GIN PROCESS CONTROL FOR MARKET ADVANTAGE

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In preparing this talk, I was reminded of the industry goal presented by the National Cotton Council to increase the net value of U.S. cotton production by ten cents per pound.

Increase Value of U.S. Cotton Production by Ten Cents Per Pound

There are several ways this could happen.

We could hope for ten cents more in Government Subsidy Payments, but who believes we can count on anything but less from Washington?

Or, the New York Futures Market could go up ten cents. This would likely result only from a large decrease in U.S. plantings, and not be good for those segments of the cotton industry dependent on bales of production for profitability. Also, given our global, free trade economy, how much U.S. reduction would be planted elsewhere in the world, offsetting some of any increase in the market.

I have identified three other possibilities that we have more control over, and I believe a much greater likelihood of achieving:

Breakeven Yield @ $0.65	Production Cost Reduction Goal
400 pounds	$ 40
600 pounds	$ 60
800 pounds	$ 80
1,000 pounds	$100

The first of these is to reduce the cost of production by ten cents per pound. Here we see different breakeven yields in the left column, and in the right column what must be cut per acre to effect a ten cent production cost reduction.

Added Fiber Value to the Spinner

	TODAY	TOMORROW
NYCE	**.72**	**.72**
Basis and Grade	**- .07** (discount)	**+ .03** (premium)
Net to the grower	**.65**	**.75**

Another possibility would be to increase the value of our cotton fiber to the textile manufacturer, assuming that at least ten cents of the added value is reflected in an improved basis, reduced quality discounts, or increased quality premiums to the grower.

Breakeven Yield @ $0.65	Yield Increase *Necessary To Reach* Goal
400 pounds	62 pounds
600 pounds	92 pounds
800 pounds	123 pounds
1,000 pounds	154 pounds

The third would be to increase yields by ten cents per pound. Here we see different breakeven yields in the left column, and in the right column the yield increase necessary to effect a ten cent per pound net value increase.

Increase Cotton Productions Value to the Grower By Ten Cents per Pound Through

1. **Government subsidy increased**
2. **NYCE increased**
3. **Production cost reduced**
4. **Cotton fiber's spinning value increased**
5. **Yield increased**

To meet the Council's ten cent challenge, we will have to see benefit from more than one of these possibilities, but I have deleted counting on the Government or increased New York price as either highly unlikely, or undesirable to gins, warehouses, merchants and spinners. Number three is being dealt with through cotton production technologies, and is outside my limited area of knowledge.

GIN TECHNOLOGY = **ADDED VALUE TO SPINNER**
+ INCREASED YIELD PER ACRE
MORE NET $ TO GROWER

Therefore, I will focus on cotton ginning technologies we have implemented over the past four years that have increased the cotton's value to the spinner and grower, and increased the grower's yield. What is so exciting to me is that much of what we have done at Servico can now be implemented by others.

Servico first attempted to increase growers net production value in 1993 by ginning some of the smooth leaf cotton with only one stage of lint cleaning.

Intitial Attempt to Improve Quality

The results of this first year of very limited process machinery control, coupled with a growing frustration among some textile manufacturers about fiber damage resulting from the gin process, convinced me that the gin process could be improved as demanded by the market.

USDA Stoneville Ginning Laboratory's Gin Process Control System Installed in Servico in 1994

The following year, 1994, we entered into a Cooperative Research and Development Agreement with the USDA Cotton Ginning Laboratory in Stoneville, Ms. Under this

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agreement, Servico would install and help develop a computer driven technology designed to automatically control the amount of cleaning and heat we expose the cotton to, based on quality measurements made on line. This technology, known as the Gin Process Control System, had been invented and under development for several years by the Stoneville Lab, under the direction of Stanley Anthony.

Though the system had already been experimented with by two commercial gins, Westlake in California and Burdett in Mississippi, Servico's was the first capable of changing the flow of cotton either through or around lint cleaners automatically, and without momentarily stopping the flow of cotton.

USDA Licenses Gin Process Control System to Zellweger Uster-makers of HVI

In 1996, USDA licensed the Gin Process Control System to Zellweger Uster. Zellweger Uster is the Knoxville, Tennessee, based company that makes all the High Volume Instruments used by our classing offices to grade your cotton.

Uster's Intelligin

System of Automatic Gin Process Control

Since then, Uster has been working cooperatively with USDA and Servico to develop the technology, and plans to introduce it on a very limited basis this year under the brand name IntelliGin.

