COTTON VALUATION MODEL

A Proposal to Determine the Fair Utility Value
of Cotton
For Marketing Purposes

by Helmut Deussen & Chris Färber

Copy for: **Dr. Don E. Ethridge**

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October 19, 1994

Mr. Helmut Deussen
Schlafhorst Inc.
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Charlotte, N.C. 28224

Dear Helmut:

Enclosed are copies of selected pages from the report by you and Chris Färber. As we discussed, I am sending all the comments--some are suggestions, some are questions, and some are merely self-directed notations. Also enclosed are some notes given to me by Darren Hudson, a Ph.D. student who I asked to read the report and provide me with his input. Darren is about as direct and aggressive in his questions and analysis as I tend to be, but I think you may find some use for many of his thoughts.

Please understand that I applaud and support your efforts to inject more rationality into the marketing system; much of my research has the same general objective. However, attempts to impose a preconceived structure of prices on any market have always failed; this is why I have suggested that you avoid advocating the system of use-value computations as a "marketing system." On the other hand, by educating the users of fibers (manufacturers) on the utility value as you have derived them in your model, it will influence their purchasing behavior, thereby affecting the quality attribute premiums and discounts in the market (perhaps not as much as your model calculations indicate, but at least in the direction that is indicated). As that occurs, and as our work to measure and report accurate market prices and quality premiums and discounts has its impact, producers will get correct market signals and respond accordingly. It is in this manner that I see our separate research efforts as complementary, not competitive. And it is in that context that I am very interested in your concepts of value calculations getting its most effective exposure, and stand ready to assist if I can.

Please call or write if I can be of assistance. This work can make a significant contribution if it is presented so that those in the industry can (a) understand it and (b) avoid the perception that market functioning is being circumvented.

Sincerely,

Don

Don Ethridge
Professor

Comments on:

Cotton Valuation Model: A Proposal to Determine the Fair Utility Value of Cotton for Marketing Purposes

Overall, there are some novel ideas in this proposal. There are some specific points that I thought need to be addressed.

(1) The authors make references to the word "transparent". I am not sure what the meaning of this word is in this context.

(2) There need to be references in this paper. A lot of statements are made that need substantiation.

(3) There is not enough explanation of the different fiber evaluation systems (pg. 3).

(4) I do not follow how the "spread of points" and "% contribution" were calculated. Are these arbitrary? Or are they based on some scientific decision criteria? (pp. 8-10).

(5) There are no formal definitions of some of the variables used in the discussions (i.e., CV%, pg. 10).

(6) "Zero-base" cotton is a very good idea. However, it would require a world-wide standardization of cotton classing, which seems unlikely in the near future. The authors are counting on the fact that other cotton producing nations will all standardize measurement in a similar fashion, which may or may not be realistic.

(7) The weighing procedure for the variables seems ad hoc; the authors state that different spinning technologies place different importance on the fiber qualities, so the fiber properties would have different weights for each type of spinning. However, this may have to be a sacrifice that is made for the clarity in the value estimates.

(8) What about bark, grass, and other? Aren't these considered either present or not, and, hence, only carry discounts because of their negative impacts? (pg. 11)

(9) Are the tables of the values given in the text in pts./lb. or ¢/lb.? This needs to be more explicit.

(10) Why are there premiums for low micronaire? I was led to believe that the low micronaire was also a "bad" thing as compared to the high micronaire. (pg. 12)

(11) Where did this formula come from? (pg. 20)

(12) Very good point. It would be much simpler to use all actual numbers, not just color. (pg. 25)

(13) Has this point been empirically established? If so, reference it. (pg. 25)

(14) Stay away from the word "efficiency". Try to use words such as effectiveness, applicability, etc.

(15) Given that this model is intending to find the "true" values of the fiber characteristics, should it not include supply and demand factors? Or is this model attempting to establish the productivity of the fiber attributes?

Schlafhorst Inc.

8801 SOUTH BOULEVARD • P. O. BOX 240828 • CHARLOTTE, N. C. 28224

September 9, 1994

Dr. Don E. Ethridge
Texas Tech University
Agricultural Economics Department
Lubbock, TX 79409-2132

Re: **Cotton Valuation Model 1994**

Dear Don,

You are familiar with the original "Valuation Model for Cotton" which we proposed since 1988. Knowing your interest in this subject, I am sending you with this letter a draft of our 1994 Model which is a revised and expanded version of the original.

After you have had a chance to study this material, we would be most interested in your critique and comments. We had the benefit of many good suggestions from cotton experts; they are included in the write-up.

At the end of the paper we have made several references to your analysis of "Texas-Oklahoma Producer Cotton Market Summary". It was very kind of you to send me a copy. We want to be very sure that you are in agreement with our statements, or that we make any necessary corrections prior to publishing this 1994 Model.

Don, we value your opinion and we would be most appreciative of any help and comments you care to provide.

Sincerely,

Helmut

Helmut Deussen

cc: Chris Färber

TELEPHONE: 704 554-0800 · TELEX: 802-171 · TELEFAX: 704 554-7350

A Cotton Valuation Model

A Proposal to Determine the ~~Fair~~ Utility Value of Cotton

~~For Marketing Purposes~~

by Helmut Deussen & Chris Färber

September 9, 1994

DRAFT COPY

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SCHLAFHORST INC.

Pricing Model to Reflect Utility Value of Cotton

ABSTRACT

Cotton breeders and growers need clear signals which cotton fiber properties are important to the spinning industry for what reasons. ~~The marketing system needs to be revised to provide producers with the right incentives and merchants and processors with a clear and transparent fiber profile based on correctly measured quality and true utility value.~~ *Textile manufacturers need a clearer understanding of the use value of cotton in manufacturing. This report outlines an approach for assessing the utility value of cotton that is based on its contribution to processing performance, unaffected by market variations.*

The 1988 valuation model by Schlafhorst has been updated and expanded to reflect progress in HVI instrumentation and in fiber quality during the past six years. The rationale in the construction of premiums and discounts is explained and application of the Model illustrated.

Comparisons of the Model's output with the quality differentials in the current loan rate structure and in the spot market prices show that the 1994 Model identifies and recognizes fiber quality attributes much better than existing marketing mechanisms and can serve as a price finding instrument equitable to all cotton interests.

I would avoid this statement -- it is too subjective.

Cotton Valuation Model

A Proposal to Determine the Fair Utility Value of Cotton for Marketing Purposes

Contents

A Cotton Valuation Model

A Proposal to Determine the ~~Fair~~ Utility Value of Cotton

For Marketing Purposes ?

by Helmut Deussen & Chris Färber

1. Concept and Objectives

Our current system of producing and marketing cotton is based primarily on commercial traditions and on the laws of supply and demand. The latter is of vital importance in a free economy and will be given full play in the proposed Valuation Model in which the final price for a given cotton property profile is aligned to the prevailing world market prices.

However, commercial traditions in price determination do not express the true utility value of a given cotton quality level of which the world market offers thousands of composites. The origin of this price finding deficiency can be found in the diverging agendas which the key parts of the cotton chain from breeder to spinner have pursued:

- in breeding raw cotton varieties, better yield per acre is more important to the breeder than better fiber quality. Breeders have - and continue to receive - very mixed signals which fiber traits to improve in which direction.
- most cotton producers are not aware of their real customers (the spinners) needs; their immediate customer is the ~~ginner, the warehouse, the~~ US government or the merchant, each with a different agenda.
- to stay in business and to remain profitable, yield per acre is the most important goal to the farmer. Certain cotton varieties with superior quality traits, but somewhat lower yield fall victim to this fact of life until the marketing system compensates for reduced yield with a premium on desirable fiber properties.
- the ginners business objective is to deliver the best possible color grade and lowest leaf grade with little regard to fiber damage, short fiber content, etc.

this may occur because producers receive "wrong" market signals.

Is the marketing system doing this? If not, why not?

- as long as the fiber test data (green card) does not accompany the bale from gin point to the spinning mill, accurate quality descriptions are subject to alterations. To reward the merchants' risks, transparency in a true valuation system must allow for a reasonable margin. ?

- marketing by growing regions has created distortions in fiber values, as progress in fiber quality in some regions is overshadowed by the regions past reputation, and vice versa. ?

- cotton buyers are motivated by the lowest possible price. Only slowly these purchasing practices are transformed by the requirements of modern spinning technologies which specify the exact fiber requirements for a given end product.

- the continuing controversy of how much cotton should be cleaned in the gin or in the mill.

Helmut, we are now working with Bragg, Baker, et al. on this.

The proposed Valuation Model seeks to correct these deficiencies and to provide a unified approach in a fair and transparent system equitable to all.

As long as cotton fiber properties could not be accurately assessed in great volume, the true utility value of cotton could not be determined and used as a basis for any marketing model. The dramatic expansion of HVI testing into the entire US cotton crop has created the foundation on which a ~~good~~ more exact valuation system can be built. It is now possible to measure seven key fiber properties with reasonable accuracy and repeatability. However,only 5 of these 7 properties are currently used in the marketing system. Efforts must continue to not only improve the assessment of these seven, but also to add five more to the HVI instrumentation. (Fig 1)

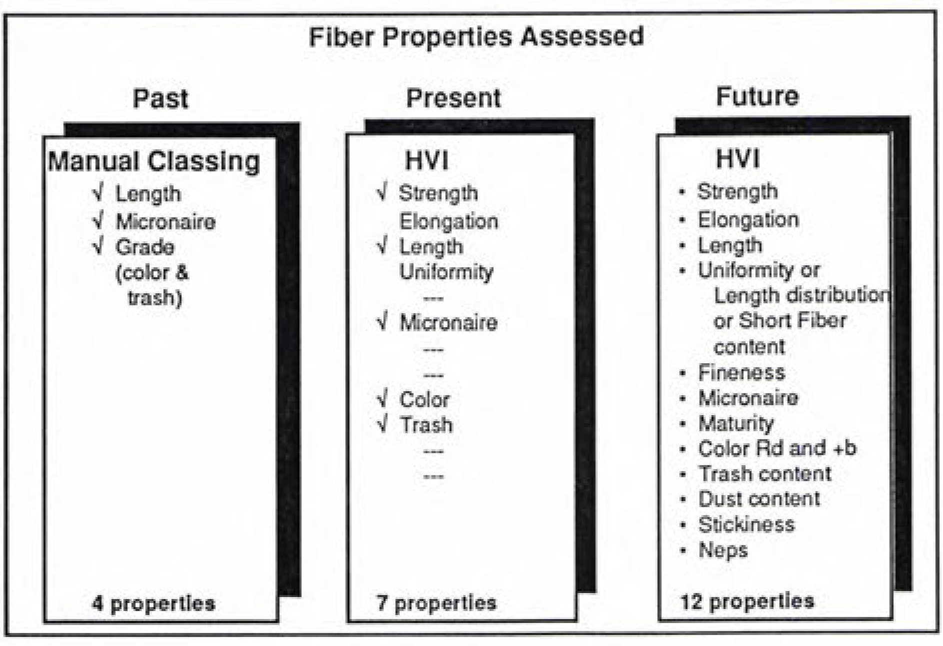

Fig. 1

This is essential, because a spinner can design his process and his product for maximum efficiency and quality in a computer integrated manufacturing (CIM) environment only with full knowledge of all 12 fiber properties. Fiber tests not yet possible in HVI are currently made on individual instruments on a small sample scale.

The proposed Valuation Model is clearly intended to find worldwide application. Its introduction may be facilitated in the USA where a giant data bank of HVI test values is being established with albeit limited access. Unfortunately, it will have to gradually replace an ingrained culture whose political traditions are quite resistant to change. In other developed cotton producing countries, such as Australia, its introduction may be easier in an environment unencumbered by government interference. The best chances of starting a new marketing system are perhaps in those lesser developed production areas such as India, Uzbekistan, and China, as soon as HVI and general computerization spread in these regions. ?

At present, HVI speaks two languages: in "USDA Mode" (Pressley 1/8" ga. g/tex, UHM and M length, uniformity index) and in "International Mode" (Stelometer 1/8" ga, cN/tex, 2.5% and 50% spanlength, uniformity ratio). The Valuation Model can easily be converted from one language into another and still produce identical premiums and discounts. It would be desirable, however, for the international cotton community, including the USA, to agree on a common language and standardize all HVI measurements and calibrations; but the Model need not wait for this event.

As stated by the International Textile Manufacturers Federation(ITMF), HVI will continue to be used for cotton production and marketing. AFIS and individual instruments will find applications in cotton research and processing. High speed AFIS or MANTIS lines are not on the horizon. Therefore, the Model must use data generated by HVI - USDA and/or HVI - ICCS and test methods which are likely to be integrated into HVI.

Another clear objective of the proposed Model is to cover all spinning systems, regardless of their designs, speeds, methods, applications and popularity. This includes ring spinning, rotor spinning, air jet spinning, friction spinning, etc., as long as they use cotton fibers and/or cotton blends. While the raw material requirements differ in each spinning system (see separate papers on this subject), they all depend on a factual, detailed fiber description for optimum spinning results and end - use performance. Each spinner can select the fiber profile most suitable to his processing machinery, and select with the aid of the Valuation Model the utility value (price) most economical to him. He can then search the market for the type of cotton he has identified.

How can a single model that purports to focus on utility value alone be applicable to all spinning systems?

It is true that the original Model in 1988 was born of the necessity to tailor cotton fiber properties to the expanding technology of rotor spinning; but the same basic principles apply to any modern, high speed and automated yarn making method.

One fact is undisputable: all spinning technologies benefit from finer, stronger, longer and cleaner cottons; albeit to varying degrees: ring spinning depends on fiber length and length uniformity, rotor spinning emphasizes fiber strength and fineness, air jet spinning fiber length, uniformity and fineness etc. To ensure success in all yarnmaking systems, all fiber properties are important; a message which should be understood by all breeders, producers and ginners. (see Fig. 2)

Importance of Fiber Properties to Each Spinning System

	100% Cotton Yarns			Yarns from Man-Made Fibers & Blends		
Rank	Ring	Rotor	Air Jet	Ring	Rotor	Air Jet
1	Length	Strength	Length	Length	Friction	Friction
2	Strength	Fineness	Cleanliness	Friction	Strength	Length
3	Fineness	Length	Fineness	Strength	Fineness	Fineness
4		Cleanliness	Strength	Fineness	Length	Strength

Fig. 2

The Model's benefit to the producer is, simply stated, that true fiber quality brings as many rewards as does yield. Variety selection appropriate to the region becomes more important. Income from a superior quality profile compensates for a possible reduction in yield.

The Model also presents an answer to the question whether cleaning should be done at the gin or at the mill. It will be the ginners decision how little or how much to clean ~~his~~ cotton to obtain the best overall fi~~ber quality profile~~. In the absence of grade, and with all fiber parameters, in particular UHML, length uniformity, color Rd, color +b, trash content and neps being measured and valued, the ginner can balance his strategy between quality needs and gin output. Textile mills with reasonably modern opening and cleaning equipment can handle most any trash level within normal ranges.

It has been suggested by several researchers to peg premiums and discounts for each fiber property to the yarn quality spun, in particular yarn strength. The contributions of each cotton fiber property to yarn strength has been detailed in mathematical models. The problem with this approach is that it only fits specific spinning methods and specific count ranges and therefore cannot be universally applied. Depending upon the textile end product, yarn strength is very important to some spinners; yarn uniformity, freedom from defects, color and dyeability and other processing characteristics are more important than strength to other processors. The Model herein proposed gives the spinner freedom to choose those fiber properties important to his product.

2. Reasons for Revision

The original Valuation Model was conceived in 1988 at a time when HVI instrumentation was in its infancy. During the past 6 years very substantial progress has been made both in the assessment of more fiber properties, in the accuracy and repeatability of individual measurements, and in the coverage of HVI testing of almost the entire US crop. Thus, one major obstacle to the implementation of this Model has been removed. As more refined measurement methods became available, and additional fiber properties could be assessed via HVI, it became necessary to review the instrumental basis of the Model and expand it to 12 fiber properties. These changes are detailed below.

Another reason for updating the Model's structure of premiums and discount levels is the remarkable progress made in the last 6 years in raising the quality level of the US cotton crop. This progress is illustrated in the subsequent graphs of the 3 major fiber properties: strength, length, and micronaire: (Figs. 3 - 5)

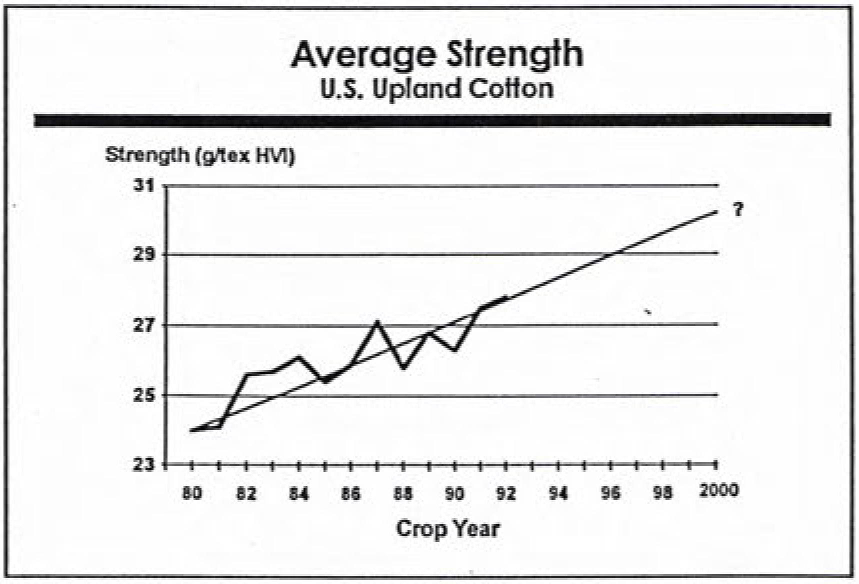

Fig. 3

The average fiber strength in the US has risen .25 g/tex per year during the past 10 years due to breeders efforts, education in cotton physiology, and improved farm management practices.

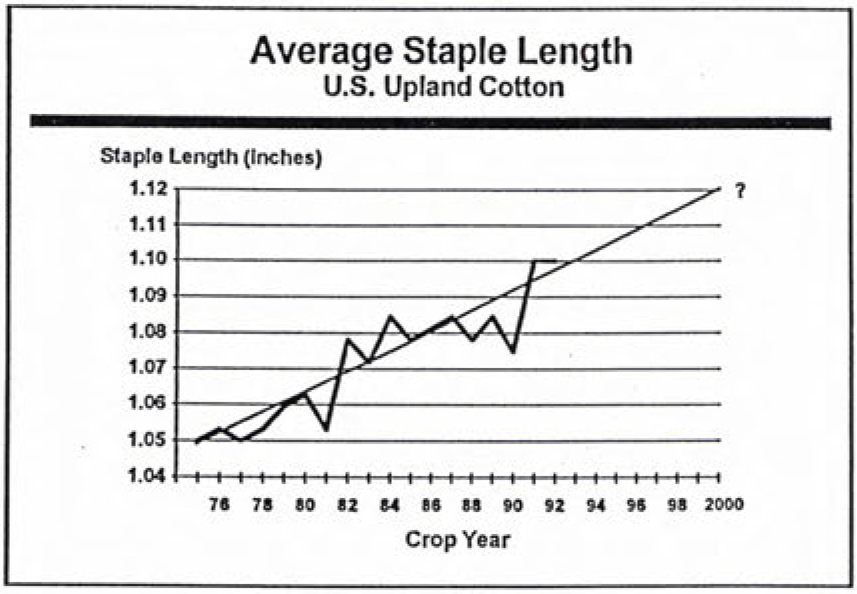

Fig. 4

The same is true for fiber length and length uniformity (uniformity index). Average fiber length has increased from 1.05" in 1975 to 1.10" in 1992, thanks again to breeders offering better varieties, sophisticated farm management and improved ginning practices. (Fig. 4)

The competitiveness of the US cotton industry in the world has been greatly enhanced by these efforts.

