Module Averaging and Individual Bale Classing: A Study of 1993 Results from a South Texas Gin

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Abstract

This paper examines the impact module averaging would have had on producers whose cotton was processed at a South Texas gin during the 1993 season. A test was also carried out to see if cotton processed at this South Texas gin had a statistically significant different CCC loan price level by farm. For the 9,341 bales ginned and classified using module averaging, the module averaging method would have resulted in an increase in loan value of 0.16% over all farms. The largest increase in per farm loan gross revenues was 1.01%, with the largest percentage decrease in gross loan revenues being a -1.86% change. Forty-five of the 64 farms included in the study would have experienced increased gross loan revenues under module averaging. Results support the conclusion that differences between CCC loan prices received by farms are statistically significant.

Introduction

Module/Trailer Averaging was introduced by the Cotton Division of the Agricultural Marketing Service (AMS) in 1991 as a means to improve the accuracy of high volume, precision instrument (HVI) strength readings. An increasing amount of cotton was classed under the module average system for HVI measurements during the 1992 and 1993 seasons (Table 1) (USDA-AMS). Module averaging is currently being used to measure micronaire, length, length uniformity, color(Rd), color(+b) and trash content in addition to strength. AMS studies for the 1993 crop demonstrated that the repeatability (accuracy) of HVI measurements using module averaging were superior to that of single bale HVI classing (Table 2) (USDA-AMS).

As would be expected, this change in the method of classing cotton has generated a great deal of interest within the cotton industry as to the economic impact of the new system. Many of the producer questions asked regarding module average classing are typically "Would I be better off having my cotton classed using module averaging". Like most questions involving economics, the answer is "It depends". As stated before, the main benefit of module-averaging is that it should improve the repeatability of HVI measurements over individual bale classing. If the cotton within the module is representative of the cotton within each bale, module averaging should provide a more accurate assessment of the fiber quality measurements.

This paper examines the impact module averaging would have had on producers whose cotton was processed at a South Texas gin during the 1993 season. Comparisons are made of each HVI measurement between individual bale classing and module average classing for 9,341 bales ginned and subject to module averaging at that location during the 1993 season. This paper includes an analysis of the change in cotton loan values by individual farm when going from individual bale classing to module average classing. In addition, a test was carried out to see if cotton processed at the gin had a statistically significant different CCC loan price level by farm.

During the 1993 season, a total of 9,494 bales were ginned at this location. Out of the 9,494 bales ginned, 9,341 bales were module averaged, with 153 outliers individually classed that accounted for 1.6% of the total bales ginned. In the following analysis, only the 9,341 bales that were module averaged are included for comparison purposes.

Results and Discussion

The initial step in this study consisted of determining the distribution of strength, length, length uniformity, micronaire, color(Rd) and color(+b) readings for cotton classed as individual bales and module averaged. The number of bales individually classed for strength that fell below 23.4 grams per tex, (cotton subject to CCC loan discount) was 811 bales, or 8.7% of the total. The number of individually classed bales that had strength measurement that met or exceeded 25.5 grams per tex (cotton that was subject to a CCC loan premium) was 6,411 bales, or 68.6% of the total. Strength measurements for individually classed bales ranged from a minimum of 18.7 grams per tex to a maximum of 33.1 grams per tex, with an average of 26.53 grams per tex. The number of bales that were module averaged and had strength measurements falling below 23.4 grams per tex was 548 bales, making up 5.9% of the total. The number of bales classed with module averaging with strength measurements in excess of 25.5 grams per tex was 6,718, or 71.2% of the total. Module averaging resulted in 263 fewer bales (2.8% of the total) being subject to CCC loan strength discounts, and an additional 307 bales (3.3% of the total) being eligible for strength premiums. The distributions of individually classed strength and the module averaged readings are shown in Figure 1.

