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TEXAS-OKLAHOMA PRODUCER COTTON
MARKET SUMMARY: 1997/98

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Abstract

The 1997/98 Texas-Oklahoma producer cotton markets experienced a decrease in the average producer price of almost 5.5 cents/lb. from the previous marketing year.

Overall, quality was generally high and differed little from the 1996 crop. The size of the 1997 crop increased significantly, while the amount of cotton available in the spot market increased accordingly, possibly contributing to the fall in prices. With the exception of strength, discounts for the 1997 crop decreased for every quality attribute, while premiums increased for every quality attribute except staple.

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TEXAS-OKLAHOMA PRODUCER COTTON MARKET SUMMARY: 1997/98

Introduction

This report summarizes the price, premium, and discount estimates made by the Daily Price Estimation System (DPES), maintained and operated by the Department of Agricultural and Applied Economics, Texas Tech University, for the 1997/98 marketing year (also referred to as the 1997 crop year). The DPES is a computerized, econometrically-based price analysis system that evaluates cotton sales and estimates quality premiums and discounts for the West Texas and East Texas/Oklahoma cotton marketing regions on a daily basis (Brown et al.). The DPES receives data each day from electronic spot markets operating in these regions, which are used to make the daily estimations. The data represent only producer spot market transactions, not contracted cotton, commission sales to mills, or sales among merchants. All reported results are based on the official HVI grading standards used by the U.S. Dept. of Agriculture.

1997/98 Crop Statistics

Table 1 provides a summary of the crop statistics for the past 4 years. All of the averages are computed by taking a simple average (a sum of all data, divided by the numbers of observations) of the data compiled for those marketing years. A total of 1,851,428 bales (1,705,128 bales from West Texas and 146,300 bales from East Texas/Oklahoma) and 21,269 sales transactions were used in the 1997/98 DPES estimations. This represents about 35% of the 5.2 million bale crop in Texas and Oklahoma and about 57% of the producers' cash market sales for these regions (U.S.

Table 1. Texas-Oklahoma Crop Statistics from the DPES, by Marketing Year.

| Attribute | Average | | | | 95% Population Range ^a | | | |
|-----------------------------|---------|---------|---------|---------|-----------------------------------|---------------|---------------|---------------|
| | 1997/98 | 1996/97 | 1995/96 | 1994/95 | 1997/98 | 1996/97 | 1995/96 | 1994/95 |
| Price (cents/lb.) | 57.99 | 63.48 | 75.18 | 71.67 | 49.87 - 66.10 | 56.01 - 70.96 | 71.47 - 78.89 | 59.64 - 83.86 |
| Bales per Sale | 87 | 65 | 43 | 39 | 1 - 347 | 1 - 244 | 1 - 181 | 1 - 168 |
| Leaf Grade | 3.40 | 3.18 | 2.90 | 3.39 | 1.37 - 5.43 | 1.48 - 4.87 | 1.40 - 4.40 | 1.39 - 5.39 |
| First Digit of Color Grade | 2.48 | 2.62 | 2.41 | 2.47 | 1.06 - 3.91 | 1.34 - 3.91 | 1.29 - 3.53 | 1.34 - 4.58 |
| Second Digit of Color Grade | 1.70 | 1.46 | 1.55 | 1.66 | 1 - 3.15 | 1 - 2.56 | 1 - 2.61 | 1 - 2.67 |
| Staple | 33.57 | 34.23 | 33.13 | 32.86 | 31.31 - 35.83 | 31.87 - 36.59 | 30.53 - 35.74 | 29.84 - 35.88 |
| Strength | 28.68 | 27.33 | 27.92 | 27.69 | 25.49 - 31.87 | 23.80 - 30.86 | 23.10 - 32.75 | 22.89 - 32.49 |
| Micronaire | 3.95 | 3.77 | 3.66 | 4.12 | 3.08 - 4.83 | 2.71 - 4.83 | 2.75 - 4.57 | 3.15 - 5.09 |
| Level 1 Bark (%) | 22.74 | 26.14 | 26.70 | 12.45 | 0 - 80.57 | 0 - 88.75 | 0 - 58.07 | 0 - 56 |
| Level 2 Bark (%) | 0.95 | 0.06 | 0.07 | 0.03 | 0 - 8.95 | 0 - 3.12 | 0 - 3.50 | 0 - 2 |
| Level 1 Other (%) | 0.86 | 0.87 | 1.17 | 2.07 | 0 - 11.09 | 0 - 12.64 | 0 - 15.18 | 0 - 22 |
| Level 2 Other (%) | 0.48 | 0.12 | 0.10 | 0.17 | 0 - 7.71 | 0 - 5.36 | 0 - 4.42 | 0 - 6.2 |

^aThe range within which 95% of the population will fall.

Dept. of Ag., May 12, 1998). The number of sales and bales received by the DPES showed an increase of approximately 27%. This represented a slight increase over the previous year's totals in proportion to the increase in the overall size of the 1997 crop, which increased by about 17% from approximately 4.3 million bales in 1996. The larger volume received could be accounted for by the increase in the crop size and the slight decrease in forward contracting from 18% during the 1996/97 marketing year to 13% in 1997/98. These changes are further reflected in Table 1, as the average number of bales per sale rose from 65 to 87 bales per lot. This reflects an upward trend in the number of bales per lot over the past four years. This trend is also present in the variation in lot size, with 95% of the transactions falling between 1 and 347 bales per lot.

The 1997 crop was characterized by an unusually long marketing year, running from around the middle of October to the beginning of June compared to the end of October through the beginning of March for the 1996 crop. Figure 1 illustrates the pattern of sales transactions for the 1997/98 marketing year. The bulk of sales took place between the middle of December and the middle of February. After February 10, sales dropped off sharply and several periods of little to no market activity interspersed by brief surges in sales were witnessed until the end of the season. The average price received by producers declined once more for the third year in a row, falling to 57.99 cents/lb. The variation in average prices continued to show increases, with 95% of the prices between 49.87 and 66.10 cents/lb. The pattern of base price movements throughout the year revealed a distinct downward trend throughout the first half of the year as prices fell from the mid-60s to the middle and upper 50s (Figure 2). Base prices