The only fiber property which has not changed over the years is fineness (micronaire). (Fig. 5) One can take solace in the fact that micronaire has not increased on the average, but all new spinning technologies depend on finer fibers (see trend to low denier fibers in man - made fiber production).

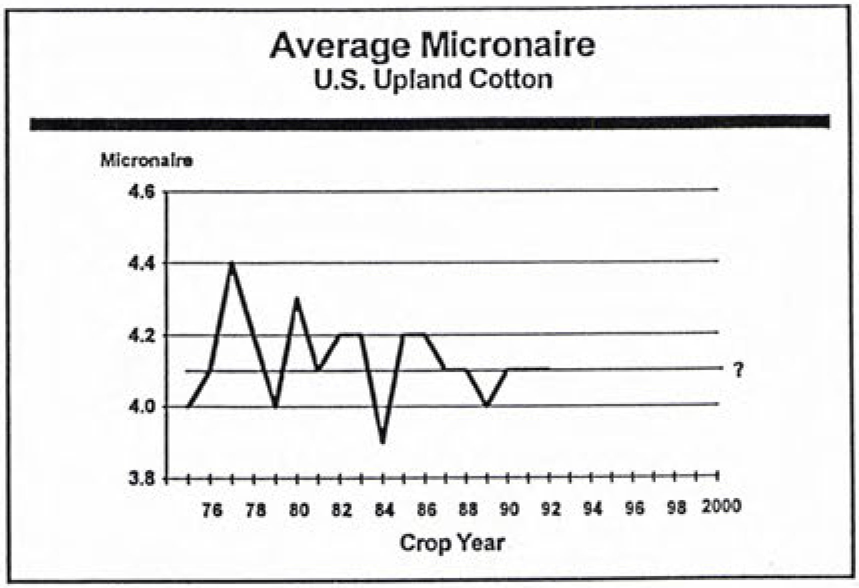

Fig. 5

While stronger and longer varieties can be bred without affecting yield, this task is more difficult with finer, yet mature fibers. Therefore, premiums for finer and mature cottons have to essentially be set to compensate for possible losses in yield, if farmers can ever be interested in planting these varieties.

Unfortunately, we must recognize that in today's industrial world the same product's improved quality is not honored with a linear increase in the products price in the fight for global market shares (see automobiles, computers, even our own machinery). It follows logically that premiums for a given fiber property, strength for instance, set 6 years ago cannot be maintained indefinitely, but have to be adjusted from time to time commensurate with the degree of improvement and with consumer/market forces. This is why some premium/discount ranges in the revised Model have been changed. As long as the producer receives a sizable reward for growing fiber properties better than the average, he should not construe these adjustments as misdirecting his incentives.

A third major reason for revising the 1988 Model is the inclusion of additional fiber properties such as color Rd and +b as well as neps in the Model upon the request of many producers and spinners. Adding new properties to the Model must not dilute the value of other major properties. Thus, the weighting of each individual property within the total becomes very important (see below).

3. Model Overview

The Model comprises a total of 12 fiber properties, one of which ("neps per gram") has been added since the original Model in 1988. Of the two definitions of fiber fineness, i.e. micronaire or gravimetric fineness in millitex (or decitex) only one or the other can be used and they are therefore weighted as one, each carrying the same premium/discount range and increments. The fineness of cotton fibers can best be expressed by fineness in mtex and maturity which allows the calculation of micronaire. Once instrumentation to measure fineness and maturity on a high volume basis will be available at some point in the future, the use of micronaire in the Model can be abolished.

The tables in Fig. 6 below depicts the basic structure of the Model in 1988 and how it has been revised and augmented in 1994:

Changes in Valuation Model between 1988 and 1994

how is this derived?

1988 Model					
Fiber Properties	Range of Units	Increments	Spread of Points	% Contribution	Cumulative
Micronaire mic	3.0 - 5.0	5	60	n/a	n/a
Fineness m/tex	120 - 230	5	60	20.20	20.20
Strength g/tex	16 - 32	5	50	16.80	37.00
Length inch	.80 - 1.40	2	24	8.10	45.10
Maturity %	60 - 100	5	40	13.50	56.60
Elongation %	3.0 - 9.0	5	40	13.50	72.10
SFC %	2-22	3	30	10.10	82.20
Length Uniformity UI					
Trash weight	.5 - 6.0	2	22	7.40	89.60
Stickiness %	.05 - .30	2	12	4.00	93.60
Dust %	.1 - 1	1	9	3.00	96.60
Color Rd	White to Gray	2	10	3.40	100.00
Neps	n/a	n/a	n/a	n/a	n/a
Total :	Points available:		~~200~~ 287 =	100.00	

1994 Model					
Fiber Properties	Range of Units	Increments	Spread of Points	% Contribution	Cumulative
Micronaire mic	2.8 - 5.2	4.00	48	n/a	n/a
Fineness m/tex	120 - 230	4.00	48	24.00	24.00
Strength g/tex	20 - 36	2.30	36	18.00	42.00
Length inch	.80 - 1.45	2.00	26	13.00	55.00
Maturity %	60 - 90	3.50	21	10.50	65.50
Elongation %	4.0 - 9.0	1.70	17	8.50	74.00
SFC %					
Length Uniformity UI	77-86	1.25	16	8.00	82.00
Trash weight/area	.10 - .60	1.00	10	5.00	87.00
Stickiness %	.35 - 1.00	1.50	9	4.50	91.50
Dust c/gr	250 - 1750	1.00	6	3.00	94.50
Color +b	6.0 - 16	0.50	5	2.50	
Color Rd	60 - 82	0.30	3	1.50	98.50
Neps c/gr	50 - 600	0.50	3	1.50	100.00
Total :	Points available:		200 =	100.00	

Fig. 6

For each property the range is shown as well as the individual increments for premiums and discounts. It is important to note that the Model's computer program computes fractional premium and discount ratings in a continuous manner, not in steps; i.e. a fractional input of, for example, 28.5 g/tex strength reading, produces a fractional rating of, for example, +1.15; that is 2 digits behind a decimal point. This method eliminates the problem with brackets and rounding up or down as is the case in the present CCC Loan scheme or in spot price point brackets.

The "Spread of Points" in Fig. 6 means the total number of premium and discount points available for a given fiber property. The original 1988 Model carried a total of 297 points for 10 fiber properties in the ranges defined at that time. The 1994 Model uses a total of 200 points for 12 properties in their listed (adjusted) ranges. This structural modification results in a narrower range of values between the poorest and the best cotton quality profile (see Section #5). It does not alter the values of average cotton descriptions!

The distribution of total points available among the 12 fiber properties denotes the weighting or significance assigned to each property in the scheme. These contributions are expressed in percent and shown under "% Contribution" in Fig 7.

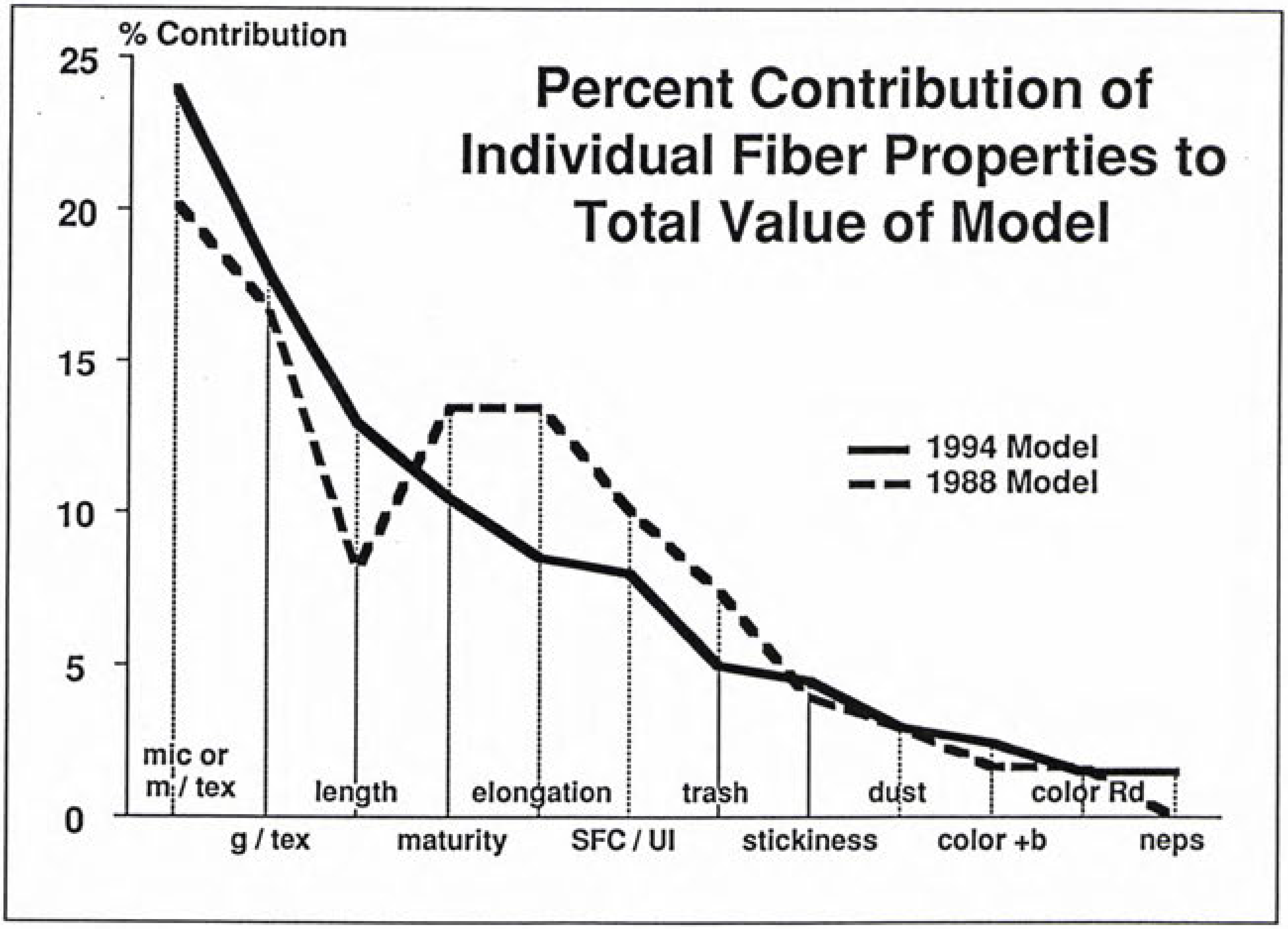

Fig. 7

As the graph in Fig. 7 illustrates, the weightings have been modified between the 1988 and the 1994 Model. Fiber maturity, elongation, and short fiber content were somewhat overemphasized in 1988. The 1994 Model increased the importance of the three major fiber properties fineness, strength and length from 45% to 55%. This group is not only the major quality and therefore value determinant, but also has the most influence on processing results and therefore on utility. The influence on the other 9 properties has been lowered from 55% to 45% and appears to now be a fairer representation of value for the majority of end uses.

As stated earlier, the Model's emphasis on individual property values also seeks to send the right signals to breeders and farmers. While much progress has been made in improving length and strength, much more needs to be done in increasing fineness without adversely affecting other fiber attributes, and most importantly, without significant loss of yield. The premiums created for greater fiber fineness should more than offset a minor loss in yield. Therein lies the incentive for the producer and the gain for many spinners.

Although it is understood that not all spinners require finer cottons, particularly those spinning coarser counts, the benefits of greater fineness and therefore of a greater number of fibers per yarn cross section are substantial in the upper half of the yarn count range; that is above Ne 24. (see separate papers on this subject).

As a further explanation, it would be ideal to apply premiums and discounts not only to the average fiber property determined in each category, but also to the range/distribution/CV% of each measurement, as several experts have suggested. However, that would mean doubling the number of parameters from 12 to 24; which would render this entire model unwieldy and very complex. Besides, range information is not readily available from bale HVI print outs.

4. Building Blocks of Model Structure

The centerpoint of the Model is the so-called "Zero - Base Cotton", i.e. the description of a standard, normal or average cotton on a world-wide basis. The fiber property profile of this "Zero - Base Cotton" has been established after careful examination of several data banks. None of the available data banks are, unfortunately, complete in the description of every measurable fiber trait. However, there is a sufficient amount of data at our disposal in the major fiber properties, allowing a reasonably accurate determination of a "Zero - Base". As data banks are being expanded and standardized around the world, the accuracy of this description will improve in the future.

The Model uses the Zero - Base line as the center of the premium and discount scales. Higher quality is rewarded with premiums and lower quality with discounts, both in usually equal increments commensurate with the importance or weight of a given fiber property. Although fiber producers would prefer the use of premiums only, and spinners the use of discounts only (for understandable reasons), the equitable solution is to work from a quality average up and down on the property range. (with one exception: stickiness. A cotton is either non-sticky and can be processed without problems, or it is sticky to varying degrees and poses problems).

Fig. 8 compares the average fiber properties found in two data banks: the USDA report for the 1993 crop and the Schlafhorst fiber test collection covering the past 5 years, of which only the last 3 years have been used. It is hoped that Zellweger Uster will have a cotton fiber data bank similar to the Uster Yarn Quality Statistics. The broader the basis of information, the more reliable the finding of value with this Model will be.

Comparison of Data Base Averages with Zero - Base Cotton of Model

Fiber Properties	Data Source	Schlafhorst Data Base International HVI Mode	USDA HVI Mode	USDA Data Base HVI	Zero-Base Cotton of Model HVI
Average Annual Data		1991-1993	1991-1993	1993 Crop	n/a
Micronaire	mic	4.00	4.00	4.35	4.20
Fineness	m/tex	172.00	172.00	166.00	175.00
Strength	g/tex	21.40	27.00	28.50	28.00
Length	inch	28.8mm	1.13	1.09	1.10
Length Uniformity		n/a	n/a	81.50	see diagram
Maturity	%	77.00	77.00	n/a	80.00
Trash	weight/area	n/a	n/a	0.29	0.25
Stickiness	%	n/a	n/a	n/a	0.35
SFC	%	5.40	5.40	n/a	see diagram
Elongation	%	6.40	6.40	n/a	6.50
Color	Rd	n/a	n/a	n/a	72.00
Color	+b	n/a	n/a	n/a	10.00
Neps	c/gr	n/a	n/a	n/a	300.00
Dust	c/gr	n/a	n/a	n/a	750.00

Fig. 8

When we establish cotton fiber profiles in our laboratory at Schlafhorst, we assess all 12 fiber properties required for the Model. The following pages explain in detail how all premium and discount scales are constructed and why certain changes are required in the 1994 Model.

4.1. Micronaire

The computer model accepts only one measure of fiber fineness: either micronaire or fineness in mtex, in order to make sure value for fineness is not counted twice.

Between 1988 and 1994, the Zero - Base line has not changed, but the increments for premiums and discounts are slightly smaller. The definition of the range has been clarified and now extends from 5.2 to 2.8 mic. (Fig. 9)

1988 Model			1994 Model		
Only if mature!			MICRONAIRE		
Eventually to be replaced by next tables A & B					
Data from HVI Line			Data from HVI Line		
above 5.0	-	25	5.2 & above	-	20
5.0	-	20	5.0	-	16
4.8	-	15	4.8	-	12
4.6	-	10	4.6	-	8
4.4	-	5	4.4	-	4
4.2		0	4.2		0
4.0	+	5	4.0	+	4
3.8	+	10	3.8	+	8
3.6	+	15	3.6	+	12
3.4	+	20	3.4	+	16
3.2	+	25	3.2	+	20
3.0	+	30	3.0	+	24
below 3.0	+	35	2.8 & below	+	28

Fig. 9

The premium range in the current USDA loan program extends from 3.7 to 4.2 mic.

4.2. Fineness

The scale for gravimetric fineness in mtex as determined by the FMT method (not yet integrated in HVI) and has been altered slightly.

1988 Model

To replace micronaire!		
From FMTor NIR Method in Millitex		
Future faster instrument in HVI Line requires corresponding adjustment		
230 & above	-	25
225	-	20
215	-	15
205	-	10
195	-	5
185		0
175	+	5
165	+	10
155	+	15
145	+	20
135	+	25
125	+	30
120 & below	+	35

1994 Model

FINENESS		
From FMTor NIR Method in Millitex		
230& above	-	24
225	-	20
215	-	16
205	-	12
195	-	8
185	-	4
175		0
165	+	4
155	+	8
145	+	12
135	+	16
125	+	20
120& below	+	24

Fig. 10

The Zero-Base line has been moved from 185 to 175 mtex (see Fig. 10). Both micronaire and mtex premiums/discounts now correspond to each other at 80% fiber maturity. The graph in Fig. 11, based on Lord's formula, illustrates this relationship.

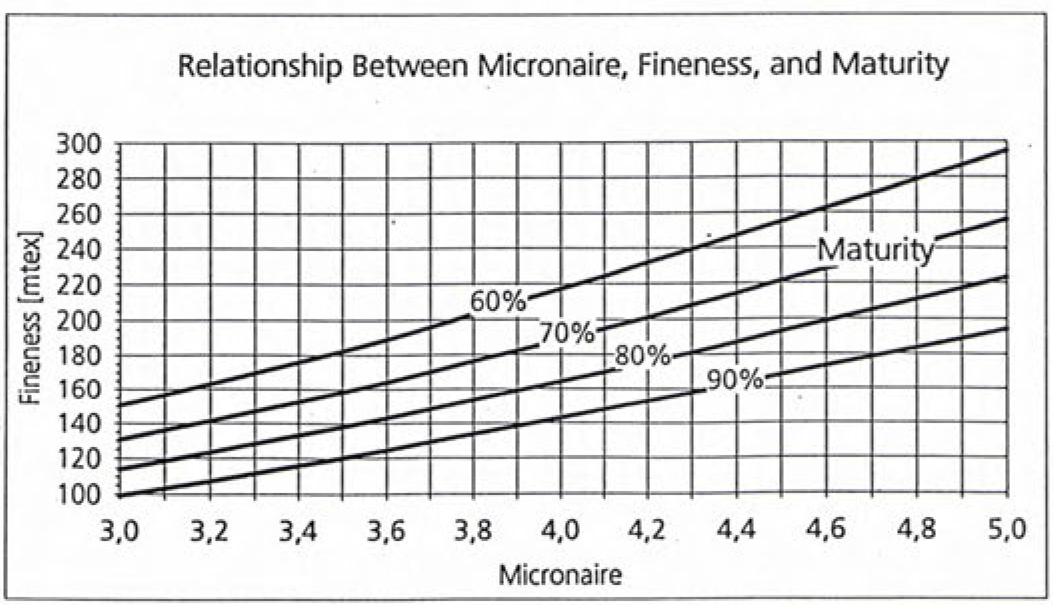

Fig. 11

4.3. Maturity

We find very few cottons with maturities above 90% because today's harvesting practices and short seasons rarely allow fibers to fully mature beyond 90% on the average. Also, fiber maturities between 90 and 100% do not add significantly to value, whereas low maturities significantly detract from fiber quality and processing results. Therefore, the scale is cut off at 90%.