Length measurements for individually classed cotton ranged from 0.96 inches to 1.16 inches, with an average length measurement of 1.05 inches. Cotton length measurements for individually classed cotton subject to CCC loan discounts (<1.05 inches) were 3,833 bales, or 41% of the total. Of the bales individually classed, 2,029 were at or above the premium range of 1.08 inches, representing 21.7% of the total ginned. Length measurements for module averaged classed cotton ranged from 0.99 inches to 1.13 inches, with an average length of 1.05 inches. The module averaged classification resulted in 3,538 bales, or 37.9% of the total with length measurements less than 1.05 inches. Of the bales classified using module averaging, 1,740 were at or above the premium range of 1.08 inches, representing 18.6% of the total. Distributions of individually classed length and the module averaged readings are shown in Figure 2.

Micronaire readings for individually classed bales ranged from 2.9 to 5.5, with an average reading of 4.298. Individual bales classed with micronaire readings at or below 3.4 totaled 114 bales ginned, falling into the CCC loan discount. Individual bales classed with micronaire readings 5.0 or greater were 517 bales, which is also subject to CCC loan discount, or 5.5% of the total bales ginned. Micronaire readings for module averaged cotton ranged from a minimum of 3.0 to a maximum of 5.3, with an average reading of 4.3. Nineteen of the module averaged bales had micronaire readings below 3.4, falling into the CCC loan discount. Module averaged classed bales with micronaire readings of 5.0 or higher were 483 bales, or 5.2% of the total. Module averaging resulted in an additional 129 bales (1.4% of the total) being classed in the micronaire base range when compared with individual bale classing. Distributions of individually classed micronaire and the module averaged readings are shown in Figure 3.

Length uniformity measurements for individually classed bales ranged from a minimum of 78 to a maximum of 84, with an average of 80.73. Length uniformity measurements for module averaged classed bales ranged from a minimum of 78 to a maximum of 83, with an average of 80.75. Module averaging would have resulted in 9,252 bales being classified in the intermediate and above degree of uniformity (99% of the total), while individual bale classing would have resulted in 8,549 bales (91.5% of the total) being in the intermediate and above degree of uniformity range. Distributions of individually classed strength uniformity measurements and the module averaged readings are shown in Figure 4.

Color(Rd) measurements for individually classed bales ranged from a minimum of 63 to a maximum of 81, with an average of 74.65. Color(Rd) measurements for module averaged classed cotton ranges from a minimum of 64 to a maximum of 80, with an average of 74.67. Distributions of individually classed Color(Rd) measurements and the module averaged readings are shown in Figure 5.

Color(+b) measurements for individually classed bales ranged from a low of 6.6 to a maximum of 10.5, with an average of 8.496. Color(+b) measurements for module averaged classed bales ranged from a minimum of 7.4 to a high of 10.0, with an average of 8.5. Distributions of individually classed Color(+b) measurements and the module averaged readings is shown in Figure 6. Color grade distributions for individually classed and module averaged bales are shown in Figure 7.

The change in loan values for all cotton ginned by farm are shown in Table 3. For the 9,341 bales ginned and classified using module averaging, the module averaging method resulted in an increase in loan value of 0.16% over all farms. The largest increase in per farm loan gross revenues was 1.01% using module averaging. The largest percentage decrease in gross loan revenues per farm was -1.86% using module averaging. Forty-five of the 64 farms included in the study would have experienced increased gross loan revenues under module averaging.

In addition to the main objective of this study, a test was proposed to see if loan prices determined using individual bale classing was different between producers. To see if per bale cotton loan prices were different by farm, an analysis of variance procedure was carried out using farm number as a class variable. The results showed that the farm class model was highly significant, with an F-value of 114.43 with 63 and 9,493 degrees of freedom. The farm class model explained 43.3% of the variation in the per bale loan values. These results support the conclusion that even within a relatively small cotton production region with homogenous soil types and climatic conditions, management differences between farms as measured by the CCC loan discount/premium schedule are statistically significant.

Acknowledgements

The authors would like to express their appreciation to Mr. Jerome Boyd, AMS-USDA for his help in reviewing this paper.

References

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Table 1. Module averaged cotton by crop in the United States.

Crop year	Number of gins	Number of bales module/trailer averaged	Percent of bales classed
1991	99	1.2 Million	8
1992	212	2.2 Million	15
1993	242	3.1 Million	20

Table 2. Reproducibility of results for individual bale vs. module average classing for the 1993 U.S. cotton crop.

