, or in terms of the Bradford spinning count system, 86.4 percent was 64's and finer and 13.6 percent was 60's and 62's.

Average fineness of all wool sampled and sold was 20.98 microns. Average fineness for 3 years at warehouses A, B and C was 20.90, 21.01 and 21.06; respectively. The average fineness for all warehouses for 1957, 1958 and 1959 was 20.19, 21.27 and 21.36, respectively. Wool produced in 1957 was considerably finer than that produced in either 1958 or 1959 because of poor range and feed conditions in 1957. Warehouse B in 1957 had an average fineness of 19.92 microns, the finest at all the warehouses for all years. This measurement was on the coarse side of a 70's grade. Warehouse B in 1958 had an average fineness of 21.39 microns, the coarsest at the warehouses for all years.

Much wider variations occurred between lots. The finest lot found during the 3 years, measured 18.03 microns, the coarsest lot, 24.58 microns. The finest lot was measured in 1957 at warehouse C, the coarsest at warehouse B in 1959. Each warehouse had wool lots that were finer in 1957 than in either 1958 or 1959, and the coarsest of the lots in 1957 was finer than the wool in any lots sampled in 1958 or 1959 with the exception of a lot at warehouse C.

Slightly less than 1,100,000 pounds of wool, clean basis, of the 1,250,000 pounds sampled was fine, that is 64's and finer. A total of 170,000 pounds, clean basis, or 13.6 percent of all wool sampled, was 22 microns or more in diameter. In 1957, none of the wool sampled had an average diameter of 22 microns or more at warehouse A in 1957. In 1957, 96.5 percent of all wool sampled and sold was fine; in 1958 and 1959, 81.9 and 82.5 percent, respectively, were fine. During the 3 years, 95.9 percent of the wool at warehouse A was fine. The comparative percentage for warehouse B was 80.8 percent, for warehouse C, 82.5 percent. A relatively higher percentage of fine wool was noted at all warehouses in 1957 than in any other year.

TABLE 8. PERCENT CLEAN WOOL FOR EACH WAREHOUSE FOR EACH YEAR, FOR ALL YEARS AND FOR ALL WAREHOUSES FOR WOOL SAMPLED AND SOLD AT THE THREE LOCATIONS, 1957-59

Warehouse	1957	1958	1959	1957-59
	Percent clean			
A	41.4	48.0	46.7	45.2
B	43.8	48.9	45.9	46.4
C	43.2	48.1	47.5	46.5
All warehouses	42.5	48.2	46.6	45.9

Length

Length is a major characteristic that determines the usefulness of a particular wool lot. The shorter the wool, the more limited are its uses.

The 3-year average unstretched length of wool sampled at all warehouses was 2.8 inches. Average wool lengths for the 3 years at warehouses A, B and C were 3, 2.5 and 2.8 inches, respectively. The average length for 1957, 1958 and 1959 for all warehouses was 2.8 inches.

The average unstretched length of all wools sampled and sold at warehouse A was longer than the average length of those sampled and sold at either of the other two warehouses for all years. Warehouse A wools ranged from .3 inch to .9 inch longer than the others. For the entire period, warehouse A wools averaged .6 inch longer than wools at warehouse B and .3 inch longer than those at warehouse C. Wools at warehouse B were always shorter than the average, but those at warehouse C were nearer the average length for all warehouses.

The greatest average length of a single lot at all warehouses during the 3 years was 3.8 inches, the shortest was 1.3 inches. The lot that had the longest average length was sampled in 1959 at warehouse A, and the lot that had the shortest average length was sampled in 1957 at warehouse C. The lots that showed the longest average lengths for the 3 years were 3.8, 3.4 and 3.6 inches at warehouse A, B and C, respectively. The lots that showed the shortest average length were 1.8, 1.4 and 1.3 inches for the same period at the same warehouses. By years, the longest average lot lengths were 3.7, 3.4 and 3.8 inches; and the shortest average lot lengths were 1.3, 1.4 and 1.7 inches during 1957, 1958 and 1959, respectively. The shortest lengths above were from wools of less than 12 months growth.

According to the standards for length, proposed by the USDA, the following classifications may be made: Wool lots that have an average length of 2.75 inches and above are classified "strictly staple," those of 2 to 2.75 inches as "staple and good French," those of 1.5 to 2 inches as "average and good French" and those under 1.5 inches as "short French and clothing." On a clean basis, 715,000 pounds, or 57 percent, of all wool sampled and sold were strictly

staple; 466,000 pounds, or 37.1 percent, were staple and good French; 61,000 pounds, or 4.9 percent, were average and good French; and 13,000 pounds, or 1 percent, were short French and clothing wool. No short French and clothing wools were sampled and sold in 1959.

Color

Objective standards for determining the color of a particular wool lot are not yet available, but methods used to determine color were those currently employed by the USDA. Colors were estimated by representative samples of various colors and by visual comparison of the subjected lot with the sample.

The colors were ranked *A* through *E*; *A* was the whitest and *E* the creamy or least desirable color.