In view of the compounding effect of adding fiber properties to the Model, the increments were reduced from 5 to 3.5. This, in our opinion, represents a penalty sufficient to discourage immature qualities from coming to market. (Fig. 12)

1988 Model

To replace micronaire in combination with fineness		
From FMT Method in %		
Future Faster instrument in HVI Line (NIR or other) requires corresponding adjustment		
60% & below	-	20
65	-	15
70	-	10
75	-	5
80		0
85	+	5
90	+	10
95	+	15
100% & above	+	20

1994 Model

MATURITY		
To replace micronaire in combination with fineness		
From FMT or NIR Method in %		
60% & below	-	14.0
65	-	10.5
70	-	7.0
75	-	3.5
80		0
85	+	3.5
90% & above	+	7.0

Fig. 12

The inclusion of the FMT method into HVI to assess both fineness and maturity seems to be in doubt for lack of speed and reproducibility. The NIR method is given better chances, whereby maturity is measured by spectral analysis and fineness calculated from micronaire and maturity.

4.4. Length

Some critics say the Model's length values are understated to the detriment of ring spinning. We do not think so since past valuations seem to correctly reflect the importance of length in all spinning systems. If a utility value for either length uniformity or short fiber content is added to the model, then the emphasis on "length" is adequate. (Fig. 13)

1988 Model

LENGTH		
Data from HVI Line in inches or from Fibrograph		
.80 & below	-	12
.85	-	10
.90	-	8
.95	-	6
1.00	-	4
1.05	-	2
1.10		0
1.15	+	2
1.20	+	4
1.25	+	6
1.30	+	8
1.35	+	10
1.40 & above	+	12

1994 Model

LENGTH		
Data from HVI Line in UHM Length in inches		
.80 & below	-	12
.85	-	10
.90	-	8
.95	-	6
1.00	-	4
1.05	-	2
1.10		0
1.15	+	2
1.20	+	4
1.25	+	6
1.30	+	8
1.35	+	10
1.40	+	12
1.45 & above	+	14

Fig. 13

It is conceivable that the Zero-Base line for length, now 1.10", may have to be moved to 1.15", since the average fiber length is increasing, particularly in the USA.

4.5. Short Fiber Content

The Model intends to use a reliable expression of the length distribution of a given cotton. This goal can be accomplished by using either the "short fiber content" or the "uniformity index or ratio", but not both (overkill).

The industry calls for a measure of SFC in HVI, even though it is aware that the 1/2" cut-off is arbitrary. The correlations among individual instruments (Almeter, AFIS, Suter-Webb) in % SFC are poor. A variety of formulas proposed to estimate SFC should not be used, since they are complicated and not very accurate. To confuse matters further, SFC is sometimes expressed in % by weight and sometimes in % by number; two very different measuring levels.

No expression of SFC is available from HVI lines, except for the "Short Fiber Index" in the International Mode. It is calculated from the 2.5% and 50% span lengths and the uniformity ratio, and corresponds somewhat to the Fibrograph principle. Zellweger Uster believe they may shortly have a method in the HVI - USDA Mode, which determines SFC by weight or a similar "Short Fiber Index" calculated from UHM and M lengths, and UI.

For the time being, the only input of SFC into the Model must come from manual instruments, which restricts the Model's use.

In the 1988 Model, SFC scales were based on Fibrograph information (Preysch formula), as shown below: (FIG. 14)

To replace "grade"!		
Data calculated from Fibrograph in % by weight of fibers below 1/2"		
Eventually to be substituted by faster method in HVI Line		
22 or above	-	15
20	-	12
18	-	9
16	-	6
14	-	3
12		0
10	+	3
8	+	6
6	+	9
4	+	12
2 or below	+	15

Fig. 14

This approach was incomplete, in as much as the short fiber content in % varies substantially with staple length, i.e. 12% may be a very high SFC for a cotton of 1.25 inch in length, and quite low for a cotton of 0.9 inch of UHM length.

Knowing the average UHM length and the average UI in a given crop year, one can estimate the SCF by weight for each staple length with the aid of the Sasser/Zeidman formula. This exercise produces the conversion table in Fig. 15.

UHML - UI - SFC Conversion Table (1991 Crop)

UHML inch	UI %	SFC (w) %
0,70	75,4	22,4
0,80	76,9	19,0
0,90	78,4	15,6
1,00	79,9	12,2
1,10	81,4	8,7
1,20	82,9	5,3
1,30	84,4	1,9
1,40	85,8	0,0

Fig.15

Utilizing these relationships, it is possible to construct a premium/discount graph, in which one coordinate is calibrated in "UHML" taken from HVI print outs, and the other coordinate is calibrated in SFC by weight % taken from HVI International Mode's "Short Fiber Index". These two inputs produce the Zero-Base line and premiums/discounts shown in Fig. 16.

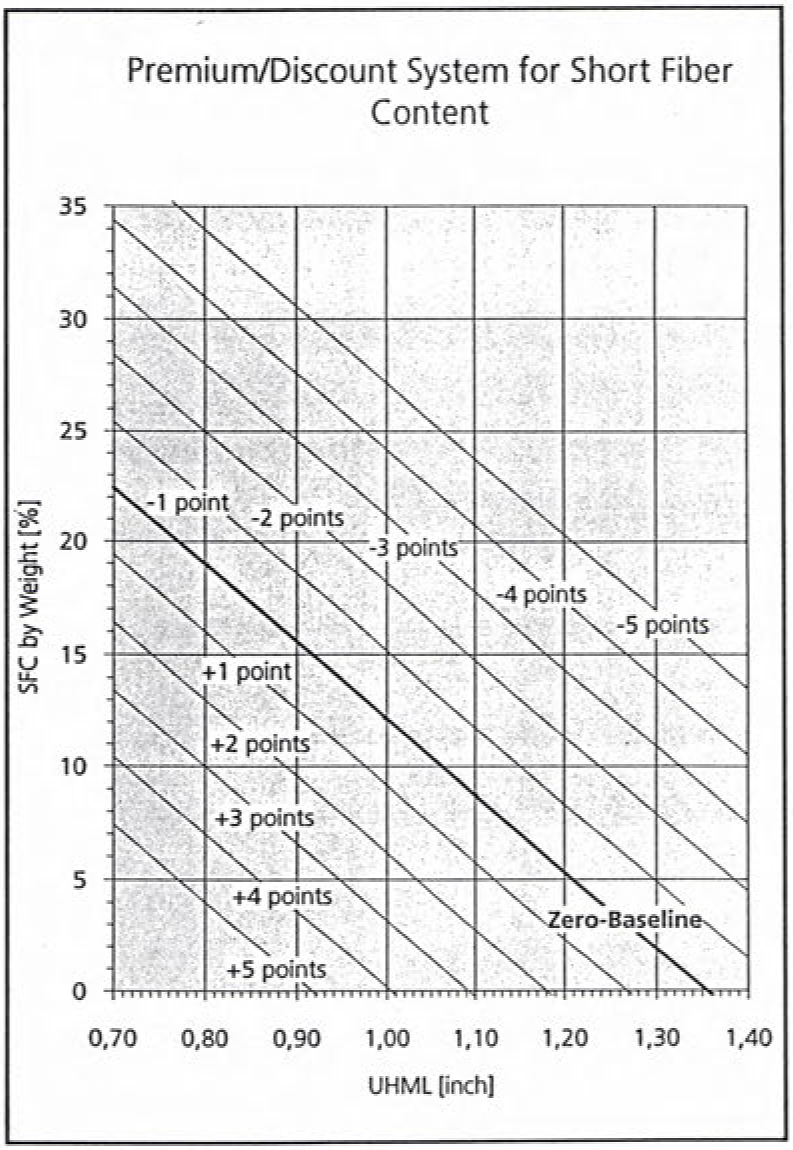

Fig. 16

The accuracy of this diagram depends on changes in the average UI per crop year used, and the accuracy of measuring UHML and ML together with the precision of the Sasser/Zeidman formula.

4.6. Length Uniformity

Since the preceding determination of premiums and discounts for short fiber content is circuitous and not without flaws, we believe a simpler way to express fiber length distribution would be to use UI (uniformity index) in relation to staple length (UHML).

UHML and UI data is readily available from HVI print outs. Short fiber content is bypassed altogether, as it is a component of uniformity index. Fig.17 illustrates the Zero-Base line computed from average UI in the 1991 crop year in relation to average staple length (UHML).

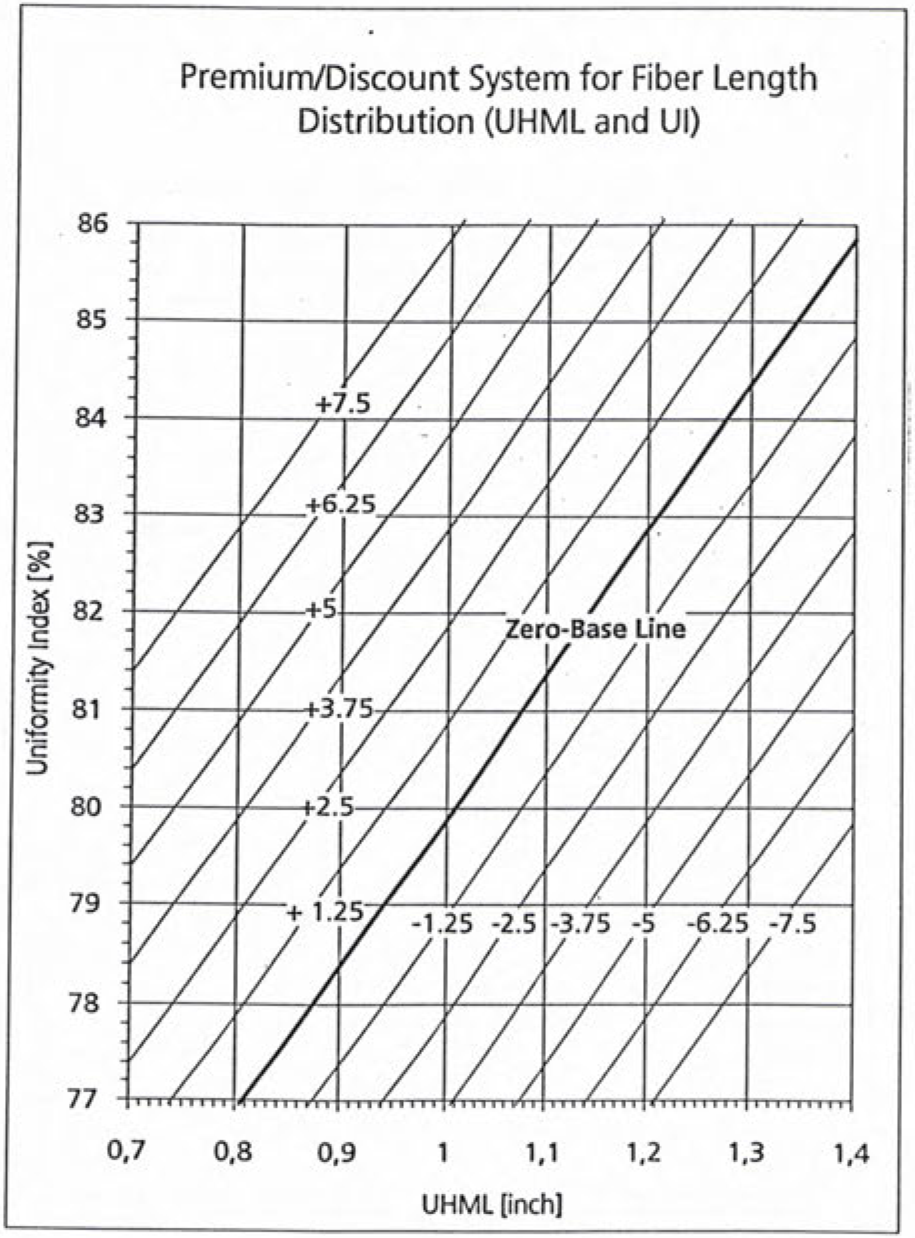

Fig. 17

The premium and discount scale's increments in points are merely the deviation of UI from the Zero-Base line. This approach satisfies the dependence of length uniformity, thus also SFC, on staple length.

The formula applied is

$$P/D = 1.25 \cdot UI - 18.68 \cdot UHML - 81.155$$

We have chosen this method over Short Fiber Content, section 4.5., for inclusion in the Model.

The relationship between staple length and uniformity index of all US cotton in the 1991 crop is shown below: (Fig. 18)

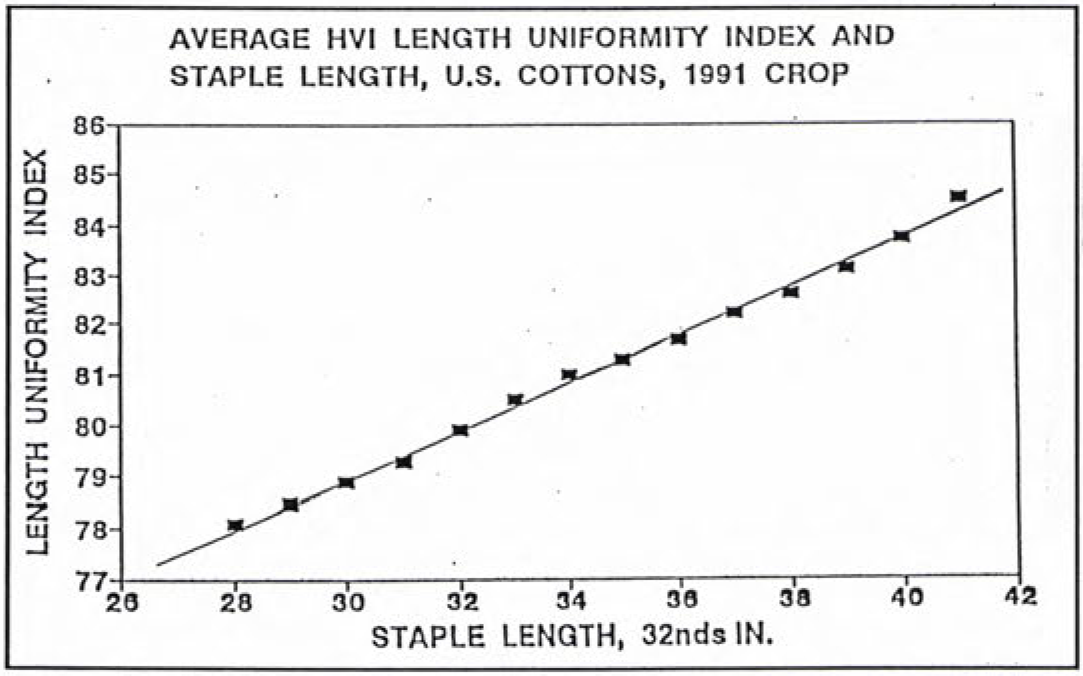

Fig. 18

This data needs to be collected for the 1992 and 1993 crop years as well.

4.7. Strength

In the 1988 valuation tables we have, perhaps, somewhat overemphasized the importance of strength in relation to other fiber properties. Also, with fiber strength levels going up fairly rapidly, we run the risk of overvalueing many cottons.

Therefore it is proposed to modify the strength scales as shown below and move the Zero-Base Line up to 28 g/tex, while cutting the lower end at 20 g/tex and extending the upper end to 36 g/tex HVI. (Fig. 19) Breeders have demonstrated the ability to raise cottons with strength levels between 33 and 36 g/tex.

1988 Model

STRENGTH		
Data from HVI Line, in g/tex		
When using data from 1/8" gauge Stelometer adjust accordingly		
below 16	-	25
16	-	20
18	-	15
20	-	10
22	-	5
24		0
26	+	5
28	+	10
30	+	15
32	+	20
Above 32	+	25

1994 Model

STRENGTH		
Data from HVI Line, in g/tex		
20 or below	-	18.4
21	-	16.1
22	-	13.8
23	-	11.5
24	-	9.2
25	-	6.9
26	-	4.6
27	-	2.3
28		0
29	+	2.3
30	+	4.6
31	+	6.9
32	+	9.2
33	+	11.5
34	+	13.8
35	+	16.1
36 or above	+	18.4

Fig. 19

4.8. Elongation

While not totally reliable, the percent fiber elongation as measured by HVI is the only data base currently available.

Because of the increasing importance of elongation and work-to-break in processing, it is suggested to break down the current table into smaller increments and to use a scale commensurate with the other fiber properties: (Fig. 20)

1988 Model

ELONGATION	
Data from HVI Line, in %	
below 3	- 20
3	- 15
4	- 10
5	- 5
6	0
7	+ 5
8	+ 10
9	+ 15
Above 9	+ 20

1994 Model

ELONGATION	
Data from HVI Line, in %	
4.0 or below	- 8.5
4.5	- 6.8
5.0	- 5.1
5.5	- 3.4
6.0	- 1.7
6.5	0
7.0	+ 1.7
7.5	+ 3.4
8.0	+ 5.1
8.5	+ 6.8
9.0 or above	+ 8.5

Fig. 20

An accurate assessment of fiber elongation with stress-strain curves can probably be made only by single fiber testing (MANTIS), not by bundle strength/elongation methods. It is unlikely, however, that such a method can be applied at HVI speeds and therefore cannot serve in this marketing model.

4.9. Trash Content

We still think it would be best to deduct the weight of trash from the actual bale weight and bypass the valuation tables altogether; however this proposal was unacceptable to the USDA and other interested parties.

The USDA Classing Handbook describes trash as follows:

Trash

Trash is a measure of the amount of non-lint materials in the cotton, such as leaf and bark from the cotton plant. The surface of the cotton sample is scanned by a video camera and the percentage of the surface area occupied by trash particles is calculated. Although the trash determination and classer's leaf grade (see page 15) are not the same, there is a correlation between the two as shown in the tabulation below.

Relationship of trash measurement to classer's leaf grade

Trash Measurement (4-yr. Avg.) (% area)	Classer's Leaf Grade
0.08	1
.12	2
.18	3
.34	4
.55	5
.86	6
1.56	7

If we cannot use AFIS results in terms of % weight and count, staying with this HVI mode means we have to use "% area" rather than "% weight."

According to the 1993 Cotton Quality Report, the trash area % ranges from 0.05% or less to 1.8% and above, with the averages running from 0.09% or less in California to 0.47% in New Mexico. The US average is 0.29% trash area and could represent the Zero-Base Line at 0.25% **area**.

It so happens that this compares with 2.5% trash by **weight** as the Zero-Base Line in our current model, or a ratio of 10 to 1.