	% Reproducibility	
HVI measurement	**Individual bale percent vs.**	**Module/trailer average percent**
Micronaire	76	80
Strength	69	79
Length	74	86
Uniformity	80	90
Color (Rd)	88	89
Color (+b)	90	95
Trash (% area)	80	88

Table 3. Loan value of module averaged cotton vs. individual classing by farm.

Farm	Bales	Dollar value: Module averaged	Dollar value: Individually classed	Change	Percent change
1	125	30,367.36	30,176.74	190.62	0.63%
2	271	68,939.14	68,904.29	34.85	0.05%
3	218	53,715.76	53,566.31	149.45	0.28%
4	49	11,885.40	11,932.45	-47.05	-0.39%
5	55	14,443.19	14,424.77	18.42	0.13%
6	37	9,103.18	9,079.44	23.74	0.26%
7	60	15,849.32	15,824.68	24.64	0.16%
8	56	14,135.69	14,088.54	47.15	0.33%
9	522	137,798.73	137,551.87	246.86	0.18%
10	21	5,254.20	5,280.74	-26.54	-0.50%
11	58	14,491.99	14,353.94	138.05	0.96%
12	5	1,280.71	1,274.06	6.65	0.52%
13	28	7,051.70	7,007.38	44.32	0.63%
14	159	39,643.99	39,518.22	125.77	0.32%
15	60	15,360.46	15,449.46	-89.00	-0.58%
16	76	19,982.65	20,121.60	-138.95	-0.69%
17	1657	427,622.64	427,705.31	-82.67	-0.02%
18	377	94,667.68	94,469.28	198.40	0.21%
19	273	73,536.66	73,526.73	9.93	0.01%
20	129	32,931.12	32,875.87	55.25	0.17%
21	287	72,145.35	72,117.54	27.81	0.04%
22	17	4,394.18	4,477.37	-83.19	-1.86%
23	72	18,085.78	18,301.86	-216.08	-1.18%
24	59	15,477.70	15,400.29	77.41	0.50%
25	70	18,257.08	18,224.10	32.98	0.18%
26	170	43,374.06	43,309.51	64.55	0.15%
27	597	156,945.01	156,656.34	288.67	0.18%
28	229	58,513.02	58,692.53	-179.51	-0.31%
29	260	64,437.33	64,264.35	172.98	0.27%

Table 3. Continued.

		Dollar value			
Farm	Bales	Module averaged	Individually classed	Change	Percent change
30	255	67,308.26	67,197.12	111.14	0.17%
31	79	18,826.93	18,685.25	141.68	0.76%
32	41	10,238.17	10,242.33	-4.16	-0.04%
33	141	30,933.34	30,958.35	-25.01	-0.08%
34	34	7,331.16	7,332.64	-1.48	-0.02%
35	25	5,813.20	5,791.31	21.89	0.38%
36	84	22,510.35	22,417.43	92.92	0.41%
37	116	28,973.37	28,932.18	41.19	0.14%
38	72	17,933.46	17,875.96	57.50	0.32%
39	20	4,869.38	4,863.04	6.34	0.13%
40	69	17,582.54	17,619.98	-37.44	-0.21%
41	77	16,461.45	16,481.84	-20.39	-0.12%
42	291	77,742.30	77,361.83	380.47	0.49%
43	117	30,745.58	30,798.14	-52.56	-0.17%
44	110	26,634.85	26,445.54	189.31	0.72%
45	45	10,599.65	10,572.31	27.34	0.26%
46	202	52,522.72	52,159.70	363.02	0.70%
47	75	19,974.26	19,973.30	0.96	0.00%
48	78	19,524.91	19,462.13	62.78	0.32%
49	44	11,047.25	11,105.64	-58.39	-0.53%
50	43	9,433.39	9,445.70	-12.31	-0.13%
51	284	74,913.84	74,504.65	409.19	0.55%
52	28	7,104.48	7,033.54	70.94	1.01%
53	55	14,647.63	14,566.26	81.37	0.56%
54	99	26,837.97	26,787.70	50.27	0.19%
55	40	10,573.52	10,596.74	-23.22	-0.22%
56	43	10,952.61	10,985.12	-32.51	-0.30%
57	14	3,467.80	3,440.01	27.79	0.81%
58	232	57,817.43	57,541.14	276.29	0.48%
59	58	14,310.39	14,358.43	-48.04	-0.33%
60	161	38,623.75	38,484.31	139.44	0.36%

Table 3. Continued.