Texas wools are not normally the whitest wools produced in the United States. Whitest wool or *A* color is given an index value of 1; *B, C* and *D* values of 2, 3 and 4, respectively. The average color for all warehouses for all years was 1.9 or only slightly better than *B* color. However, wools produced in 1957 were considerably whiter than those produced in either 1958 or 1959. This fact characterized wools sampled at all warehouses. The lowest color rating for wool sampled and sold at any warehouse during any year was sampled at warehouse C in 1958 and had an average rating of 2.3. Very little difference in average color was found in wools at all warehouses during these 3 years.

Eighty-five lots, or 27.7 percent of all lots, were *A* color; 181 lots, or 59 percent, were *B* color; 40 lots, or 13 percent, were *C* color; and only one lot, or .3 percent, was *D* color. A total of 75 lots, or 88.2 percent of all lots with *A* color, were sampled in 1957. Most *B* wools were sampled in 1958 and 1959.

On a clean basis, 277,000 pounds, or 22.08 percent of all wool sampled and sold, were *A* color; 816,000 pounds, or 65 percent, were *B* color; 159,100 pounds, or 12.7 percent, were *C* color; and only 2,000 pounds, or .2 percent, were *D* color. Distribution by weight and by lot are very similar. Most weight classified as *A* color was so classified in 1957, which was also the case by lots. Most of the weight classified as *B* wool was accumulated in 1958-59.

Crimp

Crimp of wool is a characteristic presently determined by tentative methods. No one standard method for crimp measurement is used since a variety of methods are employed. Although the method used in this study is not entirely satisfactory, it offers a quick and convenient method of determining objectively the staple crimp of a particular wool lot and gives a distinct impression of whether the wool has a coarse or fine crimp. No measurements on crimp depth were made.

The average crimp per inch for all wool sampled was 15.6. The highest number of crimps per inch for any lot was 21.1, the lowest was 9.5. The year which the wools sampled showed the lowest average number of crimps per inch was 1958.

Lot Size

The average grease weight of wool in all lots sampled during these 3 years was 8,903 pounds. The smallest lot sampled contained 1,445 pounds and the largest 36,947 pounds, grease basis. The average lot weight of all lots sampled increased about 900 pounds, grease basis, between 1957 and 1958. This indicated increase, however, was not characteristic of grease wool production throughout Texas. The most important cause for increase in size of the lots sampled was probably the improved range conditions in the primary wool-producing areas of the State.

The average size of lot by warehouses was 14,350, 8,611 and 5,518 pounds at warehouses A, B and C, respectively. During the 1956 marketing year, the average lot size for the entire State was 2,120 pounds (5). The difference between the figure for 1956 and the average for the 3 years is caused by the elimination of all lots with less than 20 bags from consideration for sampling purposes.

Bag Weights and Number of Bags Per Lot

The average bag weight of all wool sampled was 158 pounds, grease basis. The lightest average bag weight at any warehouse during any year was 146 pounds at warehouse A in 1958, and the heaviest was 179 pounds at warehouse C in 1957. The average bag weights at all warehouses were lighter in 1958 than in either of the other 2 years because of a lighter shrinking wool in 1958. Bags contained, on the average, about 15 pounds less grease wool at warehouse A than at either of the other warehouses during these 3 years. Yearly average bag weights at all warehouses were approximately 10 pounds heavier in 1957 and 1959 than in 1958.

The average number of bags per lot increased from 52 in 1957 to 61 and 56 in 1958 and 1959, respectively. The average number of bags per lot for the 3 years at warehouse A was about three times the number at warehouse C and about twice the number at warehouse B.

The highest number of bags sampled and sold in any lot was 256 bags, and the lowest number was 14 bags. The highest number of bags per lot occurred at warehouse A for all 3 years.

Other Characteristics

Other physical characteristics that should be investigated include strength, handle and black fiber content. Originally, black fiber content was considered, but this factor was eliminated from this study after 1957 because there was no suitable method available for determining black fiber content of indi-

vidual lots. Strength was not included in this study because instruments for measuring strength and satisfactory methods of analysis of strength data are not available for rapid determinations. This study indicates that additional work should be done on methods and procedures that can be used in measuring these characteristics.

Texas wools generally are considered superior to most U. S. produced wools in handling characteristics. The wools produced in the State characteristically have a soft pliable feel and are desirable for use alone or in blends since they tend to improve the handle and feel of a wool fabric. No generally accepted objective standards are available to determine this characteristic, and additional work needs to be done in this particular area.

Generalizations Concerning Type of Wool Produced

Texas wools, on the average, yield about 46 percent clean wool. Generally, short staple wools are expected to yield less than the longer staple wools. However, our data do not confirm this generalization.

More than 85 percent of Texas wool is fine. The average diameter of all wool included was 21 microns, a figure which represents a firm 64's grade, although a substantial volume of wool produced in the State is finer than 64's. In years when the range conditions vary from poor to very poor, much wool produced borders on a 70's grade. The average length of 2.8 inches is somewhat short and barely made the staple class according to the proposed standards of the USDA. Slightly more than half, or 57 percent, of all wool sampled and sold was staple.