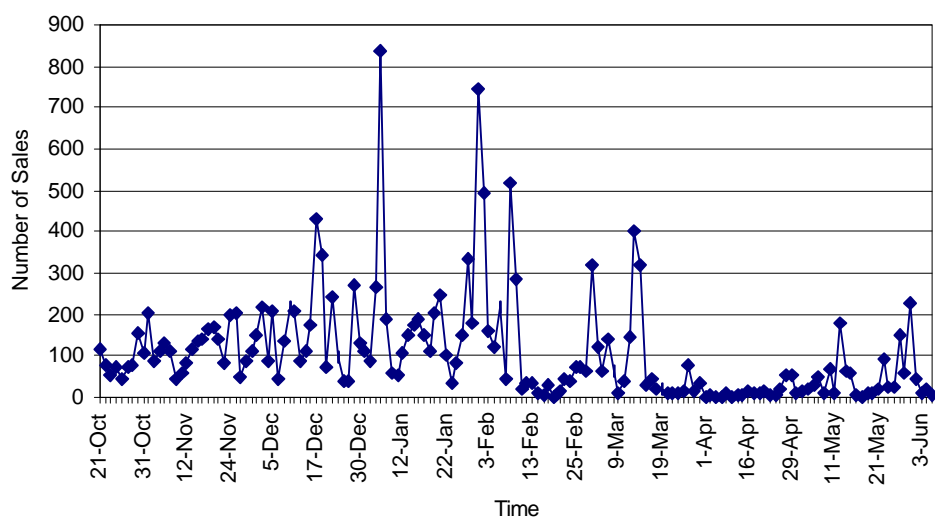


Figure 1. Daily Volume of Transactions for the 1997/98 Marketing Year.

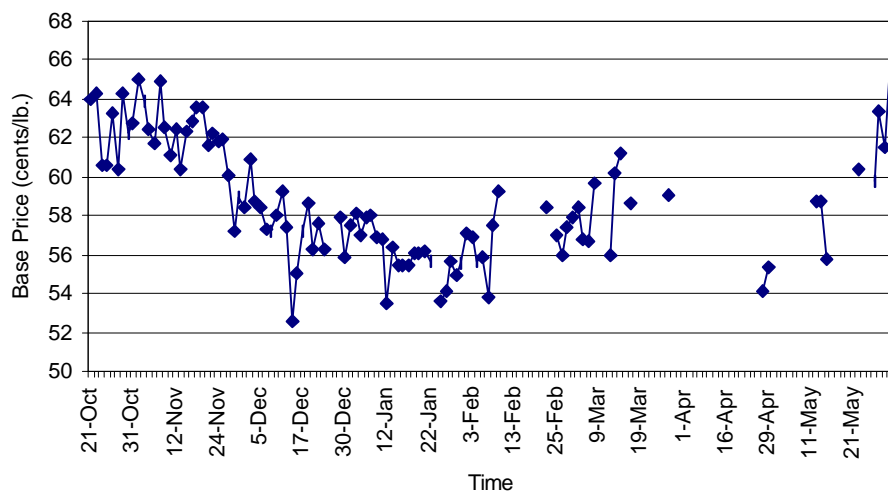


Figure 2. Movement of Base Prices for the 1997/98 Marketing Year, West Texas.

bottomed out around the latter part of January and an upward pattern emerged which continued to the end of the year. This rise in prices coincides with the sudden drop-off in market activity and the shortage of cotton on the spot market may have contributed to the recovery in prices towards the latter part of the marketing year.

The average leaf grade for the 1997 crop increased to 3.40 from 3.18 the previous year. The variation in leaf grades also increased for the third year. The first digit of the color grade, indicating the degree of grayness, fell to an average of 2.48 from the 1996 crop year, with a 95% population range from 1.06 to 3.91. The second digit of the color grade, indicating the degree of yellowness, increased from 1.46 to 1.70 for the 1997 crop year. In addition, variation in yellowness saw a significant increase over that of the previous three years, ranging between 1 and 3.15.

The average staple length for 1997 fell to 33.57 32nds/inch while variation also fell with 95% percent of sales between 31.31 and 35.83 32nds/inch. Average strength also increased to 28.68 grams/tex from 27.33 grams/tex the previous year. Average strength measurements varied less than in the previous three years, ranging from 25.49 to 31.87 grams/tex. Micronaire increased to 3.95 from the previous two years with a variation ranging from 3.08 to 4.83.

Bark is reported as the percentage of bales having level 1 or level 2 bark. Level 1 bark decreased from the previous year to 22.74%, while the 95% population range decreased slightly to an upper bound of 80.57%, down from 88.75% the in 1996. Level 2 bark increased quite substantially to 0.95% from the previous three years which had all been below 0.10%. Variation increased significantly as well, reaching a high of 8.95%. Other extraneous matter (reported as “Other” in Table 1) is also reported as the

percentage of bales in a lot containing either level 1 or level 2 other extraneous matter (largely grass content). Level 1 other remained relatively constant at 0.86%, while the percentage of level 2 other increased to 0.48% from 0.12% in 1996.

The 1997 crop was, in relative terms, of good quality. In general, quality and variations in quality did not deviate much from that seen last year. However, in spite of this, the 1997 crop had a significant decrease in cotton prices from those of the 1996 crop, contributing to a steady decline in spot market prices over the past three years. The larger volume of cotton available on the market in 1997 could account for the overall decrease in spot market prices, as the increased supply allowed buyers to introduce lower prices into the market with little opposition from producers.

Average 1997/98 Prices, Premiums, and Discounts

The DPES utilizes an econometric model to disaggregate the price of cotton with respect to seven quality characteristics: leaf grade, color grade, staple length, strength, micronaire, bark content, and other extraneous matter content. These quality characteristics are those used by the USDA in its grading of cotton. The resulting parameter estimates are then used to calculate the daily premiums and discounts. For a more detailed discussion regarding these procedures, refer to the appendix.

A set of parameter estimates (see appendix), representing an average of the estimates for the entire crop year, was used to calculate the premiums and discounts for the 1997/98 marketing year for the West Texas (Table 2) and East Texas/Oklahoma (Table 3) regions. The top half of the table represents the color grade/staple matrix, which contains quality premiums and discounts for color grade and staple length. This

Table 2. 1997/98 Weighted Average Price Estimates from the DPES, West Texas.