		Dollar value			
Farm	Bales	Module averaged	Individually classed	Change	Percent change
61	91	22,611.19	22,542.85	68.34	0.30%
62	46	12,119.63	12,048.53	71.10	0.59%
63	57	15,164.99	15,068.05	96.94	0.64%
64	118	31,594.34	31,415.64	178.70	0.57%

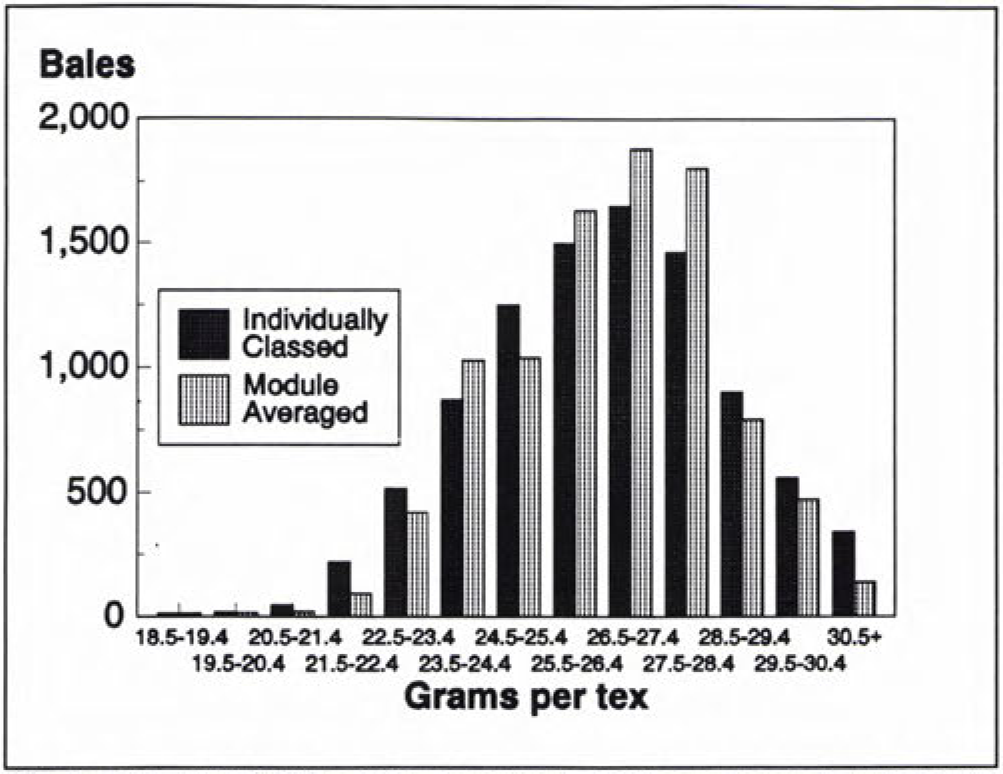

Figure 1. Individual bale and module averaged strength distributions.