Considerable improvement can be made by selection of breeding stock for length of wool produced. Sheep breeders generally believe that there is a high negative correlation between length of staple and fineness. This study, however, does not confirm that opinion, since the wools it measured indicate that staple length was not longest at the warehouse where wool was coarsest. However, it appears that fineness and length might simultaneously be improved by careful selection of breeding stock. The average fineness for all 3 years at warehouses A, B and C was 20.9, 21 and 21.1 microns, respectively, whereas the average length was 3, 2.5, and 2.8 inches, respectively. Warehouse A samples showed the finest as well as the longest wool.

Texas wools are slightly "off-white" instead of a pure white. Apparently the amount of rainfall affects the color of wool considerably. Wools produced during the years of least rainfall are closer to *A* color, but when heavy amounts of rainfall occurred, the wools were more off-white. Thus improvements in color characteristics of Texas wool would be very difficult to achieve.

Texas wool crimp varies considerably according to the breed of sheep. There is a high correlation between the number of crimps per inch and the fineness of wool produced by any one breed of sheep. There are exceptions to this however, and therefore crimp may be used only as an approximate guide to fineness. The average number of crimps per inch was 15.5, a discovery which indicates that the amount of crimp is quite satisfactory in Texas wools.

The average bag weights indicate that the bags are not packed to capacity and could be packed more firmly. Apparently no great damage to the wool occurs when bags are packed more tightly, because if the wools were damaged by overpacking, baling in the grease would not be practiced. Wools packed to greater density are perhaps less attractive to buyers but not to the extent that prices should be reduced for overpacking. The main objection to overpacking seems to be that heavier than average packed bags are usually estimated to yield less than they actually do. Fewer bags would be necessary and greater efficiency could be obtained in objectively determining the clean yield if bags were packed to a greater density. Also, a greater density of pack could be obtained in either the flat or round bag by using the current method of packing.

Lot size makes Texas wools desirable from the standpoint of convenience. Characteristically large lot sizes and concentration of wool production enables buyers to obtain any desired volume of wool of a specific type fairly easily. The average lot size probably is approximately 2,100 pounds, but in 1956 a total of 41 percent, or more than 8,500 growers, produced an average sized clip of less than 1,000 pounds (5). However, 7.5 percent of the larger producers produced more wool than did the 41 percent, since more than 1,500 producers produced an average lot size of more than 5,000 pounds, grease basis, in the same year.

Producers in Pecos, Terrell, Val Verde, Kinney, Sutton, Crockett and Schleicher counties produced 25 percent of Texas wool in 1956. Only about 4 percent of Texas wool producers are located in these seven counties, but each of these counties produced more than 1,000,000 pounds of grease wool in 1956, and the growers had an average clip of more than 5,000 pounds. A total of 15 counties (and some 5,100 growers) produced 47 percent of the wool produced in Texas in 1956. In other words, about one-fourth of the Texas growers produced almost half of the wool in the State total. The average lot size of 8,900 pounds for the clips included in this study represents a large percentage of the State's annual wool production, but only a small percentage of the growers.

Changes in Quality of Texas Wool

Improvements in preparing Texas clips have been slow, but some progress is being made. Much of the wool is still ungraded, and growers in many areas still

persist in putting up their wool carelessly. A number of growers still place tags, black wool, tender wool, wet wool and other low-grade wools into the same bag with their good or premium wool. In such cases, the grower loses financially since the whole lot is heavily discounted because of these undesirable wools. These off-type wools should be bagged and labeled separately from the premium wools in order to obtain fair market value.

Selection and culling of flocks have proved very beneficial. Agricultural extension programs in flock improvement and wool preparation have been helpful, and warehouse operators in some areas have assisted in improving the quality of Texas wool. Significant improvements have been made in the more profitable production of higher quality wool in areas where the most concentrated efforts at flocks improvement have been tried. The percent of lamb crop and weight of Texas market lambs have been improved along with wool through agricultural extension programs and warehouse efforts toward flock improvement since lambs are also a major source of income from sheep production. As improved flock practices raise the quality of wool and sheep produced in some areas, they could be more widely practiced. The development of a state-wide production program that emphasized flock improvement through better management practices would help considerably in increasing superior market products of both wool and lambs.

Uses for Which Texas Wools are Well Adapted

Texas wools are especially well suited to several purposes. First, they are useful when used in 100 percent wool products and also as blending wools, for they improve the "handle" of harsh wools by their unusual softness. For this reason, they are also especially valuable in fabrics used in the manufacture of men's and women's wear.

Texas wools are also well suited for felting purposes, and a sizable volume goes into felts annually. The shorter wools of approximately 6 months growth are particularly well suited for felting and high grade woolens.

Texas produces about 10 million pounds of spring and fall wool (3). Most spring wool is especially well adapted for use in woolen manufacture and is usually in good demand.

The longer staple wools are extremely popular in the worsted trade because of their adaptability and the wide number of uses to which they are particularly well suited. Hence, additional emphasis should be placed on improving the length of all wool in the State.

In general, Texas wools fit a wide variety of uses because of their uniformity of fineness, their handle and the concentration of volume of fine wool.

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