1988 Model (by weight)	
TRASH	
Data from new Shirley Trash Separator in % of particles coarser than 500 micron	
Eventually to be substituted by faster method (PMP, Spinlab) in HVI Line	
6.0 or above	- 14
5.5	- 12
5.0	- 10
4.5	- 8
4.0	- 6
3.5	- 4
3.0	- 2
2.5	0
2.0	+ 2
1.5	+ 4
1.0	+ 6
0.5 or below	+ 8

1994 Model (by area)	
TRASH	
Data from Data from HVI Video Trashmeter in % area	
.60 or more	- 7
.55	- 6
.50	- 5
.45	- 4
.40	- 3
.35	- 2
.30	- 1
.25	0
.20	+ 1
.15	+ 2
.10 or less	+ 3

Fig. 21

The incremental values in the 1994 Model have been changed to conform with the premiums/discounts available for other fiber properties. (Fig. 21)

The HVI video trashmeter can also count the number of particles in addition to the % area. The following equation could produce a factor indicating the average particle size or "cleanability":

$$\frac{\%\text{ area} \times 100}{\text{particle count}} \quad \text{or} \quad \frac{.25 \times 100}{40} = .625\text{, for example}$$

An additional table could be constructed to give premiums for large average particle sizes and discounts for small average particle sizes. However, this formula says nothing about the harmful or benign nature of the same size trash particle.

4.10. **Color**

We suggest getting away from the grade description and grade numbers and use the HVI colorimeter readings directly. We should break down color into two components:

- percent reflectance Rd (grayness)
- yellowness +b (by Hunter)

Although the USDA color charts are different for American Upland Cotton and for American Pima, both use the same Rd and +b scales. Since we do not use grade and color descriptions, the Model can serve both Upland and Pima. The Zero-Base Line of 72 Rd and 10 for +b describe the following cottons:

Upland:	on the border between Middling 32-2 and Strict Low Middling 42-1
Pima:	color/grade 2

Under this unified color scheme, Pimas would not fare as well as Uplands, which is also the case today. (Fig. 22)

1988 Model

Presently from "grade"!	
To be replaced by color index in HVI Line with corresponding adjustments	
Gray	- 6
Light Grey	- 4
Tinged	- 2
Spotted	0
BrightSpotted	+ 2
White	+ 4

1994 Model

COLOR (Rd) % REFLECTANCE	
from HVI Colorimeter	
60 & below	- 1.5
63	- 1.2
66	- .9
68	- .6
70	- .3
72	0
74	+ .3
76	+ .6
78	+ .9
80	+ 1.2
82 & above	+ 1.5

COLOR (+b) YELLOWNESS	
from HVI Colorimeter	
16 & above	- 3.0
15	- 2.5
14	- 2.0
13	- 1.5
12	- 1.0
11	- .5
10	0
9	+ .5
8	+ 1.0
7	+ 1.5
6 & below	+ 2.0

Fig. 22

These numbers can be taken directly from the HVI printout without conversion into grade numbers.

The combined weight of Color Rd and Color +b gives this cotton property an adequate position in the total value scheme. Because yellowness is more prone to cause processing and quality problems, and because deficiencies in grayness are usually accompanied by the deterioration of other fiber properties, Color Rd has been given 3/8 of the weighting and Color +b 5/8.

4.11. Stickiness

Of the two major categories of sugar – plant sugar and insect sugar – it is primarily insect sugar (whitefly, aphids) which causes stickiness known as "honeydew." Concentrations of 0.35% of sample weight or less present no or few problems; 0.50% can cause processing difficulties, and stickiness of 1% or more is usually impossible to process.

We have changed the scales in consultation with Dr. Perkins who is currently running large scale tests with different infestation levels. He favors the severe penalties for high stickiness levels. (Fig. 23)

1988 Model

STICKINESS IN %	
Data from Perkins Method	
Search for faster method in HVI Line, possibly NIR	
.30 or higher	- 6
.25	- 4
.20	- 2
.15	0
.10	+ 2
.05	+ 4

1994 Model

STICKINESS IN %	
Data from Perkins Method	
Search for faster method in HVI Line, possibly NIR or Thermodetector	
1.00 or higher	- 9.0
.85	- 7.5
.75	- 6.0
.65	- 4.5
.55	- 3.0
.45	- 1.5
.35	0.0

Fig. 23

Measurements of stickiness in percent can only be made on the minicard, which is too slow and too costly. NIR has difficulties distinguishing between plant and insect sugar.

The most promising approach is the Thermodetector. A High Speed Stickiness Detector now under development at CIRAD-CA may be compatible with HVI speeds. The automatic count of sticky points may eventually generate a data base for valuation purposes, rather than converting sticky points to weight percentages. Meanwhile, we can only use existing weight scales. (See Hequet paper in Bremen 1994, "A High Speed Instrument for Stickiness Measurement.")

4.12. Neps

We have been asked by a number of growers and spinners to include this property in our valuation tables.

We propose using the AFIS nep count for ginned cotton as expressed in number of neps per gram until such time where HVI includes nep assessment. Uster thinks this may be possible in the foreseeable future.

According to the latest Uster publication, the range of neps found appears to be: (Fig. 24)

1988 Model	1994 Model	
	NEPS PER GRAM	
not considered	600 or more	- 1.5
	500	- 1.0
	400	- 0.5
	300	0
	200	+ 0.5
	100	+ 1.0
	50 or less	+ 1.5

Fig. 24

Neps are becoming an increasingly serious concern, reflecting faster and harsher harvesting and ginning procedures, particularly with finer cottons and certain varieties.

Neps in ginned raw cotton should not be confused with neps created during certain textile processes, such as blending, air conveying, cleaning and drawing.

It has been suggested to also consider the **size** of neps, which is determined by the AFIS instrument, but we question the importance of this particular property.

4.13. Dust

Dust (inorganic and pulverized organic matter) and microdust present not only an environmental hazard, but also a problem in modern, high-speed processing equipment, and therefore should be recognized as a property detrimental to fiber quality. (Fig. 25)

1988 Model

To replace "grade"!	
Filter dust from new Shirley Trash Separator in % particles between 50 and 100 micron	
Eventually to be substituted by faster method (PMP, Spinlab) in HVI Line	
1.0 or above	- 6
.9	- 5
.8	- 4
.7	- 3
.6	- 2
.5	- 1
.4	0
.3	+ 1
.2	+ 2
.1 or below	+ 3

1994 Model

DUST either		DUST or	
Data from AFIS Trash/Dust Meter in count of particles between 50 & 500 micron per 1 gram		Filter dust from Shirley Trash Separator or MDTA 3 in % particles below 500 micron	
Eventually to be substituted by faster method in the HVI Line			
1750 or more	- 4	.8 or more	- 4
1500	- 3	.7	- 3
1250	- 2	.6	- 2
1000	- 1	.5	- 1
750	0	.4	0
500	+ 1	.3	+ 1
250	+ 2	.2 or less	+ 2

Fig. 25

The Shirley Trash Separators and the MDTA 3 unit measure trash, dust and fiber fragments separately in percent of fiber weight. Both instruments are widely used.

The newer AFIS - T unit measures, along with trash particles above 500 micron, the dust content of particles between 50 and 500 micron in particle count per 1 gram of stock.

The premium/discount tables above apply the same rating to either measuring method, so for the time being both methods can be used in the Model.

According to the latest Uster publication the range of dust content determined extends from 200 to 2,000 particles per gram with an average of 750.

Again, the assessment of dust will not be available from HVI anytime soon, so we need to continue the use of individual instruments.

5. Examples of Model Application

The explanations in the preceding chapters need to be augmented by several examples to test the efficiency of the Model. A computer program has been devised in which the input consists of 12 fiber quality variables, two alternate variables and the prevailing market price in cents/lb. for the standard Zero-Base cotton. If not all fiber parameters are known, the input for the missing measurement is n/a = 0.

Need to see the structure & specs.

The output is the utility value in cents/lb. for the described cotton quality, without regard to origin or region, and without a transportation allowance or merchants commission.

To compare the utility values of different cottons, unknown fiber parameters should be rated as neutral (0) on all of them, but at least all parameters available from HVI printouts should be used. Otherwise, the Model's efficiency is improperly reduced.

In the following examples, the utility value is computed on the basis of two market price levels: 60 cents/lb. and 80 cents/lb. Since this can be a daily or hourly input, any price level can be chosen, which makes the Model independent of the supply and demand balance. The Model is intended to differentiate fiber quality and processibility only.

The computer printouts in Fig. 26 to Fig. 28 reflect the utility values of poor, average and excellent cottons in the major US cotton growing regions. We have chosen these quality descriptions to determine possible value differentials from high to low.

Utility Value of Cotton

units?

Schlafhorst Model

Prepared for: **West Texas Cotton** Date: 9/6/94

Properties			0 - Base Cotton		Poor		Average		Excellent		N/A			
	Source	Unit	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	3.30	18.00	3.60	12.00	3.90	6.00				
Fineness	FMT	mtex	175.00	0	0.00	---	0.00	---	0.00	---				
Maturity	FMT	%	80.00	0	70.00	- 7.00	75.00	- 3.50	80.00	0.00				
Length (UHM)	HVI	inch	1.10	0	0.96	- 5.60	1.00	- 4.00	1.08	- 0.80				
Uniformity Index	HVI	UI	81.40	0	78.00	- 1.59	80.00	0.16	82.00					
Short Fiber Content **	AFIS	% (W)	10.00	0	20.00	---	16.00	---	12.00	- 0.86				
Strength	HVI	g/tex	28.00	0	26.00	- 4.60	28.00	0.00	30.00	4.60				
Elongation	HVI	%	6.50	0	5.00	- 5.10	5.50	- 3.40	6.00	- 1.70				
Color (Reflectance)	HVI	Rd	72.00	0	66.00	- 0.90	72.00	0.00	76.00	0.60				
Color (Yellowness)	HVI	+b	10.00	0	14.00	- 2.00	10.00	0.00	8.00	1.00				
Trash (area)	HVI	%	0.25	0	0.60	- 7.00	0.30	- 1.00	0.20	1.00				
Dust	AFIS	count/gr	750.00	0	1500.00	- 3.00	750.00	0.00	500.00	1.00				
Neps	AFIS	count/gr	300.00	0	400.00	- 0.50	300.00	0.00	200.00	0.50				
Stickiness	ThD | NIR	%	0.35	0	0.45	- 1.50	0.35	0.00	0.25	0.00				
Total Rating						-20.79		0.26		11.34				
Spot Price / lb	NYCE	US ¢		60.00		60.00		60.00		60.00				
Premium / lb		US ¢			+	--	+	0.16	+	6.81	+		+	
Discount / lb		US ¢			-	-12.47	-	--	-	--	-		-	
Utility Value / lb		US ¢		60.00		47.53		60.16		66.81				
Spot Price / lb	NYCE	US ¢		80.00		80.00		80.00		80.00				
Premium / lb		US ¢			+	--	+	0.21	+	9.07	+		+	
Discount / lb		US ¢			-	-16.63	-	--	-	--	-		-	
Utility Value / lb		US ¢		80.00		63.37		80.21		89.07				

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !

** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

why are these different?

Fig. 26

Utility Value of Cotton

Schlafhorst Model

Prepared for: **Memphis Cotton**　　　Date: 9/6/94

Properties			0 - Base Cotton		Very Poor		Better than Average		Excellent		N/A			
	Source	Unit	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	3.80	8.00	4.00	4.00	3.80	8.00				
Fineness	FMT	mtex	175.00	0	0.00	---	0.00	---	0.00	---				
Maturity	FMT	%	80.00	0	70.00	- 7.00	80.00	0.00	85.00	3.50				
Length (UHM)	HVI	inch	1.10	0	1.05	- 2.00	1.10	0.00	1.15	2.00				
Uniformity Index	HVI	UI	81.40	0	79.00	- 2.02	82.00	0.80	82.00					
Short Fiber Content **	AFIS	% (W)	10.00	0	18.00	---	8.00	---	4.00	1.01				
Strength	HVI	g/tex	28.00	0	24.00	- 9.20	26.00	- 4.60	27.00	- 2.30				
Elongation	HVI	%	6.50	0	5.00	- 5.10	6.50	0.00	7.00	1.70				
Color (Reflectance)	HVI	Rd	72.00	0	66.00	- 0.90	76.00	0.60	80.00	1.20				
Color (Yellowness)	HVI	+b	10.00	0	14.00	- 2.00	10.00	0.00	8.00	1.00				
Trash (area)	HVI	%	0.25	0	0.50	- 5.00	0.20	1.00	0.10	3.00				
Dust	AFIS	count/gr	750.00	0	1250.00	- 2.00	500.00	1.00	250.00	2.00				
Neps	AFIS	count/gr	300.00	0	400.00	- 0.50	200.00	0.50	100.00	1.00				
Stickiness	ThD | NIR	%	0.35	0	0.45	- 1.50	0.25	0.00	0.02	0.00				
Total Rating						-29.22		3.30		22.11				
Spot Price / lb	NYCE	US ¢		60.00		60.00		60.00		60.00				
Premium / lb		US ¢			+	--	+	1.98	+	13.27	+		+	
Discount / lb		US ¢			-	-17.53	-	--	-	--	-		-	
Utility Value / lb		US ¢		60.00		42.47		61.98		73.27				
Spot Price / lb	NYCE	US ¢		80.00		80.00		80.00		80.00				
Premium / lb		US ¢			+	--	+	2.64	+	17.69	+		+	
Discount / lb		US ¢			-	-23.38	-	--	-	--	-		-	
Utility Value / lb		US ¢		80.00		56.62		82.64		97.69				

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !

** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

Fig. 27

Utility Value of Cotton

Schlafhorst Model

Prepared for: **California Cotton**　　　Date: 9/6/94

Properties			0 - Base Cotton		Poor		Average		Excellent					
	Source	Unit	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	3.80	8.00	4.20	0.00	3.80	8.00				
Fineness	FMT	mtex	175.00	0	0.00	---	0.00	---	0.00	---				
Maturity	FMT	%	80.00	0	75.00	- 3.50	85.00	3.50	90.00	7.00				
Length (UHM)	HVI	inch	1.10	0	1.10	0.00	1.20	4.00	1.25	6.00				
Uniformity Index	HVI	UI	81.40	0	80.00	- 1.70	82.50	- 0.45	82.00					
Short Fiber Content **	AFIS	% (W)	10.00	0	14.00	---	8.00	---	4.00	- 0.13				
Strength	HVI	g/tex	28.00	0	27.00	- 2.30	28.00	0.00	30.00	4.60				
Elongation	HVI	%	6.50	0	5.50	- 3.40	6.50	0.00	7.00	1.70				
Color (Reflectance)	HVI	Rd	72.00	0	68.00	- 0.60	74.00	0.30	80.00	1.20				
Color (Yellowness)	HVI	+b	10.00	0	12.00	- 1.00	9.00	0.50	7.00	1.50				
Trash (area)	HVI	%	0.25	0	0.30	- 1.00	0.18	1.40	0.05	3.00				
Dust	AFIS	count/gr	750.00	0	1000.00	- 1.00	500.00	1.00	250.00	2.00				
Neps	AFIS	count/gr	300.00	0	500.00	- 1.00	300.00	0.00	200.00	0.50				
Stickiness	ThD | NIR	%	0.35	0	0.60	- 3.75	0.25	0.00	0.15	0.00				
Total Rating						-11.25		10.25		35.37				
Spot Price / lb	NYCE	US ¢		60.00		60.00		60.00		60.00				
Premium / lb		US ¢			+	--	+	6.15	+	21.22	+		+	
Discount / lb		US ¢			-	- 6.75	-	--	-	--	-		-	
Utility Value / lb		US ¢		60.00		53.25		66.15		81.22				
Spot Price / lb	NYCE	US ¢		80.00		80.00		80.00		80.00				
Premium / lb		US ¢			+	--	+	8.20	+	28.30	+		+	
Discount / lb		US ¢			-	- 9.00	-	--	-	--	-		-	
Utility Value / lb		US ¢		80.00		71.00		88.20		108.30				

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !

** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

Fig. 28

In Fig. 29 we have also described the fiber profile of a typical cotton fiber ideal to spin fine count rotor yarns. Some breeders already have this kind of cotton variety under evaluation. By the way, the Model presents a very useful tool to cotton breeders to project the utility value of the genotypes they are working with.

The Pima profile describes an average American Pima S -7 variety.

Utility Value of Cotton

Schlafhorst Model

Prepared for: **Fine Count & Pima Cottons** Date: 9/6/94

Properties			0 - Base Cotton		Typical Fine Count		Pima		N/A		N/A			
	Source	Unit	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	3.50	14.00	3.90	6.00						
Fineness	FMT	mtex	175.00	0	0.00	---	0.00	---						
Maturity	FMT	%	80.00	0	90.00	7.00	85.00	3.50						
Length (UHM)	HVI	inch	1.10	0	1.20	4.00	1.35	10.00						
Uniformity Index	HVI	UI	81.40	0	83.00	0.18	85.00	- 0.12						
Short Fiber Content **	AFIS	% (W)	10.00	0	6.00	---	5.00	---						
Strength	HVI	g/tex	28.00	0	32.00	9.20	33.00	11.50						
Elongation	HVI	%	6.50	0	7.00	1.70	6.50	0.00						
Color (Reflectance)	HVI	Rd	72.00	0	78.00	0.90	74.00	0.30						
Color (Yellowness)	HVI	+b	10.00	0	8.00	1.00	12.00	- 1.00						
Trash (area)	HVI	%	0.25	0	0.25	0.00	0.25	0.00						
Dust	AFIS	count/gr	750.00	0	750.00	0.00	750.00	0.00						
Neps	AFIS	count/gr	300.00	0	300.00	0.00	300.00	0.00						
Stickiness	ThD | NIR	%	0.35	0	0.35	0.00	0.35	0.00						
Total Rating						37.98		30.18						
Spot Price / lb	NYCE	US ¢		60.00		60.00		60.00						
Premium / lb		US ¢			+	22.79	+	18.11	+		+		+	
Discount / lb		US ¢			-	--	-	--	-		-		-	
Utility Value / lb		US ¢		60.00		82.79		78.11						
Spot Price / lb	NYCE	US ¢		80.00		80.00		80.00						
Premium / lb		US ¢			+	30.38	+	24.14	+		+		+	
Discount / lb		US ¢			-	--	-	--	-		-		-	
Utility Value / lb		US ¢		80.00		110.38		104.14						

* Micronaire is omitted from the 'Total Rating' if Fineness (mtex) is shown !

** Short Fiber Content is omitted from the 'Total Rating' if Uniformity Index is entered !

Fig. 29

Finally, the average quality profile of the entire 1993 US Upland crop has been evaluated in Fig. 30 . These averages are estimated from the USDA 1993 crop reports for West Texas, Memphis and California. Short fiber content, dust, neps, and stickiness are estimates based on the average experience in these regions. They make a difference in the end results.