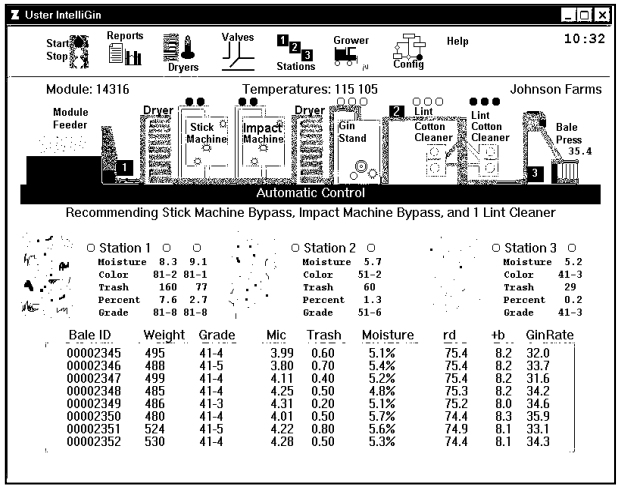

Figure 1. Uster Intelligin Control Screen

What you see here is the IntelliGin Control Screen used by the ginner. The top portion is a menu used by the ginner to bring up different screens which allow him to change the system mode, look at previous data, change the target process moisture, monitor the sampling stations, access detailed grower information, change the system configuration, or pull up a help menu.

The next section of the screen is a simple flow diagram of the gin with emphasis given to those machines or processes which can be controlled.

The same kind of video cameras used to grade your cotton by the Classing Offices are located at three different places in the cotton gin, and are identified by the red squares in the flow diagram numbered 1, 2, and 3. These work with automatic samplers and moisture sensors to constantly make measurements of the cotton's color, leaf content and moisture.

The first sampling station is before any drying or cleaning takes place. These measurements, which are displayed on the screen next to a picture of the cotton being sampled, are transmitted by radio frequency to the IntelliGin computer for analysis.

When the system is in the Automatic Control mode, the recommendation to, in this case, bypass the Stick Machine and Impact Cleaner is implemented automatically, and indicated on the monitor by the machine name being displayed in red. Based on the measurements made at Station 1 automatic dryer adjustments are also made to compensate for changes in the moisture of the cotton in the module.

The second sampling station is after all drying and precleaning, and after the seed has been removed by the gin stand. This is just before the cotton is fed into the lint cleaner. These measurements are used by the decision software to adjust the amount of drying and precleaning, and to determine how many lint cleaners should be used to meet the desired leaf level.

The third and final sampling station is just before the cotton enters the bale press. This measurement is used as a quality control check in that if the predicted grade is not made, the IntelliGin computer will change its drying and or cleaning decisions in an attempt to hit the quality target.

The bottom section of the screen displays the bale ID or bale number, the bale weight, average bale grade as measured by the third sampling station, and Micronaire, which is measured at the press off line. The trash number displayed is converted to a leaf level number like you are accustomed to seeing from the Classing Office. Displayed next is the moisture level, rd or reflectance and +b which is the yellowness of the cotton, and finally the speed in bales per hour at which the gin was running.

Servico now has four seasons of experience, and each beginning with 1994 has proved and improved the systems functionality and benefit. Similar to most computer and computer software systems, we have implemented several improved component versions, including three different generations of cameras, on going updates to the software, two different generations of computer hardware, operator

interfaces, moisture sensors, and samplers, to say nothing of radio frequency data transmission, and expanded and improved overall process control.

Gin Process Control System's Benefits

What are the dollar benefits of the system compared to before the system?

Our base line will be a conventionally ginned pre 1994 bale of cotton that because of a light spot discount and market basis was invoiced by the grower to the merchant for a net 65 cents.

For this example, we will discuss one bale of cotton. I will use a bale that experienced the greatest dollar benefit, but I want you to understand that not every bale should or can be processed minimally. Every bale can, however, be processed optimally, and therefore value added by controlling the gin process.

3% higher process moisture = 15 pounds

This bale would have, prior to IntelliGin, been ginned at three percentage points dryer process moisture. Three percent times a 500 pound bale equals 15 additional pounds.

3% higher process moisture	**= 15 pounds**
four fewer precleaners	**= 16 pounds**

Servico would have processed this cotton over four additional precleaners, which take out about four pounds each, or 16 additional pounds.

		GAIN
3% higher process moisture	**=**	**15 pounds**
four fewer precleaners	**=**	**16 pounds**
reduced/minimal lint cleaner	**=**	**20 pounds**
TOTAL ADDITIONAL WEIGHT		***51 POUNDS***

Servico would have used two conventional saw type lint cleaners, but this bale was processed with greatly reduced lint cleaning. In this example, the additional yield resulting from process optimization is 51 pounds.

		PREMIUMS
strength premium	**=**	**100 points**
length premium	**=**	**50 points**
uniformity premium	**=**	**50 points**
TOTAL PREMIUM		***200 POINTS***

Next, because we have the IntelliGin system, we are now selling directly to a textile manufacturer, who is very interested in certain fiber properties. This spinner believes controlling the gin process for optimization can result in longer, stronger, more uniform cotton with less short fiber content, and he is willing to pay a 200 point premium for these characteristics.