Yearly Weighted Average of the Daily Spot Cotton Price Estimates
 Dept. of Ag. and Applied Econ., Texas Tech Univ. # Sales: 18220
 Date: 1997 Crop Region: West Texas # Bales: 1705128
 Color Grade and Staple Premiums and Discounts in Points/lb.^a

| Col Grade | Staple Length | | | | | | | | | | |
|--------------|---------------|------|------|------|------|------|--------------------|------|------|------|------|
| | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
| 11 | -- | -157 | -79 | -8 | 53 | 105 | 147 | 180 | 202 | 215 | 218 |
| 21 | -- | -167 | -89 | -18 | 43 | 95 | 137 | 169 | 192 | 204 | 207 |
| 31 | -- | -214 | -136 | -67 | -6 | 45 | 87 | 120 | 142 | 154 | 157 |
| 41 | -- | -297 | -220 | -152 | -92 | -41 | 58.03 ^b | 32 | 54 | 66 | 69 |
| 51 | -- | -414 | -339 | -272 | -214 | -164 | -124 | -93 | -71 | -59 | -57 |
| 61 | -- | -564 | -491 | -426 | -369 | -321 | -281 | -251 | -230 | -218 | -216 |
| 71 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 12 | -- | -241 | -163 | -94 | -34 | 17 | 59 | 91 | 113 | 126 | 128 |
| 22 | -- | -251 | -173 | -104 | -44 | 7 | 49 | 81 | 103 | 115 | 118 |
| 32 | -- | -297 | -220 | -152 | -92 | -41 | -0 | 32 | 54 | 66 | 68 |
| 42 | -- | -379 | -303 | -236 | -177 | -127 | -86 | -55 | -33 | -21 | -19 |
| 52 | -- | -494 | -420 | -354 | -297 | -248 | -208 | -177 | -156 | -144 | -142 |
| 62 | -- | -642 | -570 | -505 | -449 | -402 | -363 | -333 | -313 | -301 | -299 |
| 23 | -- | -458 | -384 | -317 | -259 | -210 | -170 | -139 | -118 | -106 | -103 |
| 33 | -- | -503 | -429 | -363 | -305 | -256 | -217 | -186 | -165 | -153 | -151 |
| 43 | -- | -581 | -508 | -443 | -387 | -339 | -300 | -269 | -248 | -237 | -235 |
| 53 | -- | -693 | -621 | -558 | -502 | -455 | -417 | -387 | -367 | -355 | -353 |
| 63 | -- | -834 | -765 | -703 | -649 | -603 | -566 | -538 | -518 | -507 | -504 |
| 34 | -- | -817 | -747 | -685 | -631 | -585 | -548 | -519 | -499 | -488 | -486 |
| 44 | -- | -891 | -822 | -761 | -708 | -663 | -626 | -597 | -578 | -567 | -565 |
| 54 | -- | -996 | -928 | -869 | -816 | -772 | -736 | -708 | -689 | -678 | -676 |

| Micronaire Differences Points/lb. | Leaf Grade Differences Points/lb. | Bark Discounts Points/lb. | | Strength Differences Points/lb. | |
|---|---|---------------------------------|--------------|---------------------------------------|--------------------------------|
| Mike Range | Leaf Grade | Disc./ Prem. | Bark Code | Disc. | Grams/ Tex. Disc./ Prem. |
| 24&below | -520 | 1 | -- | Level 1 | -139 18&below |
| 25-26 | -433 | 2 | 52 | Level 2 | -594 19 |
| 27-29 | -304 | 3 | 48 | ----- | 20 |
| 30-32 | -177 | 4 | 0 | Other | 21 |
| 33-34 | -96 | 5 | -90 | Discounts | 22 |
| 35-49 | 0 | 6 | -219 | Points/lb. | 23 |
| 50-52 | -207 | 7 | -386 | ----- | 24 & 25 |
| 53&above | -294 | ----- | Other | | 26 |
| | | | Code | Disc. | 27 |
| | | | ----- | | 28 |
| | | | Level 1 | -398 | 29 |
| | | | Level 2 | -607 | 30 |
| | | | ----- | | 31&above |
| | | | | | 67 |

^a100 points = 1 cent^bBase Price in cents/lb.

Yearly Weighted Average of the Daily Spot Cotton Price Estimates
Dept. of Ag. and Applied Econ., Texas Tech Univ. # Sales: 3049
Date: 1997 CROP Region: East Texas/Okla. # Bales: 146300
Color Grade and Staple Premiums and Discounts in Points/lb.^a

| Micronaire Differences Points/lb. | Leaf Grade Differences Points/lb. | | Bark Discounts Points/lb. | | Strength Differences Points/lb. |
|---|---|-----------------|---------------------------------|----------|---------------------------------------|
| Mike Range | Leaf Grade | Disc./ Prem. | Bark Code | Disc. | Grams/ Tex. Disc./ Prem. |
| 24&below -521 | 1 | -- | Level 1 | -139 | 18&below - |
| 25-26 -434 | 2 | 52 | Level 2 | -595 | 19 - |
| 27-29 -304 | 3 | 48 | ----- | | 20 - |
| 30-32 -177 | 4 | -0 | Other | | 21 - |
| 33-34 -96 | 5 | -90 | Discounts | | 22 -64 |
| 35-49 -0 | 6 | -220 | Points/lb. | | 23 -36 |
| 50-52 -207 | 7 | -387 | ----- | -24 & 25 | -0 |
| 53&above -294 | ----- | | Other | | 26 28 |
| ----- | | | Code | Disc. | 27 43 |
| | | | ----- | | 28 54 |
| | | | Level 1 | -399 | 29 62 |
| | | | Level 2 | -607 | 30 66 |
| | | | ----- | | 31&above 67 |

^a100 points = 1 cent

^bBase Price in cents/lb

section also includes the base price at color grade 41 and staple length 34 (the remaining attributes are held at base levels). For example, for the West Texas region, the average base price was 58.03 cents/lb. The average discount for color grade 41 and staple length 33 was 41 points/lb. (100 points = 1 cent). The bottom half of the table lists the average discounts for micronaire, bark and other extraneous matter content, and premiums and discounts for strength and leaf grade. In these sections of the table, the zeros are for the base quality as defined by USDA.

Patterns of Premiums and Discounts

The following is a summary of the producer premiums and discounts as observed throughout the 1997/98 marketing year. For each attribute, the value (premium or discount) and movement over the marketing year have been summarized. During the discussion of a specific attribute, all other attributes are held at the base level. In the following discussion, the quality attribute premiums and discounts for West Texas are used to illustrate seasonal patterns and make comparisons, but the estimations and activity levels are not appreciably different from those for East Texas/Oklahoma.