Utility Value of Cotton

Schlafhorst Model

Prepared for: **Partial Source USDA 1993** Date: 9/6/94

Properties			0 - Base Cotton		West Texas		Memphis		California		NA		NA	
	Source	Unit	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	4.00	4.00	4.30	- 2.00	4.10	2.00				
Fineness	FMT	mtex	175.00	0	0.00	---	0.00	---	0.00	---				
Maturity	FMT	%	80.00	0	78.00	- 1.40	80.00	0.00	82.00	1.40				
Length (UHM)	HVI	inch	1.10	0	1.03	- 2.80	1.09	- 0.40	1.13	1.20				
Uniformity Index	HVI	UI	81.40	0	81.00	0.85	81.50	0.36	82.00					
Short Fiber Content **	AFIS	% (W)	10.00	0	18.00	---	12.00	---	9.00	- 0.43				
Strength	HVI	g/tex	28.00	0	29.00	2.30	27.00	- 2.30	31.00	6.90				
Elongation	HVI	%	6.50	0	5.50	- 3.40	6.00	- 1.70	6.50	0.00				
Color (Reflectance)	HVI	Rd	72.00	0	70.00	- 0.30	72.00	0.00	74.00	0.30				
Color (Yellowness)	HVI	+b	10.00	0	11.00	- 0.50	10.00	0.00	9.00	0.50				
Trash (area)	HVI	%	0.25	0	0.30	- 1.00	0.38	- 2.60	0.19	1.20				
Dust	AFIS	count/gr	750.00	0	1000.00	- 1.00	750.00	0.00	500.00	1.00				
Neps	AFIS	count/gr	300.00	0	300.00	0.00	200.00	0.50	400.00	- 0.50				
Stickiness	ThD | NIR	%	0.35	0	0.25	0.00	0.35	0.00	0.45	- 1.50				
Total Rating						- 3.25		- 8.14		12.07				
Spot Price / lb	NYCE	US ¢		60.00		60.00		60.00		60.00				
Premium / lb		US ¢			+	--	+	--	+	7.24	+		+	
Discount / lb		US ¢			-	- 1.95	-	- 4.88	-	--	-		-	
Utility Value / lb		US ¢		60.00		58.05		55.12		67.24				
Spot Price / lb	NYCE	US ¢		80.00		80.00		80.00		80.00				
Premium / lb		US ¢			+	--	+	--	+	9.66	+		+	
Discount / lb		US ¢			-	- 2.60	-	- 6.51	-	--	-		-	
Utility Value / lb		US ¢		80.00		77.40		73.49		89.66				

* Micronaire is omitted from the " Total Rating " if Fineness (mtex) is shown !

** Short Fiber Content is omitted from the " Total Rating" if Uniformity Index is entered !

Fig. 30

The Table in Fig. 31 compares the utility values obtained by the Model:

- the values computed with the original 1988 Model and those with the 1994 Model
- the values computed for the three major growing seasons with a poor, average and excellent quality profile for each
- the values computed for the averages of the 1993 crop
- the ranges in each category and the total spread from the lowest to the highest value.

Comparison of Model Results 1988-1994

Cotton Description by Deussen		1988 Model ¢/lb.		1994 Model ¢/lb.	
West Texas :	poor	48.60		47.53	
West Texas :	average	53.40		60.16	
West Texas :	excellent	73.20		68.02	
West Texas :	range		24.60		20.49
Memphis :	very poor	43.20		42.47	
Memphis :	average=Zero Base	60.00		60.00	
Memphis :	better than average	71.40		61.98	
Memphis :	excellent	85.80		72.58	
Memphis :	range		42.60		30.11
California :	poor	54.00		53.25	
California :	average	72.60		66.15	
California :	excellent	91.20		80.10	
California :	range		37.20		26.85
Fine Count Cotton		88.20		82.79	
Pima ESL		78.00		78.11	
Averages 1993 Crop					
West Texas :		58.80		58.05	
Memphis :		59.40		55.12	
California :		67.80		67.64	
	range		9.00		9.59
Total Spread			48.00		40.32

Fig. 31

It is interesting to see that - at least in 1993 - Texas cottons represent a better value than Memphis cotton, a reversal from the past.

6. Flexibility

This Model has been designed to allow flexibility in program input and output. Parameters such as property ranges, increments, and Zero-Base lines can be changed over time as well as properties added or deleted.

As experience over the past 6 years has shown, a rigid model would have become obsolete in the wake of improvements in average fiber quality and progress in fiber test methods and instrumentation technology. The pace of this progress is hard to predict; but it seems likely that the Model's parameters should be reviewed and adjusted about every five years or as conditions warrant.

I don't understand how it adjusts

What model parameters? I haven't found any.

Most Model parameters are based on USDA HVI data and crop studies as well as fiber test data from Uster and Schlafhorst laboratories (The Schlafhorst databank includes fiber test results from over 3,000 world-wide cottons). All of this data should be continuously or periodically updated and fed into the Model. As an example, the determination of the average UI as a function of average staple length (UHM) has been made for the 1991 crop year and needs to be supported by data from several subsequent crop years. The same is true for broader information on trash, dust, neps and stickiness. Large-scale data collection by the USDA and independent studies are essential to the accuracy of the Model, which - just like HVI - will improve over time.

7. Further Refinement of the Model

The Model in its present, revised form is - in our opinion - ready for implementation. This does not mean that further refinements should not be pursued. In discussions with a number of well-qualified experts, several valuable suggestions have been brought to our attention:

- All premium and discount scales in the Model are essentially of linear design, i.e. equal increments up or down from the O-base line. For several properties, a good argument can be made that they should be non-linear. In the instance of micronaire, for example, a non-linear relationship might better express the utility value of this particular property. (Fig. 32)

  Premiums would be tilted toward the range of 3.6 to 4.2 mic, flatten around 3.0 mic and discounts set in earlier around 4.6 mic.

  A similar curve could be devised for length with a steeper discount for very short fibers.

  For strength, though, a linear relationship should be maintained because optimum cotton fiber strength - when compared to man-made fiber strength - has not been reached.

May not be consistent unless the marginal productivity of strength is constant.

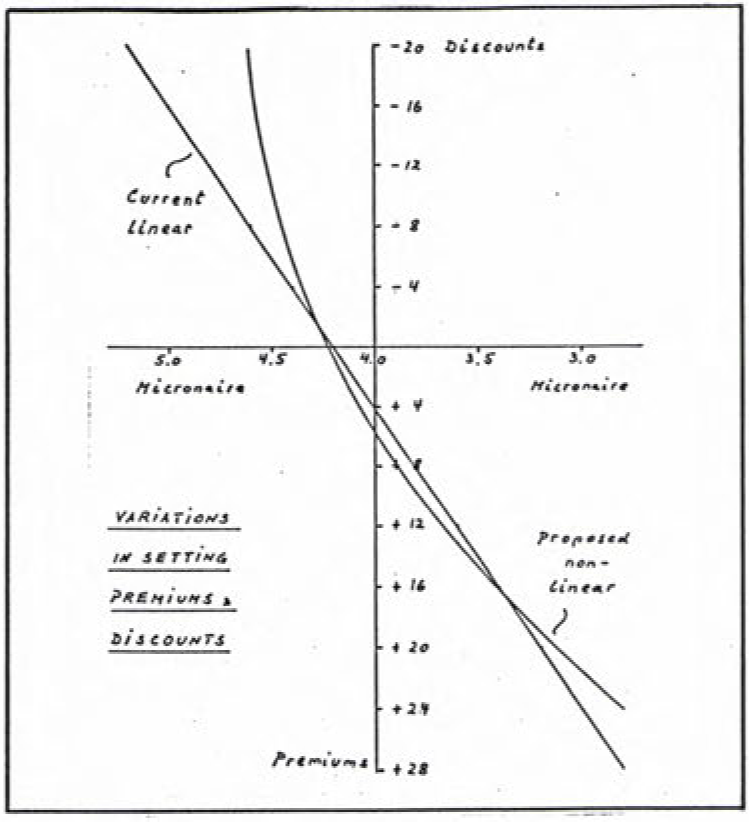

Fig. 32

- Another suggestion concerns the combination of two or more fiber properties into one value which expresses their combined effect on fiber quality and especially on processing and end product performance. This would simplify the Model considerably. For instance, breaking strength together with fiber elongation result in work load or work-to-break. Such a term equals the area under the stress-strain curve. It is the determining factor for weaving and knitting performance of a yarn and of spinning performance for a given fiber: (Example in Fig. 33)

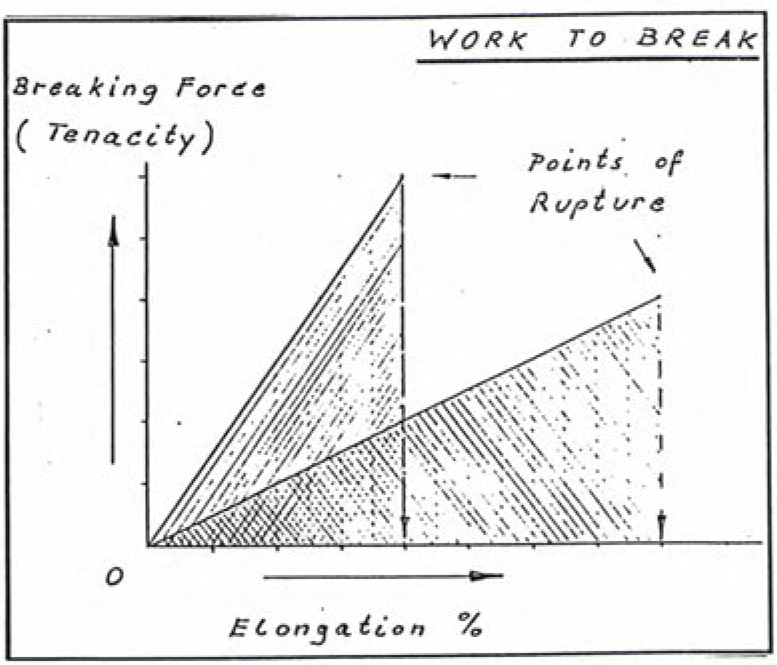

Fig. 33

- A second possibility would be to combine staple length with uniformity index and short fiber content to obtain an "effective staple length". This simplification merits further investigation and a clear demonstration of its practicality for draft roll spacing and quality differentiation.

- A third idea concerns the idea of combining the trash, dust and neps measurements into one factor: "cleanability" of a given cotton. This all-encompassing term may be difficult to quantify in raw cotton on a volume basis. Cleanability factors are known from comparisons of non-lint contents of raw cotton compared to those of opened, blended, cleaned and carded cotton. To predict cleanability, not only the quantity, but also the nature of impurities must be known. These assessments will need considerably more research.

There may be other combinations possible in the future. Again, the implementation of a "near-perfect" Model should not await these future developments.

8. Comparison to Loan Rates and Spot Prices

This characterization is oversimplified to such an extent that it is misleading.

The marketing system for cotton presently in use is basically a three-tier system:

- The CCC (Commodity Credit Corp.) of the USDA annually determines a set of loan rates which guarantee the farmer a minimum price for his crops, if the grower wants to avail himself of this protection. This scheme is particularly helpful if world prices fall below these support levels.

- the Spot Price Market in which transaction prices for cotton are based on supply and demand, adjusted daily in accordance with the USDA's premiums and discount points for fiber properties measured by HVI. ??

- The futures market of the New York Cotton Exchange and other Exchanges, where bids are made for transactions at certain points in the future. This is a further determinant of supply and demand levels, but it does not set quality differentials.

In the following paragraphs an attempt is made to compare the fiber quality differentials built into CCC Loan Rate and the Spot Price Market with the Model's value finding efficiency.

As a basis of comparison, we have chosen the average fiber properties of the 1993 Upland crop (USDA Quality Summary 1993) as they have been assessed in each of the 18 USDA Classing Offices beltwide.

The table in Fig.34 lists these profiles for 15 million bales classed via HVI (100 % of the US crop for the first time in history)

	MIC unit	LEN 32/In	LUI (%)	STR g/t	TRASH (%)	MAT RATIO	FIN mtex	NO. BALES
Florence, SC	4.6	35.5	81.5	28.3	0.37	1.05	174	641166
Macon, GA	4.6	34.8	81.1	28.4	0.29	1.03	179	731874
Birmingham, AL	4.7	35.2	81.0	27.9	0.30	1.04	187	501436
Rayville, LA	4.7	35.5	81.5	28.2	0.36	1.05	172	1123741
Greenwood, MS	4.5	35.4	81.7	27.5	0.37	1.01	174	1358238
Memphis, TN	4.6	35.4	81.8	27.4	0.39	1.02	172	821846
Dumas, AR	4.5	35.6	81.8	27.2	0.38	1.03	169	485977
Hayti, MO	4.4	35.8	81.5	27.5	0.43	0.98	174	777286
Harlingen, TX	4.2	35.4	81.3	26.3	0.24	0.98	167	350796
C. Christi, TX	4.3	34.3	81.1	26.1	0.26	0.96	167	336436
Waco, TX	4.6	34.1	81.0	25.7	0.15	1.02	168	270875
Abilene, TX	4.4	33.6	80.8	28.5	0.28	1.01	164	467787
Lubbock, TX	4.1	33.7	81.2	29.0	0.26	0.98	158	2465631
Lamesa, TX	4.2	33.6	81.1	29.0	0.25	0.98	162	770209
Altus, OK	4.3	33.4	81.1	28.3	0.34	1.00	164	523020
El Paso, TX	4.0	36.6	81.9	29.3	0.24	1.03	151	108859
Phoenix, AZ	4.7	35.9	81.2	27.5	0.15	1.08	173	774584
Visalia, CA	4.0	36.2	82.0	31.0	0.19	1.00	151	2495978
AVERAGE	4.35	35.0	81.5	28.5	0.29	1.01	166	15005739

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Fig. 34

The Market News Branch of the USDA - AMS Cotton Division was kind enough to compute for us the CCC Loan Rates and Spot prices for the "predominant quality" in each classing office. It is difficult to average non-linear color and leaf descriptions, but for the purposes of this comparison it is sufficiently indicative of the major properties' value recognition.

Fig. 35 shows the tabulation of the loan rates. It must be noted that the basic loan rates are not only different for each region/classing office, but also contain a transportation factor which increases from East to West. The concept here is the desire not to penalize spinning mills in the East for the cost of hauling cotton over greater distances from the cotton fields in the West. This apparently cancels out some of the quality differentials and explains why Eastern cotton fetches the highest loan rate (1 1/2 cents higher than the California loan rate).

VALUE OF THE PREDOMINANT QUALITY IN EACH CLASSING OFFICE AND THE UNITED STATES USING 1993 CCC LOAN RATES.

OFFICE	CCC LOCATION AREA 1/	PREDOMINANT QUALITY IN CLASSING OFFICE						BASE LOAN	C/L/S DIFF. /2	AVERAGE MIKE DIFF.	AVERAGE STR. DIFF.	AVERAGE VALUE / LB.
		COLOR	LEAF	STAPLE	MIKE	STRENGTH	UNIF.					
FLORENCE, SC	NC-1, SC-1	41	3	35.5	4.6	28.3	81.5	54.60	60	0	60	55.80
MACON, GA	GA-1	41	3	34.8	4.6	28.4	81.1	53.55	50	0	60	54.65
BIRMINGHAM, AL	AL-1	31	3	35.2	4.7	27.9	81.0	53.40	150	0	60	55.50
RAYVILLE, LA	LA-1	31	1&2	35.5	4.7	28.2	81.5	53.05	160	0	60	55.25
GREENWOOD, MS	MS-1	31	3	35.4	4.5	27.5	81.7	53.20	150	0	60	55.30
MEMPHIS, TN	TN-1	41	3	35.4	4.6	27.4	81.8	53.20	50	0	40	54.10
DUMAS, AR	AR-1	41	3	35.6	4.5	27.2	81.8	53.05	60	0	40	54.05
HAYTI, MO	MO-1	41	3	35.8	4.4	27.5	81.5	53.05	60	0	60	54.25
HARLINGEN, TX	TX-1	31	1&2	35.4	4.2	26.3	81.3	52.30	150	10	5	53.95
CORPUS CHRISTI, TX	TX-1	11&21	1&2	34.3	4.3	26.1	81.1	52.40	115	0	5	53.60
WACO, TX	TX-2	11&21	1&2	34.1	4.6	25.7	81.0	52.40	115	0	5	53.60
ABILENE, TX	TX-3	32	3	33.6	4.4	28.5	80.8	52.30	-5	0	85	53.10
LUBBOCK, TX	TX-3	11&21	3	33.7	4.1	29.0	81.2	52.30	105	10	85	54.30
LAMESA, TX	TX-3	11&21	1&2	33.6	4.2	29.0	81.1	52.30	115	10	85	54.40
ALTUS, OK	OK-2	31	3	33.4	4.3	28.3	81.1	52.40	-85	0	60	52.15
EL PASO, TX	NM-1	11&21	1&2	36.6	4.0	29.3	81.9	52.25	175	10	85	54.95
PHOENIX, AZ	AZ-1	11&21	1&2	35.9	4.7	27.5	81.2	51.15	170	0	60	53.45
VISALIA, CA	CA-1	11&21	1&2	36.2	4.0	31.0	82.0	51.15	170	10	135	54.30
UNITED STATES	AVG. LOC.	31	3	35.0	4.4	28.5	81.5	52.35	150	0	85	54.70

1/ IF CCC HAS ESTABLISHED THREE OR MORE RATES FOR A CLASSING OFFICE TERRITORY, WE USED THE BASE NEAREST THE MIDDLE OF THE CCC LOAN RANGE. IF THEY ESTABLISHED TWO BASE RATES, WE USED THE HIGHER OF THE TWO.

2/ COLOR/LEAF/STAPLE PREMIUMS (+) OR DISCOUNTS (-), STAPLE ROUNDED TO NEAREST WHOLE NUMBER.

NOTE: NO DISCOUNTS WERE APPLIED FOR EXTRANEOUS MATTER (BARK, GRASS, PREP, ETC.).

Fig. 35

A producer's incentive to grow higher quality cotton seems to be virtually wiped out by this system, which can hardly serve as a true value-finding method. It can be followed that the US government does not send the right signals to breeders and growers with this non-value oriented approach.

In the open Spot Price Market, the scheme detailed in Fig. 36 (example of North Delta cotton in May 1994) assists the price finding mechanism. Each day, the USDA in Memphis recomputes spot prices depending upon the prevailing market prices, a complex computer task indeed.