Though we have experienced a 51 pound gain and picked up a 200 point premium for quality, the bale could be classed and subject to additional discounts for leaf, color, and preparation if value is based on the traditional CCC Loan Discount and Premium Schedule.

		MILL DISCOUNTS
preparation discounts	**=**	**NONE**
classer 42 was HVI 41	**=**	**NONE**
5 level leaf valued as 4	**=**	**NONE**
TOTAL DISCOUNT	**=**	***NONE***

But this is a smart spinner, and so not to discourage fiber quality degradation resulting from traditional Loan Schedule valuation, he charges no preparation discount, buys based on the HVI color reading, and values a 5 level leaf as though it was a 4.

Traditional merchant basis	**= 250 points off Dec**
Mill basis (variety specific)	**=+100 points on Dec**
	350 points
Additional storage costs	**= -120 points**
NET INCREASE	***= 230 POINTS***

To top it all off, the 100 points on the market paid to the grower is 350 points more than the 250 basis points off the market he received previously. However, the grower must pay an additional 120 points of storage costs associated with year round shipments, so the net improvement in basis to the grower is 230 points.

51 pounds of additional lint at 69.3 cents	**=**	**$35.34**
200 points quality premium	**=**	**10.00**
230 points improved basis	**=**	**11.50**
TOTAL ADDED VALUE	**=**	**$56.84**

Adding all these together, the grower netted an additional $56.84. Though every bale did not experience this maximum gain, every bale did experience significant gain, with the least being around $27.00.

The spinner is giving up the value of the many services supplied by the merchant, such as market risk management, assuming quality risk, delivery management, and more, yet still willing to pay the grower roughly the same, as if those services were still being provided. Why? The reason is that the spinner anticipates other value, specifically improvements in certain fiber properties.

% of Total Bales Measured Through 12/18/97

	Length				Uniformity			
	<=34	35-36 %	>=37	Average in 32nd	77-79	80-82 %	83-85	Average
Birmingham Classing Office	24	58	18	35.4	9	77	14	81.2
Servico	1	29	70	36.6	1	44	55	82.5

Figure 2.

This table compares the length and uniformity expressed as a percent of the total bales classed at the Birmingham Classing Office in the first row, and in the second row, I've broken out those bales classed by Birmingham for Servico. We were significantly longer, and more uniform, which are two of the important quality categories the spinner is encouraging us to produce through the payment of a premium.

% of Total Bales Measured
Through 12/18/97

	Length				Uniformity			
	<=34	35-36 %	>=37	Average in 32nd	77-79	80-82 %	83-85	Average
Birmingham Classing Office	24	58	18	35.4	9	77	14	81.2
Servico	1	29	70	36.6	1	44	55	82.5
Visalia	1	53	46	36.3	0	62	38	82.3

Figure 3.

In this table I have added the results of Acala cotton classed at the Visalia, California, Classing Office and am very pleased to report that Servico is longer and more uniform than the average of California.

Servico also averaged over one (1) grams per tex (gpt) stronger than Birmingham, and based on measurements made independently by both Zellweger Uster and the spinner, we produced significantly fewer short fibers and neps.

Parkdale Mills has conducted spinning trials of Servico cotton, which will be reported Thursday morning by Parkdale's Gene Frye in both the Cotton Ginning Conference and the Cotton Textile Processing Conference. In addition to Gene's reports, Gordon Williams with Zellweger Uster will report the results of tests made by the Institute for Textile Technology during the Cotton Ginning Conference Thursday morning.

In closing, I want to give the credit for our success to Servico's owners and associates, our grower and spinner customers, the Stoneville Cotton Ginning Research Laboratory, and Zellweger Uster.

Let me suggest that the most significant advantage we have in America over the rest of the world is our access to technology, but if the technology we have available goes unused it is no advantage at all, and in fact, over time could become a disadvantage.

Fiber's Quality Value Expressed Through Market Price
\+ Grower Demand for Fiber Quality Preservation Driven Ginning
\+ Gin Management Focused on both Grower & Spinner Needs
\+ Implementation of IntelliGin & Other Available Technologies
\+ Stepped up Gin Research Efforts
Will Result in Exceeding the Ten Cent Challenge

The advent of **market related fiber quality valuation**, will lead to **grower demand for fiber quality focused gin processing**. This in turn will result in a **change from time quantity based ginning to fiber quality based ginning** through the **implementation of gin process control used to optimize both grower and spinner value**. These four components, which happen to have been the key components of this presentation, coupled with **continuing and increased research efforts**, will guarantee cotton's future in American Agriculture.