Leaf Grade. Leaf grade premiums for the 1997/98 marketing year displayed slightly more variation than in the previous year (Figure 3). The majority of premiums (illustrated with leaf grade 3) throughout the year fluctuated between 20 and 100 points/lb., indicating that, in general, the level of premiums differed little from last year. Figure 4 illustrates the average premiums and discounts for the 1997/98 marketing year in comparison to the previous marketing year, 1996/97. Premiums decreased slightly in 1997/98 as well as discounts.

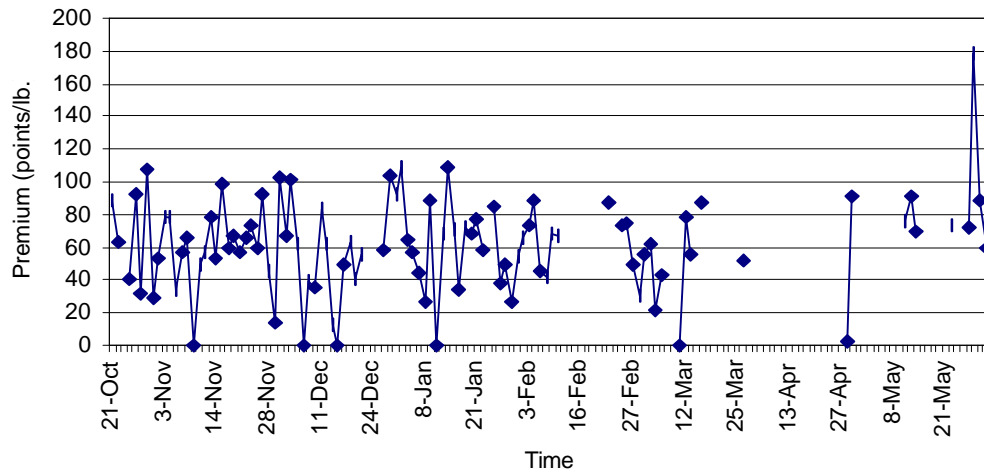


Figure 3. Leaf Grade 3 Premiums for the 1997/98 Marketing Year, West Texas.

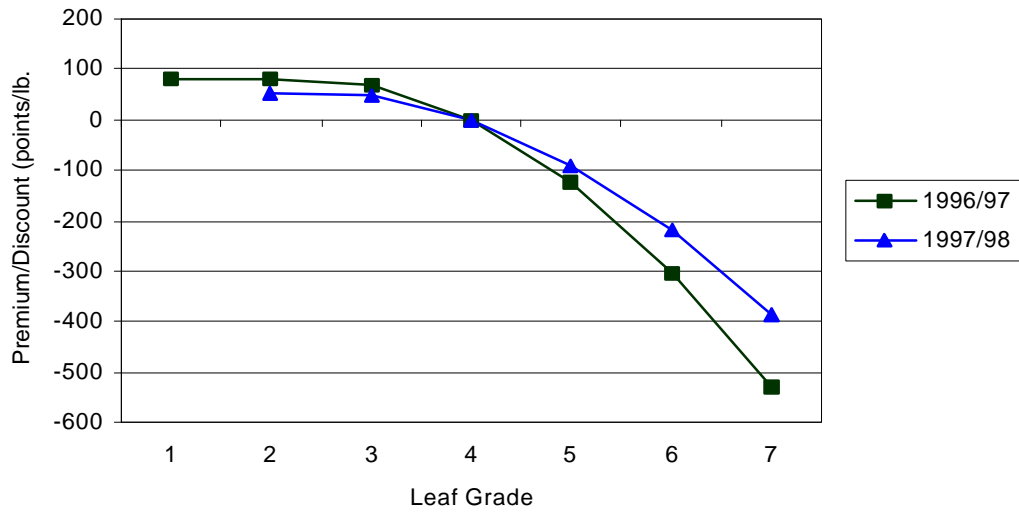


Figure 4. Leaf Grade Premiums/Discounts, 1996/97 and 1997/98, West Texas.

Color Grade. Discounts for color grade were somewhat erratic throughout the beginning of the crop year, as illustrated with color grade 42 in Figure 5. Around the beginning of December, however, these discounts began to stabilize and the bulk of discounts remained between 50 and 100 points/lb. for the rest of the season, relatively close to those of the 1996/97 marketing year.

This is further reflected in Figure 6, as premiums and discounts for the first digit of the color grade remain relatively close as quality approaches the base levels. Premiums for color grade do increase slightly over those of last year, while discounts for increasing degrees of grayness are not discounted quite as severely as in 1996/97. Discounts for the second digit of the color grade, illustrated in Figure 7, are virtually identical to those of the previous year, the only difference appearing at color grade 4. Whereas no distinctions were made between color grade 3 and 4 in 1996/97, this year the average discount for color grade 4 was over 600 points/lb.

Staple. Discounts for staple length 33 fluctuated wildly throughout the 1997 crop year (Figure 8). Discounts exhibited a downward trend throughout the first few months of the season until about mid-December when they leveled off slightly. There were several days when staple length showed no impact on price, a not unusual phenomenon, but a substantial increase over similar days which occurred in 1996/97. There appears to be a slight upward trend following the period of inactivity, but overall, staple discounts never reach the levels seen in the previous year. Figure 9 reveals a similar conclusion, where discounts for staple length decreased throughout the discount range for the 1997 crop year. Premiums, however, showed little difference, decreasing slightly over premiums for the 1996 crop.

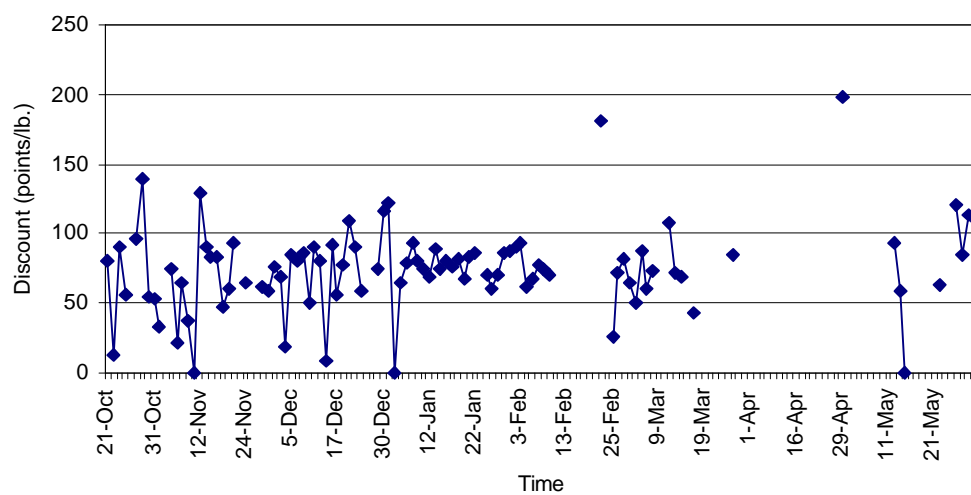


Figure 5. Color Grade 42 Discounts for the 1997/98 Marketing Year, West Texas.

