Economic Impact of Pre-sale Fiber Measurements on Prices Paid for Wool[1,2]

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Summary

A study was conducted to quantify the effects of pre-sale objective measurements on traditional Texas wool warehouse sales and particularly to quantify the economic impact of making these measurements available prior to wool sales. Accumulations of wool (173 lots) were sampled in six west Texas warehouses prior to the 1990 and 1991 wool-selling seasons. Subsamples were tested for yield, vegetable content, fiber diameter and staple length. The objectively-measured information was provided to buyers prior to bidding for half the wool lots (OBJ) but was withheld for the other comparable half (SUB), these lots being purchased in the normal manner following subjective appraisal.

In 1990, wool buyers paid more ($0.26/kg, $P < 0.05$) for wools for which objective measurements were available. The same effect was observed in 1991 but the difference ($0.15/kg) was not significant ($P > 0.05$). Selling date had a significant influence ($P < 0.01$) on prices in 1991 but not in 1990. Fiber diameter was negatively and significantly ($P \leq 0.05$) correlated with price, irrespective of marketing category (OBJ and SUB). Yield was positively and significantly ($P < 0.01$) correlated with price for the OBJ wool lots in both years of the study. This situation was also true for the SUB wools in 1991. However, the correlation between price and yield was not significant for SUB lots in 1990. Staple length was positively correlated with price in both marketing categories and both years of the study.

The major implication of this study is that prices paid for wool can be increased by providing buyers with objective data on individual lots prior to sale.

Key words: wool, objective measurements, subjective assessments, price.

Introduction

More than 15 years of basic research, instrument development and large-scale, multi-national textile mill trials have resulted in the adoption of a wool marketing system called "Sale-by-Sample" in Australia. In this system, important wool characteristics (including yield, vegetable content, fiber diameter, length and strength) are measured on each lot of skirted and classed wool and made available to potential buyers prior to sale by public auction. In contrast, much Texas wool is still sold on a greasy basis in sealed-bid sales after subjective evaluation by the buyer.

Advantages for a wool marketing system based on objective fiber measurements compared to the traditional subjective system have been enumerated (Lupton, 1987; Mackay, 1980) and far exceed the cost of testing. In addition to direct savings in wool handling at the selling centers, broader indirect improvements and savings have been reported in wool preparation, sheep breeding, wool packaging and the overall efficiency of wool marketing. These have extended the benefits of the marketing system to producers, wool buyers and processors. Such claims seem reasonable when it is considered that the advantages have accrued as a result of almost the whole Australian wool industry simultaneously adopting this form of marketing.

The question arises, "Would financial advantages accrue to U.S. wool producers who sold objectively-measured clips?" An experiment was designed to answer this question in the context of Texas fine wool produced in 1990 and 1991.

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It was originally envisaged to conduct this study using skirted and classed wools. However, since most of the prepared wools are sold with objective fiber information, warehousemen were reluctant to accommodate the experimental design which called for half the wool lots to be sold without measurements. Consequently, the study was conducted using unprepared (original bag) wool, recognizing that sampling procedures might produce less representative samples than would be expected with classed wool lines.

Materials and Methods

Twenty-five Texas warehouses were initially contacted to cooperate in this two-year project. Five warehousemen consented to participate in 1990 and six in 1991. In each year of the experiment, multiple lots of wool (74 in 1990, 99 in 1991) were sampled under the supervision of Experiment Station staff. Core samples were tested for yield (clean wool fibers present, CWFP), vegetable matter present (VMP), average diameter and distribution by Yocom-McColl Testing Laboratories, Inc. Grab samples were tested for staple length and distribution at the Texas Agricultural Experiment Station Wool and Mohair Research Laboratory, San Angelo, TX. One half of all the lots tested sold in the traditional manner on a subjective basis. In contrast, certificates summarizing the objectively-measured information were available for all the lots representing the other half. Representative bags of all lots were also available for buyer inspection prior to sale. An attempt was made to place lots in the "subjective" (SUB) or "objective" (OBJ) categories in a random manner. However, in some cases, requests from individual producers to place their wool in one or the other category were honored. Other data collected in the study included date of sale, lot size (kg) and price received ($/kg, greasy).

Mean values and standard deviations were calculated by sale category and year for each variable measured. Analysis of variance and Duncan's New Multiple-Range Test (SAS, 1988) were used to identify significant within-year differences between all mean values in the objective versus subjective sale categories. Finally, simple linear regression analysis was used to calculate correlation coefficients between prices received and objectively measured properties.

Results and Discussion

Table 1 shows the mean values and variability (standard deviations, SD) of the characteristics measured in the 1990 study summarized by marketing category. Although differences exist between objectively and subjectively sold lots in every characteristic, most of these were not significant ($P > 0.05$). Thus, as planned, average selling dates, lot sizes, CWFP, VMP, fiber diameter and staple length between the two marketing categories were not different ($P > 0.05$). In contrast, the $3.46/kg paid for the OBJ lots was greater ($P < 0.05$) than the mean value of $3.20/kg paid for the SUB lots. Thus, in 1990, wool buyers paid $0.26/kg more for the Texas original bag wools for which objective measurements were available compared to wool which they had only subjectively appraised. If the average cost of core testing (CWFP, VMP and fineness) was $100, it follows that objective marketing would have paid in 1990 for lot sizes greater than 385 kg ($100 divided by $0.26/kg).