North Delta spot cotton differences, May 1994

Color	Leaf	Staple 33	34	35	36	37
11 & 21	1-2	-200	25	35	45	45
	3	-200	25	35	45	45
	4	-217	8	18	28	28
	5	-484	-259	-249	-239	-239
	6	-1213	-988	-978	-968	-968
	7	-1416	-1416	-1416	-1416	-1416
31	1-2	-200	25	35	45	45
	3	-200	25	35	45	45
	4	-225	0	10	20	20
	5	-484	-259	-249	-239	-239
	6	-1213	-988	-978	-968	-968
	7	-1416	-1416	-1416	-1416	-1416
41	1-2	-225	0	10	20	20
	3	-225	0	10	20	20
	4	-225	0	10	20	20
	5	-570	-345	-335	-325	-325
	6	-1213	-988	-978	-968	-968
	7	-1416	-1416	-1416	-1416	-1416
51	1-2	-635	-410	-400	-390	-390
	3	-635	-410	-400	-390	-390
	4	-635	-410	-400	-390	-390
	5	-635	-410	-400	-390	-390
	6	-1186	-1186	-1186	-1186	-1186
	7	-1416	-1416	-1416	-1416	-1416
61	1-2	-1195	-1195	-1195	-1195	-1195
	3	-1195	-1195	-1195	-1195	-1195
	4	-1195	-1195	-1195	-1195	-1195
	5	-1195	-1195	-1195	-1195	-1195
	6	-1195	-1195	-1195	-1195	-1195
	7	-1416	-1416	-1416	-1416	-1416
71	1-2	-1520	-1520	-1520	-1520	-1520
	3	-1520	-1520	-1520	-1520	-1520
	4	-1520	-1520	-1520	-1520	-1520
	5	-1520	-1520	-1520	-1520	-1520
	6	-1520	-1520	-1520	-1520	-1520
	7	-1520	-1520	-1520	-1520	-1520
12 & 22	1-2	-260	-35	-25	-15	-15
	3	-260	-35	-25	-15	-15
	4	-417	-192	-182	-172	-172
	5	-697	-472	-462	-452	-452
	6	-977	-977	-977	-977	-977
	7	-1403	-1403	-1403	-1403	-1403
32	1-2	-260	-35	-25	-15	-15
	3	-260	-35	-25	-15	-15
	4	-511	-286	-276	-266	-266
	5	-697	-472	-462	-452	-452
	6	-977	-977	-977	-977	-977
	7	-1403	-1403	-1403	-1403	-1403
42	1-2	-448	-223	-213	-203	-203
	3	-544	-319	-309	-299	-299
	4	-544	-319	-309	-299	-299
	5	-723	-723	-723	-723	-723
	6	-1009	-1009	-1009	-1009	-1009
	7	-1400	-1400	-1400	-1400	-1400
52	1-2	-924	-852	-849	-845	-845
	3	-924	-852	-849	-845	-845
	4	-1060	-1060	-1060	-1060	-1060
	5	-1060	-1060	-1060	-1060	-1060
	6	-1400	-1400	-1400	-1400	-1400
	7	-1400	-1400	-1400	-1400	-1400
62	1-2	-1312	-1312	-1312	-1312	-1312
	3	-1312	-1312	-1312	-1312	-1312
	4	-1312	-1312	-1312	-1312	-1312
	5	-1401	-1401	-1401	-1401	-1401
	6	-1401	-1401	-1401	-1401	-1401

Color	Leaf	Staple 33	34	35	36	37
43	1-2	-1253	-1253	-1253	-1253	-1253
	3	-1371	-1371	-1371	-1371	-1371
	4	-1371	-1371	-1371	-1371	-1371
	5	-1468	-1468	-1468	-1468	-1468
	6	-1468	-1468	-1468	-1468	-1468
	7	-1516	-1516	-1516	-1516	-1516
53	1-2	-1508	-1508	-1508	-1508	-1508
	3	-1508	-1508	-1508	-1508	-1508
	4	-1603	-1603	-1603	-1603	-1603
	5	-1603	-1603	-1603	-1603	-1603
	6	-1652	-1652	-1652	-1652	-1652
	7	-1652	-1652	-1652	-1652	-1652
63	1-2	-1706	-1706	-1706	-1706	-1706
	3	-1706	-1706	-1706	-1706	-1706
	4	-1706	-1706	-1706	-1706	-1706
	5	-1753	-1753	-1753	-1753	-1753
	6	-1753	-1753	-1753	-1753	-1753

Mike

Range	Diff.
25-26	-1288
27-29	-934
30-32	-583
33-34	-287
35-36	0
37-42	0
43-49	0
50-52	-337
53 & Above	-513

Strength (grams per tex)

Range	Diff.
20.5-21.4	-100
21.5-22.4	-75
22.5-23.4	0
23.5-25.4	0
25.5-26.4	0
26.5-27.4	16
27.5-28.4	26
28.5-29.4	45
29.5-30.4	57
30.5 & Above	85

Extraneous Matter

Level	Diff.
1	-464
2	-864

Page 6

Fig. 36

These fluctuations are shown in Fig. 37 for different markets and a 10 month period. Any transportation charges have to be added to obtain mill costs.

Table 4. Spot cotton prices for color 41 leaf 4, staple 34 in the designated markets, monthly annd annual averages, 1993-94 1/

Market Areas	Aug. 1993	Sept. 1993	Oct. 1993	Nov. 1993	Dec. 1993	Jan. 1993	Feb. 1993	Mar. 1993	Apr. 1993	May 1993	June 1993	July 1993	Average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
Southeast	54.40	56.51	57.18	58.12	62.17	68.19	73.13	72.70	76.68	81.17			66.03
North Delta	53.94	55.86	56.21	57.33	61.59	67.18	72.83	72.81	77.97	80.49			65.62
South Delta	53.94	55.86	56.21	57.33	61.59	67.18	72.83	72.81	77.97	80.49			65.62
East Texas-Oklahoma	54.16	53.92	54.55	54.69	59.81	66.54	73.45	74.17	76.66	78.81			64.68
West Texas	54.05	53.10	53.86	54.03	59.30	65.70	73.45	74.17	76.66	78.81			64.31
Desert Southwest	49.78	50.77	51.01	52.87	58.22	65.55	72.10	71.59	74.09	77.42			62.34
San Joaquin Valley	51.03	52.07	53.07	54.95	59.36	65.41	71.02	70.93	72.81	77.89			62.85
Average	53.04	54.01	54.58	55.61	60.29	66.53	72.69	72.74	76.12	79.30			64.49

1/ Prices are for mixed lots, net weight, compressed, FOB car/truck.

Fig. 37

Again, based on the fiber profiles for each classing office, individual spot prices were compiled for us by USDA - AMS. This tabulation is given in Fig. 38 .

VALUE OF THE PREDOMINANT QUALITY IN EACH CLASSING OFFICE AND THE UNITED STATES USING THE AUGUST THROUGH MAY SPOT COTTON QUOTATIONS AVERAGES.

OFFICE	DESIGNATED MARKET AREA	PREDOMINANT QUALITY IN CLASSING OFFICE: COLOR	LEAF	STAPLE	MIKE	STRENGTH	UNIF.	AVERAGE BASE PRICE	C/L/S DIFF. /2	AVERAGE MIKE DIFF.	AVERAGE STR. DIFF.	AVERAGE VALUE / LB.
FLORENCE, SC	SOUTHEAST	41	3	35.5	4.6	28.3	81.5	66.03	15	0	0	66.18
MACON, GA	SOUTHEAST	41	3	34.8	4.6	28.4	81.1	66.03	12	0	0	66.15
BIRMINGHAM, AL	SOUTHEAST	31	3	35.2	4.7	27.9	81.0	66.03	30	0	0	66.33
RAYVILLE, LA	SOUTH DELTA	31	1&2	35.5	4.7	28.2	81.5	65.62	45	0	26	66.33
GREENWOOD, MS	SOUTH DELTA	31	3	35.4	4.5	27.5	81.7	65.62	35	0	26	66.23
MEMPHIS, TN	NORTH DELTA	41	3	35.4	4.6	27.4	81.8	65.62	10	0	16	65.88
DUMAS, AR	NORTH DELTA	41	3	35.6	4.5	27.2	81.8	65.62	20	0	16	65.98
HAYTI, MO	NORTH DELTA	41	3	35.8	4.4	27.5	81.5	65.62	20	0	26	66.08
HARLINGEN, TX	E. TX - OK	31	1&2	35.4	4.2	26.3	81.3	64.68	49	13	0	65.30
CORPUS CHRISTI, TX	E. TX - OK	11&21	1&2	34.3	4.3	26.1	81.1	64.68	49	0	0	65.17
WACO, TX	E. TX - OK	11&21	1&2	34.1	4.6	25.7	81.0	64.68	49	0	0	65.17
ABILENE, TX	W. TEXAS	32	3	33.6	4.4	28.5	80.8	64.31	-21	0	17	64.27
LUBBOCK, TX	W. TEXAS	11&21	3	33.7	4.1	29.0	81.2	64.31	31	11	17	64.90
LAMESA, TX	W. TEXAS	11&21	1&2	33.6	4.2	29.0	81.1	64.31	65	11	17	65.24
ALTUS, OK	E. TX - OK	31	3	33.4	4.3	28.3	81.1	64.68	-114	0	13	63.67
EL PASO, TX	DESERT SW	11&21	1&2	36.6	4.0	29.3	81.9	62.34	315	25	34	66.08
PHOENIX, AZ	DESERT SW	11&21	1&2	35.9	4.7	27.5	81.2	62.34	305	0	0	65.39
VISALIA, CA	SAN JOAQ. V.	11&21	1&2	36.2	4.0	31.0	82.0	62.85	625	25	75	70.10
UNITED STATES	ALL	31	3	35.0	4.4	28.5	81.5	64.49	156	0	27	66.32

1/ COLOR/LEAF/STAPLE PREMIUMS (+) OR DISCOUNTS (-), STAPLE ROUNDED TO NEAREST WHOLE NUMBER.

NOTE: NO DISCOUNTS WERE APPLIED FOR EXTRANEOUS MATTER (BARK, GRASS, PREP, ETC.).

Fig. 38

The per pound values in the last column are essentially more reflective of fiber quality differentials than the loan rates; however, the spread from low to high is only 6.43 cents/lb., about twice the spread in loan rates.

The comparison of cotton prices as determined by Loan Rate schedule, Spot Price schedule and the Schlafhorst Model is made in Fig. 39.

Comparison of Cotton Prices
Determined by Loan Rates, Spot Prices and Valuation Model

	CCC Loan Rate	Spot Price May 1994	Valuation Model 1994
Basis ¢/llb.	52.35	64.49	60.00
1. Florence, SC	55.80	66.18	59.95
2. Macon,GA	54.65	66.15	59.42
3. Birmingham, AL	55.50	66.33	56.80
4. Rayville, LA	55.25	66.33	60.99
5. Greenwood, MS	55.30	66.23	59.18
6. Memphis, TN	54.10	65.88	59.30
7. Dumas, AR	54.05	65.98	59.86
8. Hayti, MO	54.25	66.08	58.38
9. Harlingen, TX	53.95	65.30	60.73
10. Corpus Christi, TX	53.60	65.17	59.86
11. Waco, TX	53.60	65.17	60.31
12. Abilene, TX	53.10	64.27	62.03
13. Lubbock, TX	54.30	64.90	65.12
14. Lamesa, TX	54.40	65.24	64.68
15. Altus, OK	52.15	63.67	61.70
16. El Paso, TX	54.95	66.08	69.61
17. Phoenix, AZ	53.45	65.39	62.14
18. Visalia, CA	54.30	70.10	72.50
19. United States	54.70	66.32	61.81
20. Highest Value	55.80	70.10	72.50
21. Lowest Value	52.15	63.67	56.80
22. Spread	3.65	6.43	15.70
23. Average Value (19)	54.70	66.32	61.81
24. Deviation @-max	1.10	3.78	10.07
25. Deviation @-min	2.55	2.65	7.00

Fig. 39

The same data is plotted into the graph in Fig. 40.

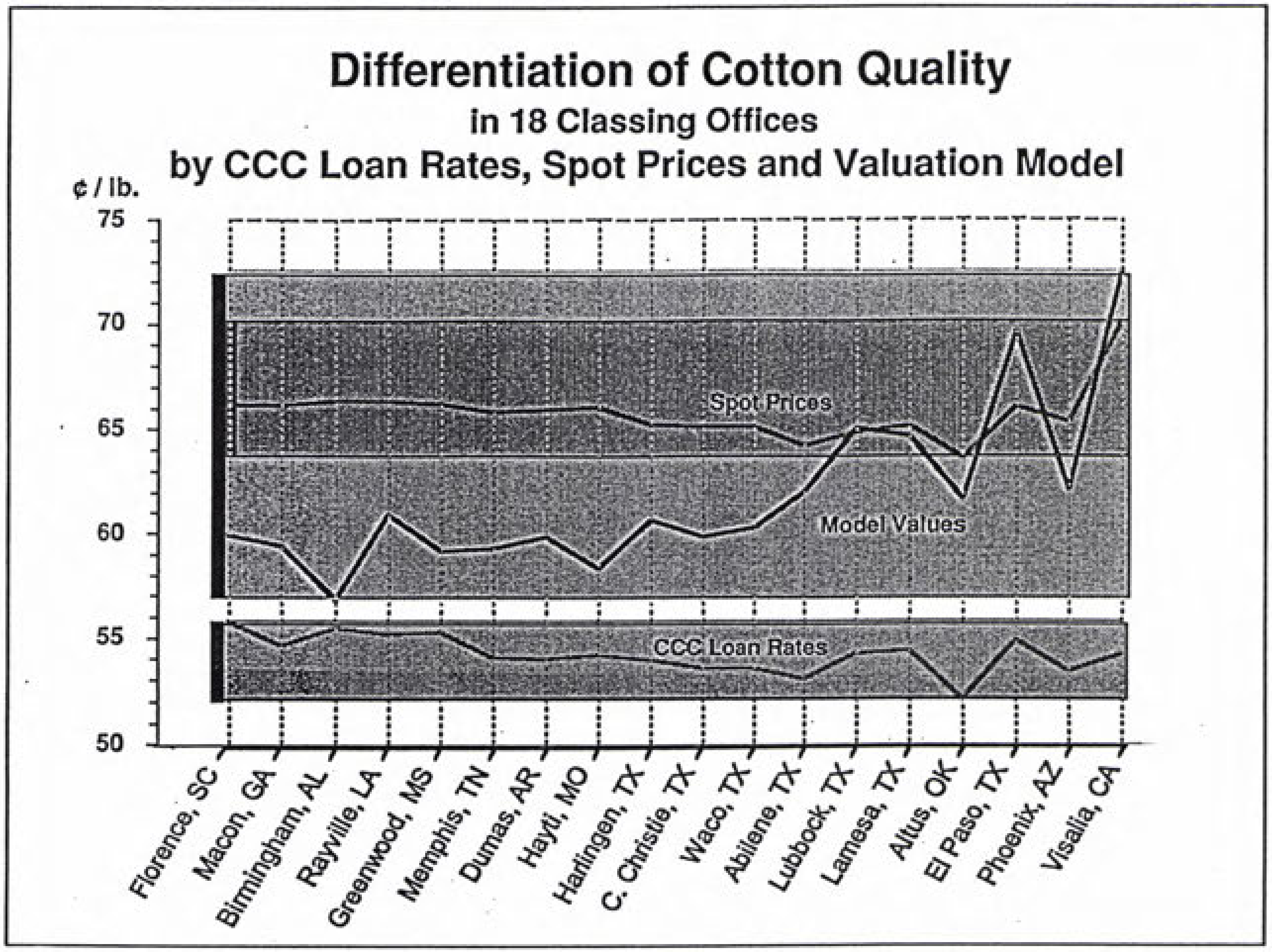

Fig. 40

While the price basis for each of the three systems is different and not directly comparable, it is certainly clear that the Model recognizes true quality differences much better than spot prices or loan rates. This recognition was, after all, the prime objective of the Model.

The Model's detailed computer printouts for each classing office can be found in Fig.46 to Fig. 55 in the appendix.

The graph in Fig. 41 illustrates quality differentials for the 18 Classing Offices when choosing a price basis of 50 cents, 60 cents, 70 cents and 80 cents per pound. As the price input (world price) increases, the utility value for higher quality cottons also increases proportionally.

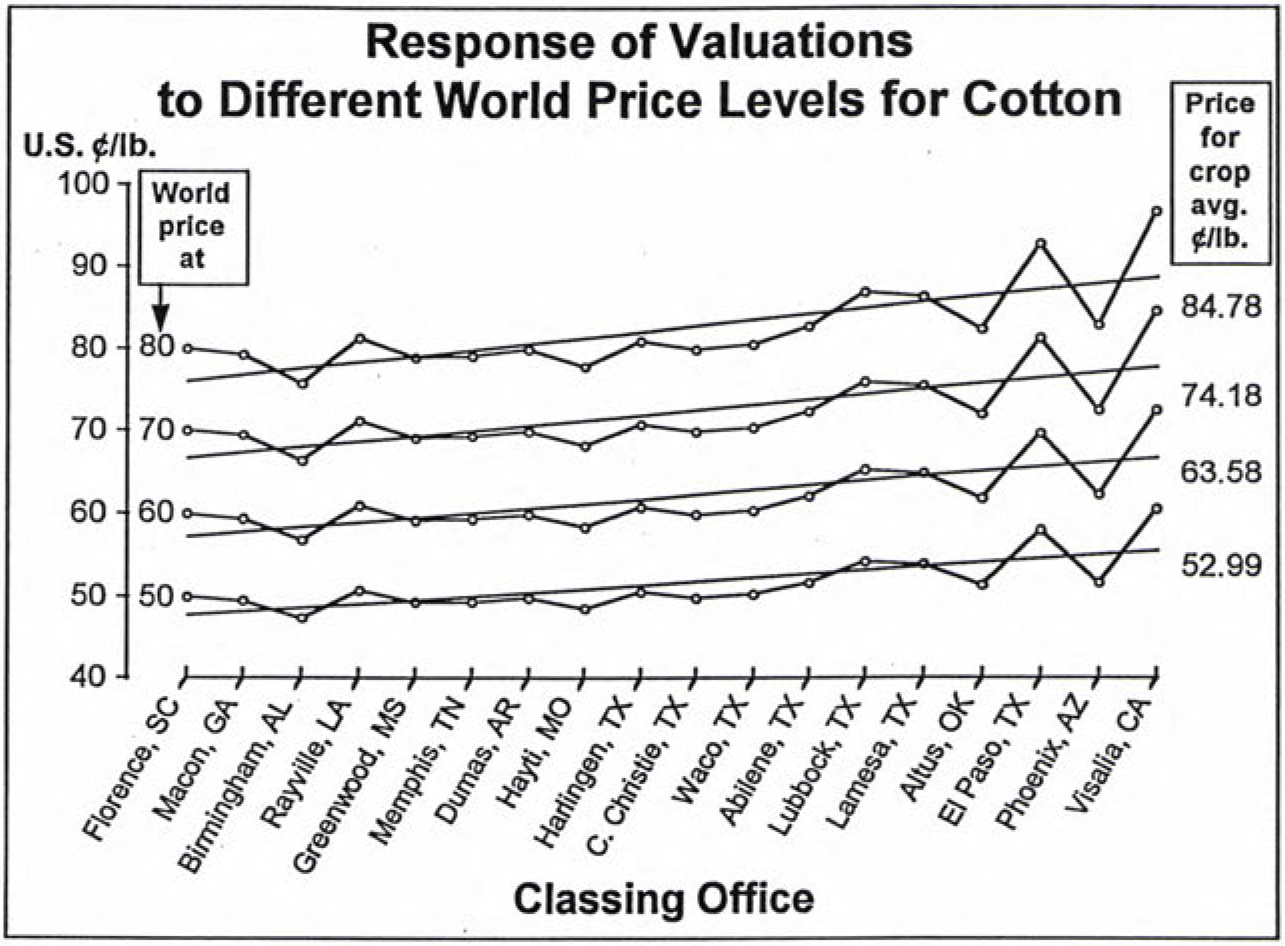
Response of Valuations
to Different World Price Levels for Cotton
U.S. ¢/lb.
100
90
80
70
60
50
40
World price at
80
70
60
50
Price for crop avg. ¢/lb.
84.78
74.18
63.58
52.99
Florence, SC
Macon, GA
Birmingham, AL
Rayville, LA
Greenwood, MS
Memphis, TN
Dumas, AR
Hayti, MO
Harlingen, TX
C. Christie, TX
Waco, TX
Abilene, TX
Lubbock, TX
Lamesa, TX
Altus, OK
El Paso, TX
Phoenix, AZ
Visalia, CA
Classing Office

Fig. 41

Texas Tech University (Dr. Don Ethridge) published a very interesting analysis of prices for Texas/Oklahoma markets (1993 crop) via the "Daily Price Estimation System". This econometric Model investigated premium and discount levels and their movements from actual transactions, in an environment of rising cotton prices.