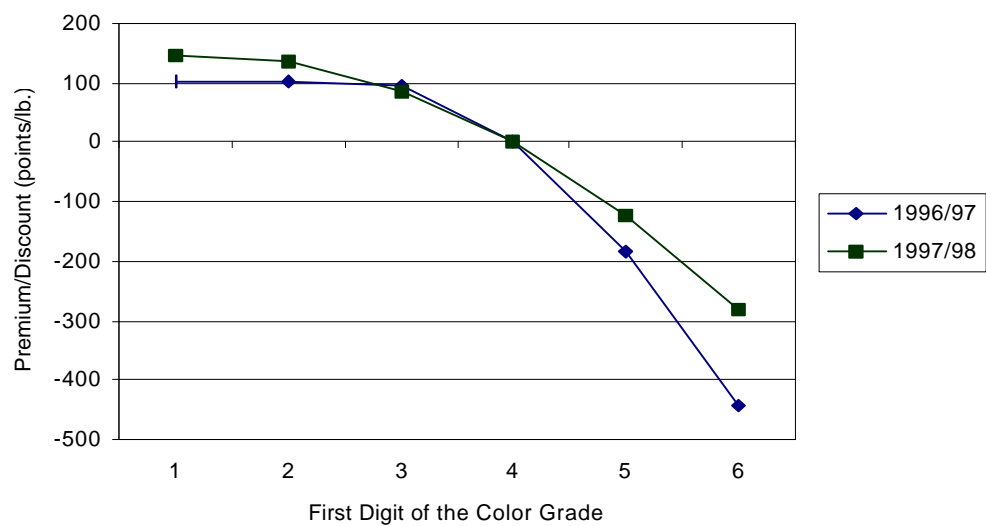


Figure 6. First Digit of the Color Grade Premiums/Discounts, 1996/97 and 1997/98, West Texas.

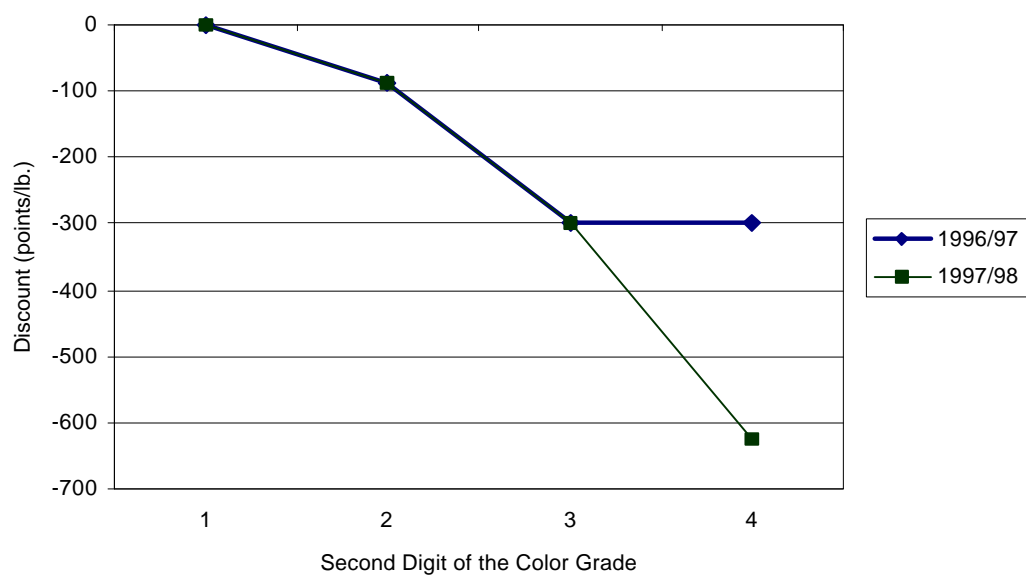


Figure 7. Second Digit of the Color Grade Discounts, 1996/97 and 1997/98, West Texas.

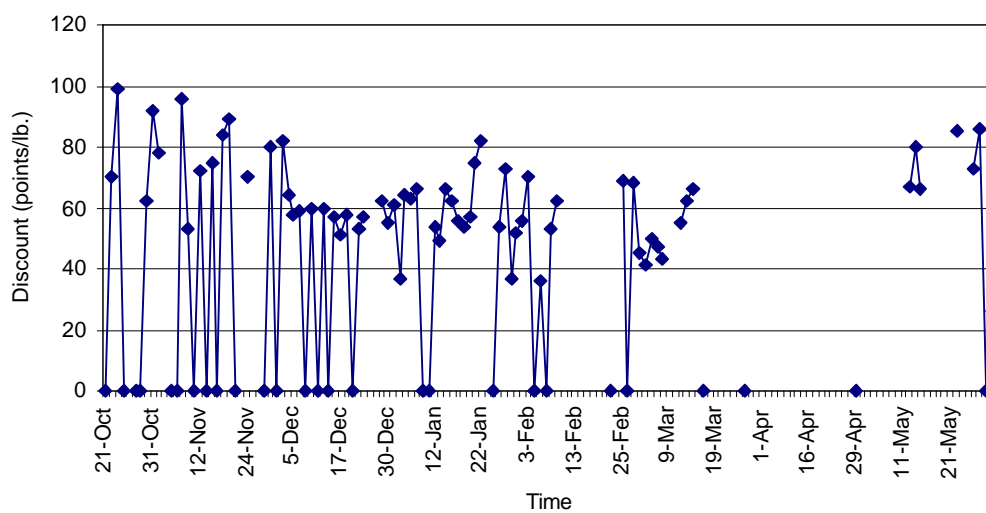


Figure 8. Staple Length Discounts for the 1997/98 Marketing Year, West Texas.