Table 2 summarizes similar data for the 1991 marketing year. From a statistical point of view, the nine mean values reported for the OBJ wool lots are not different ($P > 0.05$) than the values reported for the SUB lots. Again, a higher mean price ($0.15/kg) was paid for the OBJ wool compared to the SUB wool, but in 1991 this difference was not significant at the 95% probability level. This is primarily due to the relatively high variability observed in wool prices in the 1991 season compared to the 1990 season. Specifically, a major price increase occurred on April 30, 1991, which added a great deal of variability to the price data (in both marketing categories). Despite this lack of significance, prices paid for OBJ lots were higher than for SUB wool. This gives another positive indication that providing measurements of wool characteristics prior to sale can result in higher prices being paid.

Table 3 contains correlation coefficients (r values) for price versus measured characteristic by marketing category (OBJ and SUB) and year. The probability of the correlation being significant appears in parenthesis after the correlation coefficient. Thus, in 1990, selling date was not significantly correlated with price received ($P > 0.05$). However, under 1991 marketing conditions, the correlations between price and selling date

Table 1. Mean values and variability of characteristics measured in 1990 wool marketing study.

	Sale category			
	OBJ[a]		SUB[b]	
	Mean	SD	Mean	SD
Selling date (day of year)	144.8	16.7	139.1	20.2
Weight (kg)	2,622	2,436	1,630	1,007
CWFP (%)	50.3	2.4	50.1	3.2
VMP (%)	1.1	0.6	1.0	0.4
Fiber diameter (μm)	19.6	0.9	20.2	0.8
SD of fiber diameter (μm)	3.6	0.9	3.8	0.3
Staple length (cm)	8.58	0.96	8.46	1.40
SD of staple length (cm)	1.37	0.61	1.32	0.41
Price ($/kg, greasy)	3.46[c]	0.42	3.20[d]	0.46

[a] Objective category; 37 lots total.
[b] Subjective category; 32 lots total.
[c,d] Values in the same row with different superscripts differ ($P < 0.05$).

were both highly significant (P = 0.0001), this being a result of the April 30 price change that was explained previously.

For both years and marketing categories, price and lot size were inversely but not significantly related. This is contrary to the popular belief that has maintained price declines as lot size decreases. Price and CWFP were positively and significantly correlated for both years when the wool was sold with objective measurements. For unexplained reasons, this relationship did not hold for the 1990 subjectively-appraised wools, an indication that price equity is more difficult to achieve when measurements are not used. Price and VMP were negatively correlated. However, the only highly significant correlation of magnitude (r = -0.47) was found in 1991 for the subjectively appraised wools. These data suggest that vegetable contamination had little effect on price in 1990 but that in 1991 buyers responded to perceived (but not measured) vegetable content. Fiber diameter and price were significantly and negatively correlated. The similarity of the correlation coefficients between OBJ and SUB categories suggests that the wool buyers are doing an adequate job of visually assessing average fiber diameter. Staple lengths were uniformly longer in 1990 than in 1991 (Tables 1 and 2). This was a direct result of several six-month clips being included in the 1991 trial. For three out of four groups, price and staple length were highly correlated. For unexplained reasons, the correlation was not significant (P > 0.05) for price versus staple length in the objective category in 1990.

Table 2. Mean values and variability of characteristics measured in 1991 wool marketing study.

	Sale category			
	OBJ[a]		SUB[b]	
	Mean	SD	Mean	SD
Selling date (day of year)	124.5	20.5	127.6	19.7
Weight (kg)	3,188	2,385	3,047	2,400
CWFP (%)	53.1	3.9	52.3	4.5
VMP (%)	1.7	1.0	1.4	0.8
Fiber diameter (μm)	20.3	0.7	20.6	0.7
SD of fiber diameter (μm)	3.7	0.3	3.8	0.3
Staple length (cm)	7.21	1.57	7.01	1.60
SD of staple length (cm)	1.14	0.38	1.07	0.36
Price ($/kg, greasy)	2.40	0.64	2.25	0.70

[a] Objective category; 47 lots total.
[b] Subjective category; 52 lots total.

Conclusions

Pre-sale availability of objective measurements on wool lots appears to have made a positive impact on prices paid for original bag wool in west Texas in 1990 and 1991. Assuming a fixed cost of $100 for yield and fineness testing, minimal lot sizes of 385 and 660 kg in 1990 and 1991, respectively, would have been required for this practice to be profitable. A clear implication of this study is that prices paid for wool can be increased by providing buyers with objectively measured wool data prior to the sale.

Literature Cited

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Table 3. Correlation coefficients for price versus objectively measured characteristic (P values in parenthesis).

	Sale category, year			
	OBJ, 1990[a]	SUB, 1990[b]	OBJ, 1991[c]	SUB, 1991[d]
Selling date	0.17 (0.3119)	-0.03 (0.8481)	0.53 (0.0001)	0.63 (0.0001)
Weight	-0.18 (0.2830)	-0.30 (0.0975)	-0.16 (0.2843)	-0.17 (0.2208)
CWFP	0.54 (0.0005)	0.12 (0.5175)	0.41 (0.0039)	0.44 (0.0010)
VMP	-0.15 (0.3819)	-0.07 (0.7039)	-0.25 (0.0882)	-0.47 (0.0004)
Fiber diameter	-0.32 (0.0529)	-0.40 (0.0222)	-0.32 (0.0307)	-0.35 (0.0114)
Staple length	0.30 (0.0911)	0.56 (0.0009)	0.61 (0.0001)	0.56 (0.0001)

[a] Objective category; 37 total lots in 1990.
[b] Subjective category; 32 total lots in 1990.
[c] Objective category; 47 total lots in 1991.
[d] Subjective category; 52 total lots in 1991.