Regression analysis of the major fiber properties' premium and discount ranges from the "Weighted Average of Daily Spot Price Estimates" (page 9 of the Report) for West Texas cotton produced the graphs in Fig. 42 to Fig. 45 .

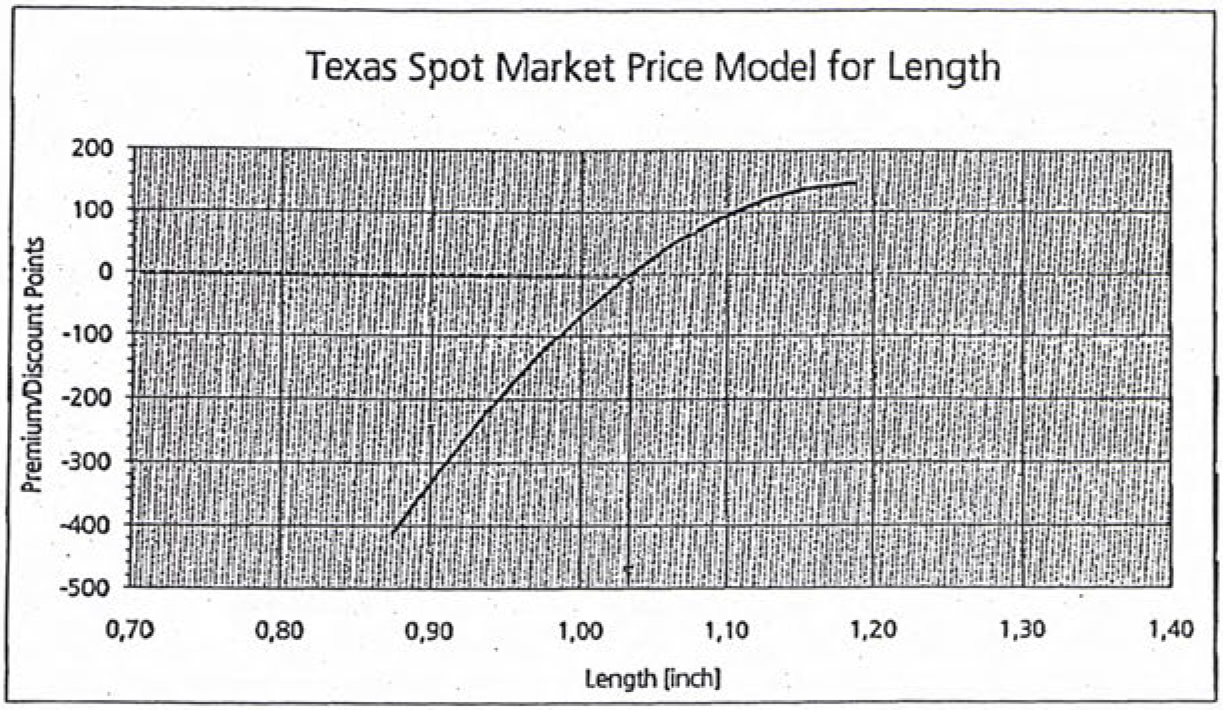

Fig. 42

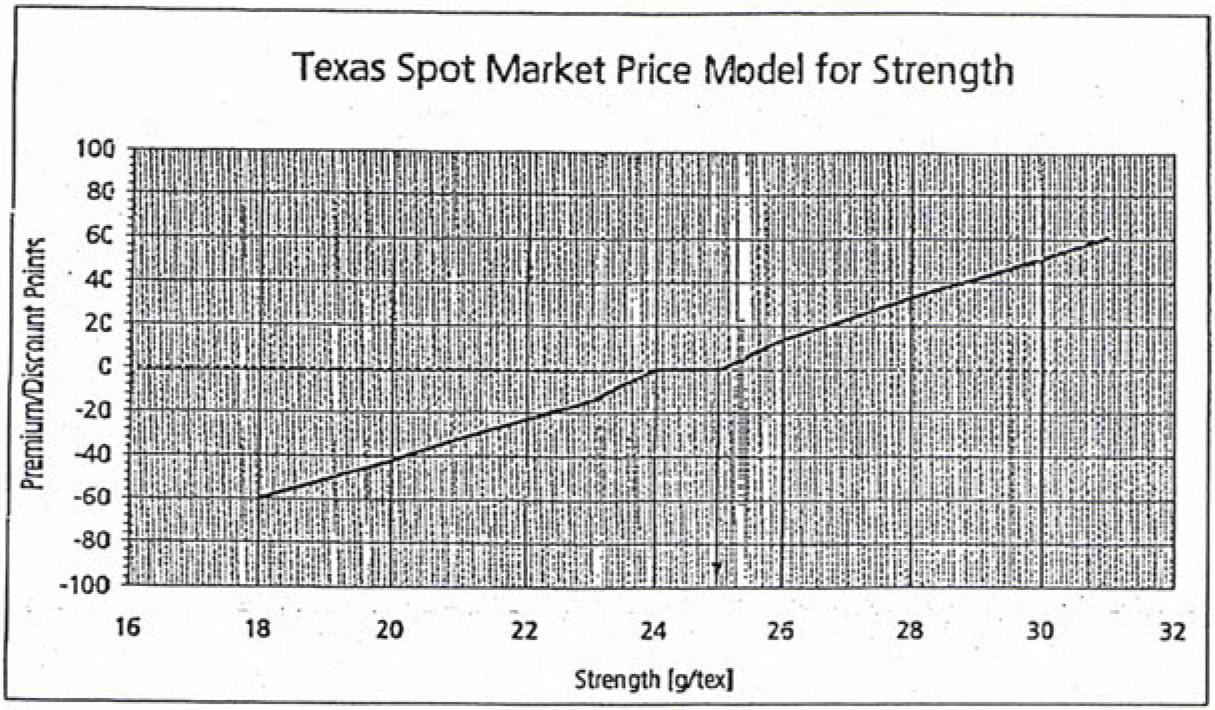
Texas Spot Market Price Model for Strength
Premium/Discount Points
100
80
60
40
20
0
-20
-40
-60
-80
-100
16
18
20
22
24
26
28
30
32
Strength [g/tex]

Fig. 43

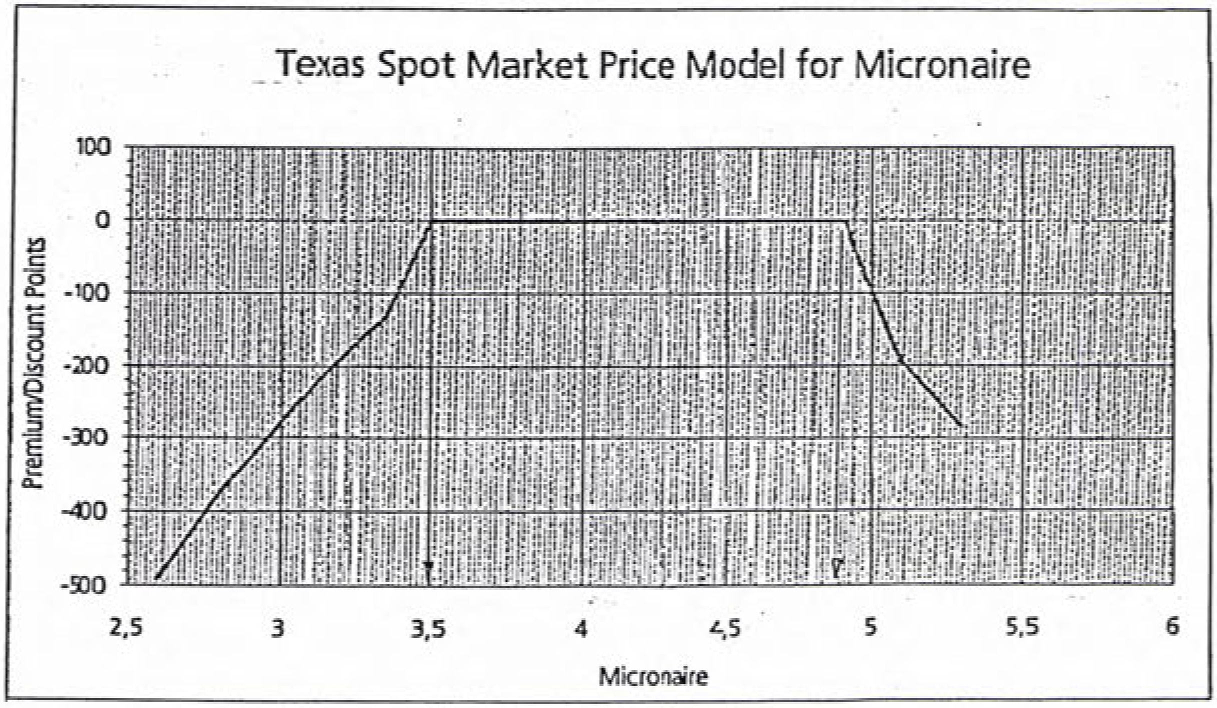
Texas Spot Market Price Model for Micronaire
Premium/Discount Points
100
0
-100
-200
-300
-400
-500
2,5
3
3,5
4
4,5
5
5,5
6
Micronaire

Fig. 44

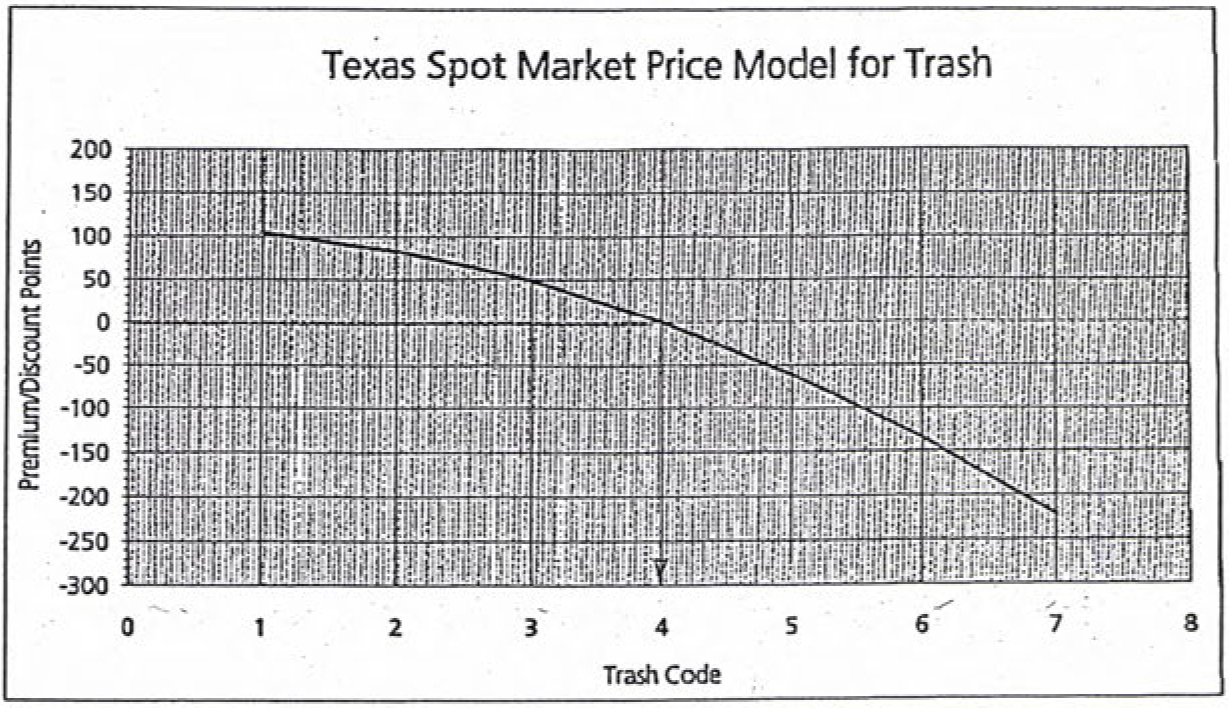

Fig. 45

strength is actually non-linear, but it appears linear on a graph.

Except for strength, all major properties show a non-linear response to premiums and discounts which operate in very narrow ranges.

The Texas Tech Model is a very useful analytical tool, but retrospective, not prospective in nature. Yes

What is needed in a new cotton marketing system is a departure from the past and a new, transparent, impartial, flexible and value-oriented, visionary Model based on an accurate, scientific description and measurement of a natural product.

APPENDIX

Utility Value of Cotton
Schlafhorst Model

Prepared for: **USDA - 1993 Crop** Date: 9/6/94

Properties	Source	Unit	0 - Base Cotton		Florence, S.C		Macon, GA		Birmingham, AL		Rayville, LA		Greenwood, MS	
			Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	4.60	---	4.60	---	4.70	---	4.70	---	4.50	---
Fineness	FMT	mtex	175.00	0	174.00	0.40	179.00	- 1.60	187.00	- 4.80	172.00	1.20	174.00	0.40
Maturity	FMT	%	80.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Length (UHM)	HVI	inch	1.10	0	1.10	0.00	1.09	- 0.40	1.10	0.00	1.11	0.40	1.11	0.40
Uniformity Index	HVI	UI	81.40	0	81.50	0.17	81.10	- 0.14	81.00	- 0.45	81.50	- 0.01	81.70	0.24
Short Fiber Content **	AFIS	% (W)	10.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Strength	HVI	g/tex	28.00	0	28.30	0.69	28.40	0.92	27.90	- 0.23	28.20	0.46	27.50	- 1.15
Elongation	HVI	%	6.50	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Color (Reflectance)	HVI	Rd	72.00	0	74.00	0.30	74.00	0.30	77.00	0.75	78.00	0.90	77.00	0.75
Color (Yellowness)	HVI	+b	10.00	0	8.50	0.75	8.50	0.75	9.20	0.40	8.20	0.90	9.20	0.40
Trash (area)	HVI	%	0.25	0	0.37	- 2.40	0.29	- 0.80	0.30	- 1.00	0.36	- 2.20	0.37	- 2.40
Dust	AFIS	count/gr	750.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Neps	AFIS	count/gr	300.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Stickiness	ThD | NIR	%	0.35	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Total Rating						- 0.09		- 0.97		- 5.33		1.65		- 1.36
Spot Price / lb	NYCE	US ¢		50.00		50.00		50.00		50.00		50.00		50.00
Premium / lb		US ¢			+	--	+	--	+	--	+	0.82	+	--
Discount / lb		US ¢			-	- 0.04	-	- 0.49	-	- 2.67	-	--	-	- 0.68
Utility Value / lb		US ¢		50.00		49.96		49.51		47.33		50.82		49.32
Spot Price / lb	NYCE	US ¢		70.00		70.00		70.00		70.00		70.00		70.00
Premium / lb		US ¢			+	--	+	--	+	--	+	1.15	+	--
Discount / lb		US ¢			-	- 0.06	-	- 0.68	-	- 3.73	-	--	-	- 0.96
Utility Value / lb		US ¢		70.00		69.94		69.32		66.27		71.15		69.04

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !
** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

Fig. 46

Utility Value of Cotton
Schlafhorst Model

Prepared for: **USDA - 1993 Crop** Date: 9/6/94

Properties	Source	Unit	0 - Base Cotton		Florence, S.C		Macon, GA		Birmingham, AL		Rayville, LA		Greenwood, MS	
			Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	4.60	---	4.60	---	4.70	---	4.70	---	4.50	---
Fineness	FMT	mtex	175.00	0	174.00	0.40	179.00	- 1.60	187.00	- 4.80	172.00	1.20	174.00	0.40
Maturity	FMT	%	80.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Length (UHM)	HVI	inch	1.10	0	1.10	0.00	1.09	- 0.40	1.10	0.00	1.11	0.40	1.11	0.40
Uniformity Index	HVI	UI	81.40	0	81.50	0.17	81.10	- 0.14	81.00		81.50	- 0.01	81.70	0.24
Short Fiber Content **	AFIS	% (W)	10.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Strength	HVI	g/tex	28.00	0	28.30	0.69	28.40	0.92	27.90	- 0.23	28.20	0.46	27.50	- 1.15
Elongation	HVI	%	6.50	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Color (Reflectance)	HVI	Rd	72.00	0	74.00	0.30	74.00	0.30	77.00	0.75	78.00	0.90	77.00	0.75
Color (Yellowness)	HVI	+b	10.00	0	8.50	0.75	8.50	0.75	9.20	0.40	8.20	0.90	9.20	0.40
Trash (area)	HVI	%	0.25	0	0.37	- 2.40	0.29	- 0.80	0.30	- 1.00	0.36	- 2.20	0.37	- 2.40
Dust	AFIS	count/gr	750.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Neps	AFIS	count/gr	300.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Stickiness	ThD | NIR	%	0.35	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Total Rating						- 0.09		- 0.97		- 4.88		1.65		- 1.36
Spot Price / lb	NYCE	US ¢		60.00		60.00		60.00		60.00		60.00		60.00
Premium / lb		US ¢			+	--	+	--	+	--	+	0.99	+	--
Discount / lb		US ¢			-	- 0.05	-	- 0.58	-	- 2.93	-	--	-	- 0.82
Utility Value / lb		US ¢		60.00		59.95		59.42		57.07		60.99		59.18
Spot Price / lb	NYCE	US ¢		80.00		80.00		80.00		80.00		80.00		80.00
Premium / lb		US ¢			+	--	+	--	+	--	+	1.32	+	--
Discount / lb		US ¢			-	- 0.07	-	- 0.78	-	- 3.90	-	--	-	- 1.09
Utility Value / lb		US ¢		80.00		79.93		79.22		76.10		81.32		78.91

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !
** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

Fig. 47

Utility Value of Cotton
Schlafhorst Model

Prepared for: **USDA - 1993 Crop** Date: 9/6/94

Properties	Source	Unit	0 - Base Cotton Data	0 - Base Cotton Rating	Memphis, TN Data	Memphis, TN Rating	Dumas, AR Data	Dumas, AR Rating	Hayti, MO Data	Hayti, MO Rating	Harlingen, TX Data	Harlingen, TX Rating	C. Christi, TX Data	C. Christi, TX Rating
Micronaire *	HVI	mic	4.20	0	4.60	---	4.50	---	4.40	---	4.20	---	4.30	---
Fineness	FMT	mtex	175.00	0	172.00	1.20	169.00	2.40	174.00	0.40	167.00	3.20	167.00	3.20
Maturity	FMT	%	80.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Length (UHM)	HVI	inch	1.10	0	1.11	0.40	1.11	0.40	1.12	0.80	1.10	0.00	1.07	- 1.20
Uniformity Index	HVI	UI	81.40	0	81.80	0.36	81.80	0.36	81.50	- 0.20	81.30	- 0.08	81.10	0.23
Short Fiber Content **	AFIS	% (W)	10.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Strength	HVI	g/tex	28.00	0	27.40	- 1.38	27.20	- 1.84	27.50	- 1.15	26.30	- 3.91	26.10	- 4.37
Elongation	HVI	%	6.50	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Color (Reflectance)	HVI	Rd	72.00	0	74.00	0.30	74.00	0.30	74.00	0.30	78.00	0.90	82.00	1.50
Color (Yellowness)	HVI	+b	10.00	0	8.50	0.75	8.50	0.75	8.50	0.75	8.20	0.90	8.80	0.60
Trash (area)	HVI	%	0.25	0	0.39	- 2.80	0.38	- 2.60	0.43	- 3.60	0.24	0.20	0.26	- 0.20
Dust	AFIS	count/gr	750.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Neps	AFIS	count/gr	300.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Stickiness	ThD | NIR	%	0.35	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Total Rating						- 1.17		- 0.23		- 2.70		1.21		- 0.24
Spot Price / lb	NYCE	US ¢		50.00		50.00		50.00		50.00		50.00		50.00
Premium / lb		US ¢			+	--	+	--	+	--	+	0.61	+	--
Discount / lb		US ¢			-	- 0.58	-	- 0.11	-	- 1.35	-	--	-	- 0.12
Utility Value / lb		US ¢		50.00		49.42		49.89		48.65		50.61		49.88
Spot Price / lb	NYCE	US ¢		70.00		70.00		70.00		70.00		70.00		70.00
Premium / lb		US ¢			+	--	+	--	+	--	+	0.85	+	--
Discount / lb		US ¢			-	- 0.82	-	- 0.16	-	- 1.89	-	--	-	- 0.17
Utility Value / lb		US ¢		70.00		69.18		69.84		68.11		70.85		69.83

* Micronaire is omitted from the 'Total Rating' if Fineness (mtex) is shown !
** Short Fiber Content is omitted from the 'Total Rating' if Uniformity Index is entered !