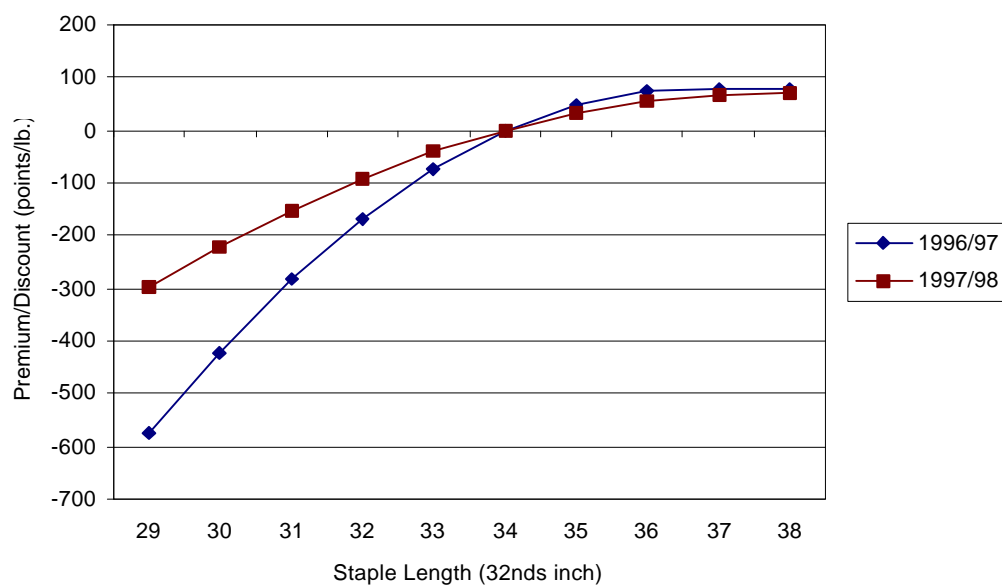


Figure 9. Staple Length Premiums/Discounts, 1996/97 and 1997/98, West Texas.

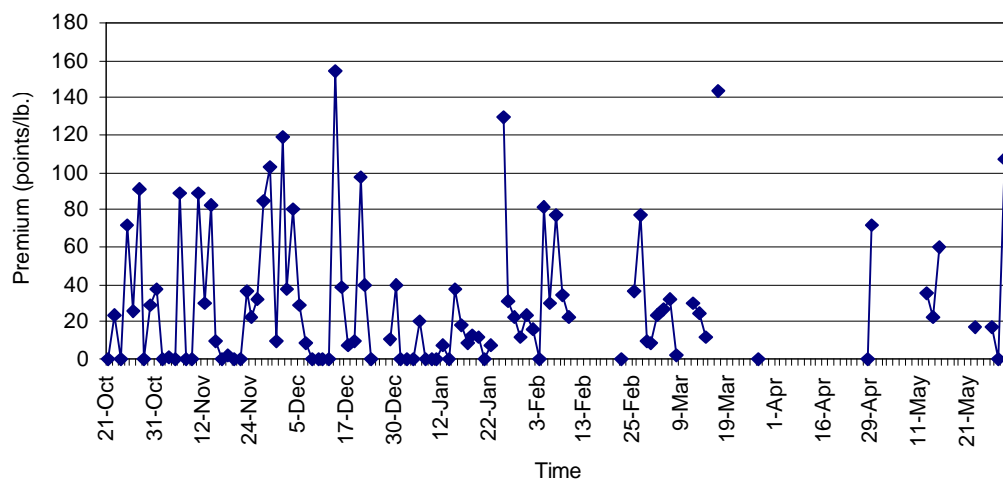


Figure 10. Strength 27 Premiums for the 1997/98 Marketing Year, West Texas.

Strength. Figure 10 shows the movement of premiums for strength 27 throughout the 1997 crop year. Premiums exhibited wide fluctuations throughout the season, with no discernible pattern present. There were, as in previous years, several days in which strength had little or no effect on price. Both premiums and discounts increased in 1997/98 compared to 1996/97, as shown in Figure 11.

Micronaire. Unlike the 1996/97 marketing year in which discounts for micronaire exhibited a fairly tight dispersion, micronaire discounts for 1997/98 returned to the more erratic pattern seen in earlier years. This is illustrated in Figure 12, which shows the movement of discounts for the 3.3 - 3.4 mike discount range. These fluctuations remain primarily within the 50 to 200 points/lb. range, indicating a lower level of micronaire discounts than that seen in 1996/97. This can be further examined by noting the large shift in the discount pattern for micronaire grades in Figure 13. While the 1996 crop year was characterized by unusually large micronaire discounts, discounts for the 1997 crop decreased for all ranges of micronaire, differing by as much as 300 points below the previous year's levels.

Bark. Discounts for level 1 bark fluctuated widely throughout the first part of the season, but around the middle of December began to exhibit an upward trend that continued to the end of the season, with the majority of the season's discount falling between 50 and 250 points/lb. a definite decrease over the previous year's discount level. Figure 15 compares level 1 and level 2 bark discounts for this year compared with those for 1996/97. This also illustrates the decrease in the discount level for both levels of bark content.

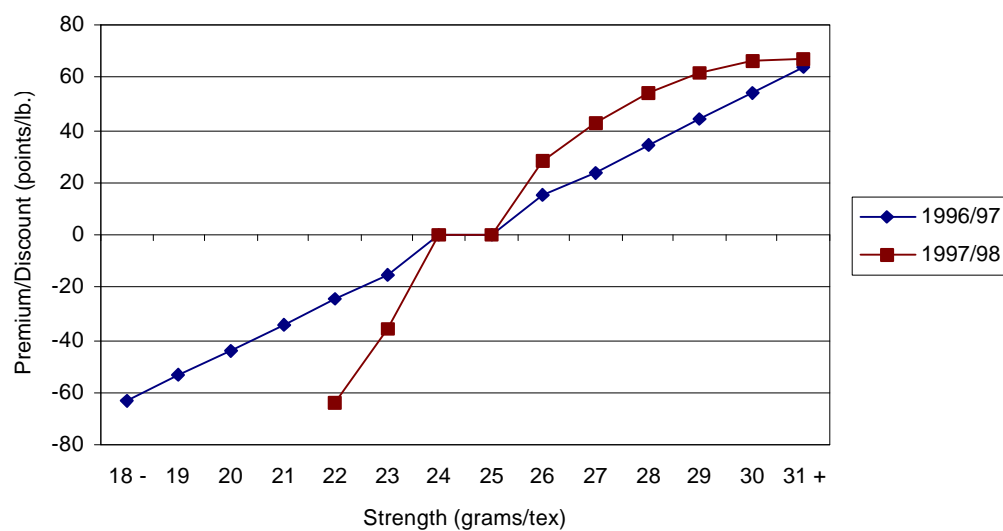


Figure 11. Strength Premiums/Discounts, 1996/97 and 1997/98, West Texas.

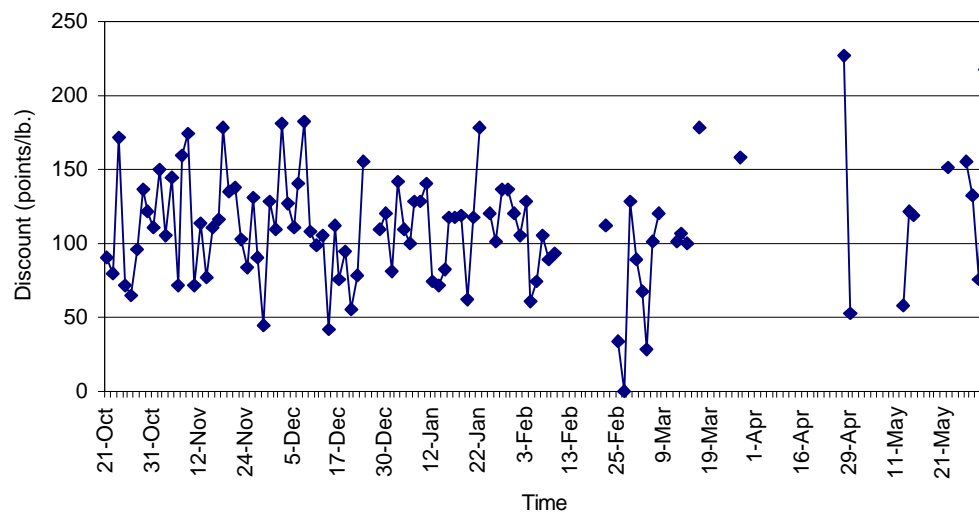


Figure 12. Micronaire 3.35 Discounts for the 1997/98 Marketing Year, West Texas.

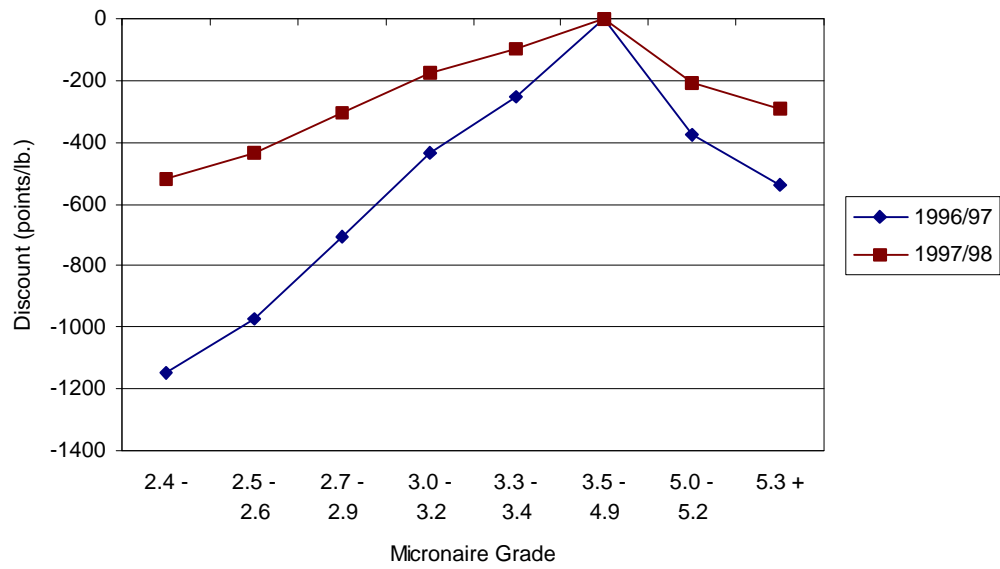


Figure 13. Micronaire Discounts, 1996/97 and 1997/98, West Texas.

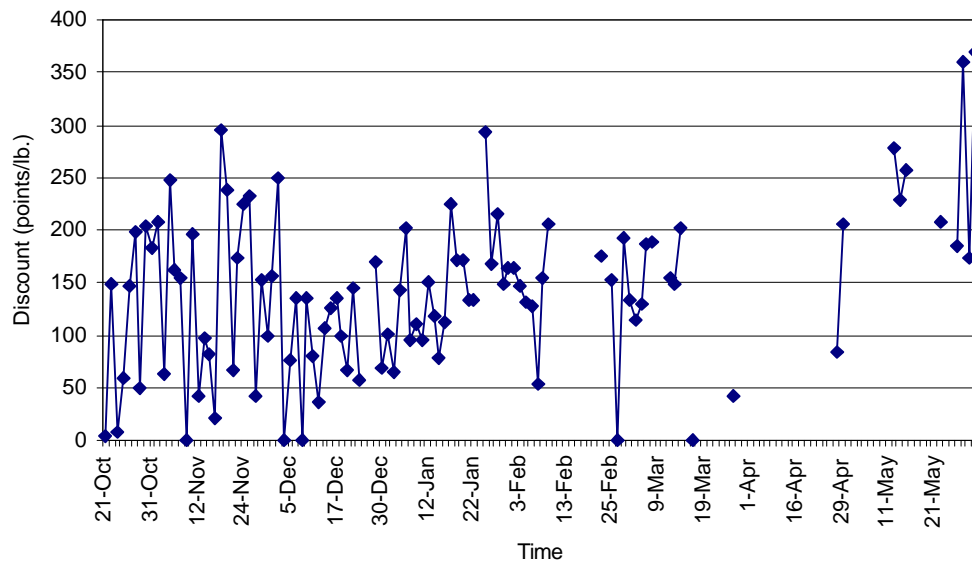


Figure 14. Bark Discounts for the 1997/98 Marketing Year, West Texas.