Fig. 48

Utility Value of Cotton
Schlafhorst Model

Prepared for: **USDA - 1993 Crop** Date: 9/6/94

Properties	Source	Unit	0 - Base Cotton Data	0 - Base Cotton Rating	Memphis, TN Data	Memphis, TN Rating	Dumas, AR Data	Dumas, AR Rating	Hayti, MO Data	Hayti, MO Rating	Harlingen, TX Data	Harlingen, TX Rating	C. Christi, TX Data	C. Christi, TX Rating
Micronaire *	HVI	mic	4.20	0	4.60	---	4.50	---	4.40	---	4.20	---	4.30	---
Fineness	FMT	mtex	175.00	0	172.00	1.20	169.00	2.40	174.00	0.40	167.00	3.20	167.00	3.20
Maturity	FMT	%	80.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Length (UHM)	HVI	inch	1.10	0	1.11	0.40	1.11	0.40	1.12	0.80	1.10	0.00	1.07	- 1.20
Uniformity Index	HVI	UI	81.40	0	81.80	0.36	81.80	0.36	81.50		81.30	- 0.08	81.10	0.23
Short Fiber Content **	AFIS	% (W)	10.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Strength	HVI	g/tex	28.00	0	27.40	- 1.38	27.20	- 1.84	27.50	- 1.15	26.30	- 3.91	26.10	- 4.37
Elongation	HVI	%	6.50	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Color (Reflectance)	HVI	Rd	72.00	0	74.00	0.30	74.00	0.30	74.00	0.30	78.00	0.90	82.00	1.50
Color (Yellowness)	HVI	+b	10.00	0	8.50	0.75	8.50	0.75	8.50	0.75	8.20	0.90	8.80	0.60
Trash (area)	HVI	%	0.25	0	0.39	- 2.80	0.38	- 2.60	0.43	- 3.60	0.24	0.20	0.26	- 0.20
Dust	AFIS	count/gr	750.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Neps	AFIS	count/gr	300.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Stickiness	ThD | NIR	%	0.35	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Total Rating						- 1.17		- 0.23		- 2.50		1.21		- 0.24
Spot Price / lb	NYCE	US ¢		60.00		60.00		60.00		60.00		60.00		60.00
Premium / lb		US ¢			+	--	+	--	+	--	+	0.73	+	--
Discount / lb		US ¢			-	- 0.70	-	- 0.14	-	- 1.50	-	--	-	- 0.14
Utility Value / lb		US ¢		60.00		59.30		59.86		58.50		60.73		59.86
Spot Price / lb	NYCE	US ¢		80.00		80.00		80.00		80.00		80.00		80.00
Premium / lb		US ¢			+	--	+	--	+	--	+	0.97	+	--
Discount / lb		US ¢			-	- 0.94	-	- 0.18	-	- 2.00	-	--	-	- 0.19
Utility Value / lb		US ¢		80.00		79.06		79.82		78.00		80.97		79.81

* Micronaire is omitted from the 'Total Rating' if Fineness (mtex) is shown !
** Short Fiber Content is omitted from the 'Total Rating' if Uniformity Index is entered !

Fig. 49

Utility Value of Cotton

Schlafhorst Model

Prepared for: **USDA - 1993 Crop** Date: 9/6/94

Properties			0 - Base Cotton		Waco, TX		Abilene, TX		Lubbock, TX		Lamesa, TX		Altus, OK	
	Source	Unit	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	4.60	---	4.40	---	4.10	---	4.20	---	4.30	---
Fineness	FMT	mtex	175.00	0	168.00	2.80	164.00	4.40	158.00	6.80	162.00	5.20	164.00	4.40
Maturity	FMT	%	80.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Length (UHM)	HVI	inch	1.10	0	1.07	- 1.20	1.05	- 2.00	1.05	- 2.00	1.05	- 2.00	1.04	- 2.40
Uniformity Index	HVI	UI	81.40	0	81.00	0.11	80.80	0.23	81.20	0.73	81.10	0.61	81.10	0.79
Short Fiber Content **	AFIS	% (W)	10.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Strength	HVI	g/tex	28.00	0	25.70	- 5.29	28.50	1.15	29.00	2.30	29.00	2.30	28.30	0.69
Elongation	HVI	%	6.50	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Color (Reflectance)	HVI	Rd	72.00	0	82.00	1.50	74.00	0.30	78.00	0.90	80.00	1.20	77.00	0.75
Color (Yellowness)	HVI	+b	10.00	0	8.80	0.60	10.20	- 0.10	10.00	0.00	9.00	0.50	9.20	0.40
Trash (area)	HVI	%	0.25	0	0.15	2.00	0.28	- 0.60	0.26	- 0.20	0.25	0.00	0.34	- 1.80
Dust	AFIS	count/gr	750.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Neps	AFIS	count/gr	300.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Stickiness	ThD | NIR	%	0.35	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Total Rating						0.52		3.38		8.53		7.81		2.83
Spot Price / lb	NYCE	US ¢		50.00		50.00		50.00		50.00		50.00		50.00
Premium / lb		US ¢			+	0.26	+	1.69	+	4.27	+	3.90	+	1.42
Discount / lb		US ¢			-	--	-	--	-	--	-	--	-	--
Utility Value / lb		US ¢		50.00		50.26		51.69		54.27		53.90		51.42
Spot Price / lb	NYCE	US ¢		70.00		70.00		70.00		70.00		70.00		70.00
Premium / lb		US ¢			+	0.36	+	2.37	+	5.97	+	5.46	+	1.98
Discount / lb		US ¢			-	--	-	--	-	--	-	--	-	--
Utility Value / lb		US ¢		70.00		70.36		72.37		75.97		75.46		71.98

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !

** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

Fig. 50

Utility Value of Cotton

Schlafhorst Model

Prepared for: **USDA - 1993 Crop** Date: 9/6/94

Properties			0 - Base Cotton		Waco, TX		Abilene, TX		Lubbock, TX		Lamesa, TX		Altus, OK	
	Source	Unit	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	4.60	---	4.40	---	4.10	---	4.20	---	4.30	---
Fineness	FMT	mtex	175.00	0	168.00	2.80	164.00	4.40	158.00	6.80	162.00	5.20	164.00	4.40
Maturity	FMT	%	80.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Length (UHM)	HVI	inch	1.10	0	1.07	- 1.20	1.05	- 2.00	1.05	- 2.00	1.05	- 2.00	1.04	- 2.40
Uniformity Index	HVI	UI	81.40	0	81.00	0.11	80.80	0.23	81.20		81.10	0.61	81.10	0.79
Short Fiber Content **	AFIS	% (W)	10.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Strength	HVI	g/tex	28.00	0	25.70	- 5.29	28.50	1.15	29.00	2.30	29.00	2.30	28.30	0.69
Elongation	HVI	%	6.50	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Color (Reflectance)	HVI	Rd	72.00	0	82.00	1.50	74.00	0.30	78.00	0.90	80.00	1.20	77.00	0.75
Color (Yellowness)	HVI	+b	10.00	0	8.80	0.60	10.20	- 0.10	10.00	0.00	9.00	0.50	9.20	0.40
Trash (area)	HVI	%	0.25	0	0.15	2.00	0.28	- 0.60	0.26	- 0.20	0.25	0.00	0.34	- 1.80
Dust	AFIS	count/gr	750.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Neps	AFIS	count/gr	300.00	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Stickiness	ThD | NIR	%	0.35	0	0.00	---	0.00	---	0.00	---	0.00	---	0.00	---
Total Rating						0.52		3.38		7.80		7.81		2.83
Spot Price / lb	NYCE	US ¢		60.00		60.00		60.00		60.00		60.00		60.00
Premium / lb		US ¢			+	0.31	+	2.03	+	4.68	+	4.68	+	1.70
Discount / lb		US ¢			-	--	-	--	-	--	-	--	-	--
Utility Value / lb		US ¢		60.00		60.31		62.03		64.68		64.68		61.70
Spot Price / lb	NYCE	US ¢		80.00		80.00		80.00		80.00		80.00		80.00
Premium / lb		US ¢			+	0.41	+	2.70	+	6.24	+	6.24	+	2.27
Discount / lb		US ¢			-	--	-	--	-	--	-	--	-	--
Utility Value / lb		US ¢		80.00		80.41		82.70		86.24		86.24		82.27

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !

** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

Fig. 51

Utility Value of Cotton

Schlafhorst Model

Prepared for: **USDA - 1993 Crop** Date: 9/6/94

Properties	Source	Unit	0 - Base Cotton Data	0 - Base Cotton Rating	El Paso, TX Data	El Paso, TX Rating	Phoenix, AZ Data	Phoenix, AZ Rating	Visalia, CA Data	Visalia, CA Rating	N/A Data	N/A Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	4.00	---	4.70	---	4.00	---				
Fineness	FMT	mtex	175.00	0	151.00	9.60	173.00	0.80	151.00	9.60				
Maturity	FMT	%	80.00	0	0.00	---	0.00	---	0.00	---				
Length (UHM)	HVI	inch	1.10	0	1.14	1.60	1.12	0.80	1.13	1.20				
Uniformity Index	HVI	UI	81.40	0	81.90	- 0.08	81.20	- 0.58	82.00	0.24				
Short Fiber Content **	AFIS	% (W)	10.00	0	0.00	---	0.00	---	0.00	---				
Strength	HVI	g/tex	28.00	0	29.30	2.99	27.50	- 1.15	31.00	6.90				
Elongation	HVI	%	6.50	0	0.00	---	0.00	---	0.00	---				
Color (Reflectance)	HVI	Rd	72.00	0	80.00	1.20	80.00	1.20	80.00	1.20				
Color (Yellowness)	HVI	+b	10.00	0	9.00	0.50	9.00	0.50	9.00	0.50				
Trash (area)	HVI	%	0.25	0	0.24	0.20	0.15	2.00	0.19	1.20				
Dust	AFIS	count/gr	750.00	0	0.00	---	0.00	---	0.00	---				
Neps	AFIS	count/gr	300.00	0	0.00	---	0.00	---	0.00	---				
Stickiness	ThD | NIR	%	0.35	0	0.00	---	0.00	---	0.00	---				
Total Rating						16.01		3.57		20.84				
Spot Price / lb	NYCE	US ¢		50.00		50.00		50.00		50.00				
Premium / lb		US ¢			+	8.01	+	1.79	+	10.42	+		+	
Discount / lb		US ¢			-	--	-	--	-	--	-		-	
Utility Value / lb		US ¢		50.00		58.01		51.79		60.42				
Spot Price / lb	NYCE	US ¢		70.00		70.00		70.00		70.00				
Premium / lb		US ¢			+	11.21	+	2.50	+	14.59	+		+	
Discount / lb		US ¢			-	--	-	--	-	--	-		-	
Utility Value / lb		US ¢		70.00		81.21		72.50		84.59				

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !
** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

Fig. 52

Utility Value of Cotton

Schlafhorst Model

Prepared for: **USDA - 1993 Crop** Date: 9/6/94

Properties	Source	Unit	0 - Base Cotton Data	0 - Base Cotton Rating	El Paso, TX Data	El Paso, TX Rating	Phoenix, AZ Data	Phoenix, AZ Rating	Visalia, CA Data	Visalia, CA Rating	N/A Data	N/A Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	4.00	---	4.70	---	4.00	---				
Fineness	FMT	mtex	175.00	0	151.00	9.60	173.00	0.80	151.00	9.60				
Maturity	FMT	%	80.00	0	0.00	---	0.00	---	0.00	---				
Length (UHM)	HVI	inch	1.10	0	1.14	1.60	1.12	0.80	1.13	1.20				
Uniformity Index	HVI	UI	81.40	0	81.90	- 0.08	81.20	- 0.58	82.00					
Short Fiber Content **	AFIS	% (W)	10.00	0	0.00	---	0.00	---	0.00	---				
Strength	HVI	g/tex	28.00	0	29.30	2.99	27.50	- 1.15	31.00	6.90				
Elongation	HVI	%	6.50	0	0.00	---	0.00	---	0.00	---				
Color (Reflectance)	HVI	Rd	72.00	0	80.00	1.20	80.00	1.20	80.00	1.20				
Color (Yellowness)	HVI	+b	10.00	0	9.00	0.50	9.00	0.50	9.00	0.50				
Trash (area)	HVI	%	0.25	0	0.24	0.20	0.15	2.00	0.19	1.20				
Dust	AFIS	count/gr	750.00	0	0.00	---	0.00	---	0.00	---				
Neps	AFIS	count/gr	300.00	0	0.00	---	0.00	---	0.00	---				
Stickiness	ThD | NIR	%	0.35	0	0.00	---	0.00	---	0.00	---				
Total Rating						16.01		3.57		20.60				
Spot Price / lb	NYCE	US ¢		60.00		60.00		60.00		60.00				
Premium / lb		US ¢			+	9.61	+	2.14	+	12.36	+		+	
Discount / lb		US ¢			-	--	-	--	-	--	-		-	
Utility Value / lb		US ¢		60.00		69.61		62.14		72.36				
Spot Price / lb	NYCE	US ¢		80.00		80.00		80.00		80.00				
Premium / lb		US ¢			+	12.81	+	2.86	+	16.48	+		+	
Discount / lb		US ¢			-	--	-	--	-	--	-		-	
Utility Value / lb		US ¢		80.00		92.81		82.86		96.48				

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !
** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

Fig. 53

Utility Value of Cotton

Schlafhorst Model

Prepared for: **USDA - 1993 US Crop Average** Date: 9/6/94

Properties			0 - Base Cotton		1993 US Crop Average		N/A		N/A		N/A			
	Source	Unit	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	4.35	---								
Fineness	FMT	mtex	175.00	0	166.00	3.60								
Maturity	FMT	%	80.00	0	0.00	---								
Length (UHM)	HVI	inch	1.10	0	1.09	- 0.24								
Uniformity Index	HVI	UI	81.40	0	81.50	0.28								
Short Fiber Content **	AFIS	% (W)	10.00	0	0.00	---								
Strength	HVI	g/tex	28.00	0	28.50	1.15								
Elongation	HVI	%	6.50	0	0.00	---								
Color (Reflectance)	HVI	Rd	72.00	0	77.00	0.75								
Color (Yellowness)	HVI	+b	10.00	0	9.20	0.40								
Trash (area)	HVI	%	0.25	0	0.29	- 0.80								
Dust	AFIS	count/gr	750.00	0	0.00	---								
Neps	AFIS	count/gr	300.00	0	0.00	---								
Stickiness	ThD | NIR	%	0.35	0	0.00	---								
Total Rating						5.14								
Spot Price / lb	NYCE	US ¢		50.00		50.00								
Premium / lb		US ¢			+	2.57	+		+		+		+	
Discount / lb		US ¢			-	--	-		-		-		-	
Utility Value / lb		US ¢		50.00		52.57								
Spot Price / lb	NYCE	US ¢		70.00		70.00								
Premium / lb		US ¢			+	3.60	+		+		+		+	
Discount / lb		US ¢			-	--	-		-		-		-	
Utility Value / lb		US ¢		70.00		73.60								

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !

** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

Fig. 54

Utility Value of Cotton

Schlafhorst Model

Prepared for: **USDA - 1993 US Crop Average** Date: 9/6/94

Properties			0 - Base Cotton		1993 US Crop Average		N/A		N/A		N/A			
	Source	Unit	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating	Data	Rating
Micronaire *	HVI	mic	4.20	0	4.35	---								
Fineness	FMT	mtex	175.00	0	166.00	3.60								
Maturity	FMT	%	80.00	0	0.00	---								
Length (UHM)	HVI	inch	1.10	0	1.09	- 0.24								
Uniformity Index	HVI	UI	81.40	0	81.50	0.28								
Short Fiber Content **	AFIS	% (W)	10.00	0	0.00	---								
Strength	HVI	g/tex	28.00	0	28.50	1.15								
Elongation	HVI	%	6.50	0	0.00	---								
Color (Reflectance)	HVI	Rd	72.00	0	77.00	0.75								
Color (Yellowness)	HVI	+b	10.00	0	9.20	0.40								
Trash (area)	HVI	%	0.25	0	0.29	- 0.80								
Dust	AFIS	count/gr	750.00	0	0.00	---								
Neps	AFIS	count/gr	300.00	0	0.00	---								
Stickiness	ThD | NIR	%	0.35	0	0.00	---								
Total Rating						5.14								
Spot Price / lb	NYCE	US ¢		60.00		60.00								
Premium / lb		US ¢			+	3.09	+		+		+		+	
Discount / lb		US ¢			-	--	-		-		-		-	
Utility Value / lb		US ¢		60.00		63.09								
Spot Price / lb	NYCE	US ¢		80.00		80.00								
Premium / lb		US ¢			+	4.12	+		+		+		+	
Discount / lb		US ¢			-	--	-		-		-		-	
Utility Value / lb		US ¢		80.00		84.12								

* Micronaire is omitted from the ' Total Rating ' if Fineness (mtex) is shown !

** Short Fiber Content is omitted from the ' Total Rating' if Uniformity Index is entered !

Fig. 55