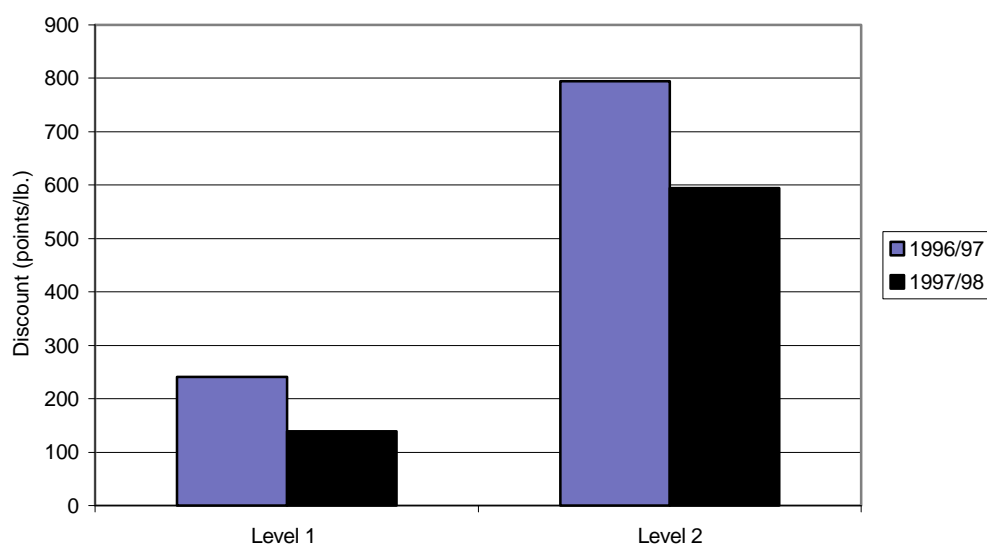


Figure 15. Bark Discounts, 1996/97 and 1997/98, West Texas.

Other Extraneous Matter. The average discount for both level 1 and level 2 other extraneous matter both decreased from those observed in 1996/97. The incidence of other extraneous matter is particularly low (averaging below 1% of bales per lot for both levels) and makes it difficult to make any interpretations or draw conclusions based on the patterns of these attributes.

Summary

Overall, the 1997 crop was of generally high quality for Texas and Oklahoma. The average quality of 1997 crop cotton experienced no major changes from that of the previous year. Once again, the average price decreased from the previous year's prices, reaching a level not witnessed since the 1993/94 marketing year. The volume of producer spot market sales showed a more modest increase of 27% over the volume of 1996/97, compared with the 1996/97 increase of 62% increase over the level of activity

in 1995/96. This could be due in part either to the decrease in forward contracting for Texas and Oklahoma and/or the overall increase in the crop size.

Discounts for the 1997 crop year decreased for every quality attribute except for strength. Premiums also increased for every quality attribute except for staple. This shift in premium and discount patterns would lead to a general increase in prices holding the overall price level constant. This indicates that the decrease in average producer prices is due to forces at work in the market other than strictly due to changes in cotton quality attributes or variations in these attributes. Although prices at the beginning of the season were at the same level as those of the previous season, producer prices experienced a sharp decline. The availability of more cotton on the spot market as result of a larger crop and less forward contracting may have played a significant role in the overall drop in prices during the 1997 crop year. As the marketing year progressed, buyers may have readjusted their bids in order to take advantage of the large crop size.

Further, as prices continued to fall with few signs of recovery in sight, it appears that there were many producers who opted to hold out for higher bids, resulting in the periods of inactivity seen towards the latter part of the year (beginning around the middle of February). In this case, this tactic may have worked to some extent, as prices did experience a slight recovery towards the end of the year after the stalemate. Buyers, faced with having to meet demand, may have been forced to eventually concede. However, this appears to have done little to help the average price level for the year, as the bulk of the 1997 crop was sold prior to that time.

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Appendix:
The DPES Model and Yearly Parameter Estimates

The heart of the Daily Price Estimation System is an econometric model which is based on the theory of hedonic price analysis (Brown and Ethridge). The premise of this approach is that the value of a commodity is determined by the value of the utility-bearing characteristics that comprise that commodity. The implicit prices of these characteristics can be determined by disaggregating the observable market price of the commodity with respect to the observable and/or measurable characteristics. The DPES uses an econometric model to regress the spot market price of cotton against the measurable quality attributes of the cotton. The model used to make estimates for the 1997/98 marketing year was:

$$P = b_0 e^{b_1 LF + b_2 LF^2 + b_3 C1 + b_4 C1^2 + b_5 C2 + b_6 C2^2 + b_7 STA + b_8 STA^2} e^{b_9 STR + b_{10} STR^2 + b_{11} M + b_{12} M^2 + b_{13} LB + b_{14} LB^2 + b_{15} HB + b_{16} LO + b_{17} HO + b_{18} R}$$

where:

LF = leaf grade (1-7),

C1 = first digit of the color grade (1-7),

C2 = second digit of the color grade (1-4),

STA = staple length in 32nds of an inch,

STR = strength of the cotton in grams/tex,

M = micronaire reading,

LB = percentage of bales classed as level 1 bark,

HB = percentage of bales classed as level 2 bark,

LO = percentage of bales classed as level 1 other extraneous matter,

HO = percentage of bales classed as level 2 other extraneous matter, and

R = binary indicator for the region (R=0 for the West Texas region; R=1 for East Texas/Oklahoma).

At the end of each marketing year, the data for that year are compiled and diagnostic tests are run on the model. The test, documented in Brown and Ethridge, identifies any systematic error that may be present in the estimates which is not detected in the daily diagnostics. The model specification indicated above was the result of the 1997/98 year-end diagnostics and analysis. Using the methods detailed in Brown and Ethridge, alterations were made in the model with respect to strength, the second digit of the color grade, and level 1 bark. These were found to eliminate a slight case of systematic error and provide the best fit for the model.

The yearly parameters for the model were computed by weighting the individual parameter estimates for each day by the number of sales transactions for that day. The resulting set of parameters represented a weighted average for the 1997/98 marketing year. These parameter estimates for the year were:

| | | | | | |
|--------------|---|----------|-----------|---|----------|
| $\ln\beta_0$ | = | 2.053263 | β_1 | = | 0.017697 |
| β_2 | = | -0.00369 | β_3 | = | 0.008129 |
| β_4 | = | -0.00329 | β_5 | = | 0.019660 |
| β_6 | = | -0.01153 | β_7 | = | 0.063544 |

$$\beta_8 = -0.00084$$

$$\beta_9 = 0.018126$$

$$\beta_{10} = -0.00029$$

$$\beta_{11} = 0.278310$$

$$\beta_{12} = -0.03426$$

$$\beta_{13} = -0.04569$$

$$\beta_{14} = 0.021403$$

$$\beta_{15} = -0.10800$$

$$\beta_{16} = -0.07110$$

$$\beta_{17} = -0.11039$$

$$\beta_{18} = 0.000664$$