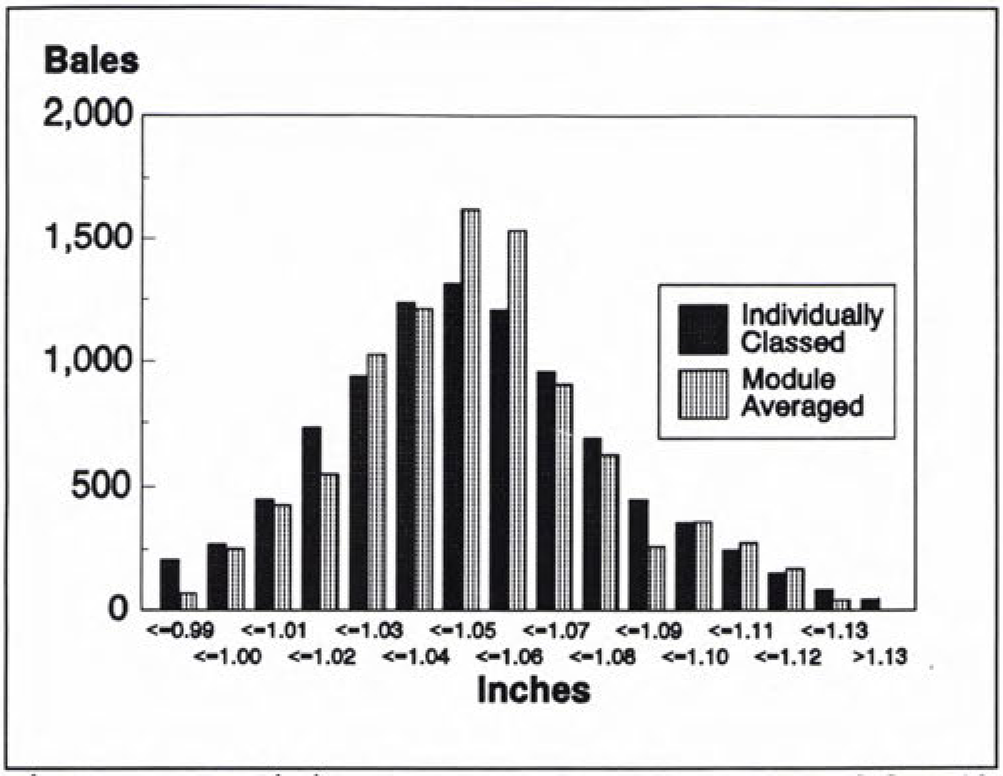

Figure 2. Individual bale and module averaged length distributions.

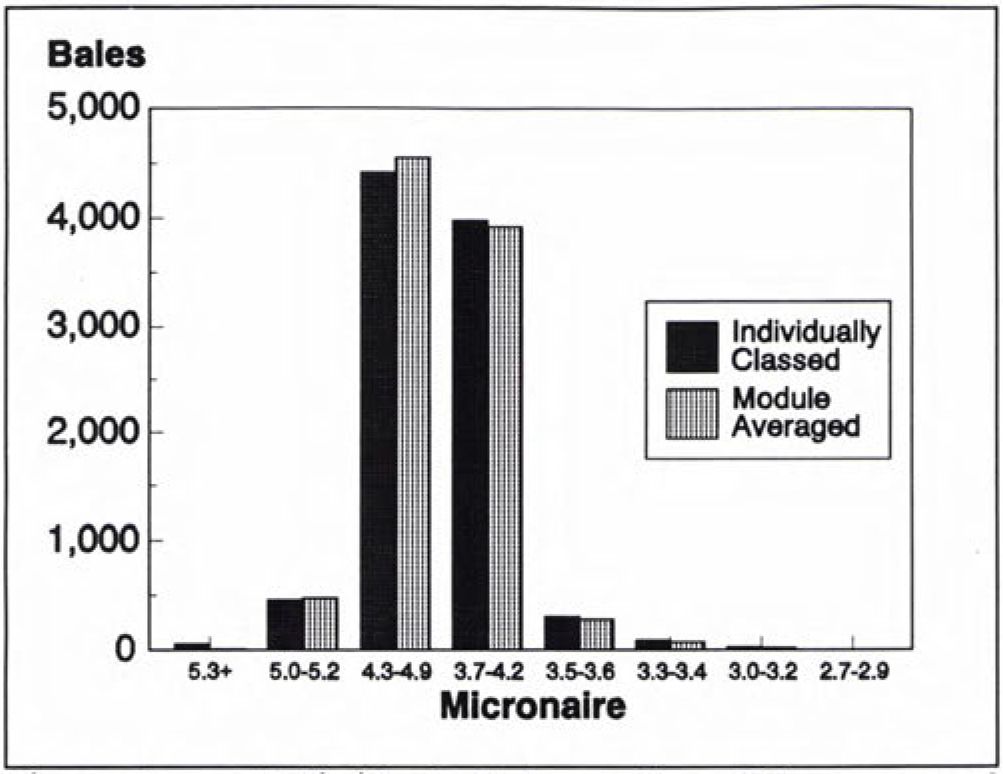

Figure 3. Individual bale and module averaged micronaire distributions.

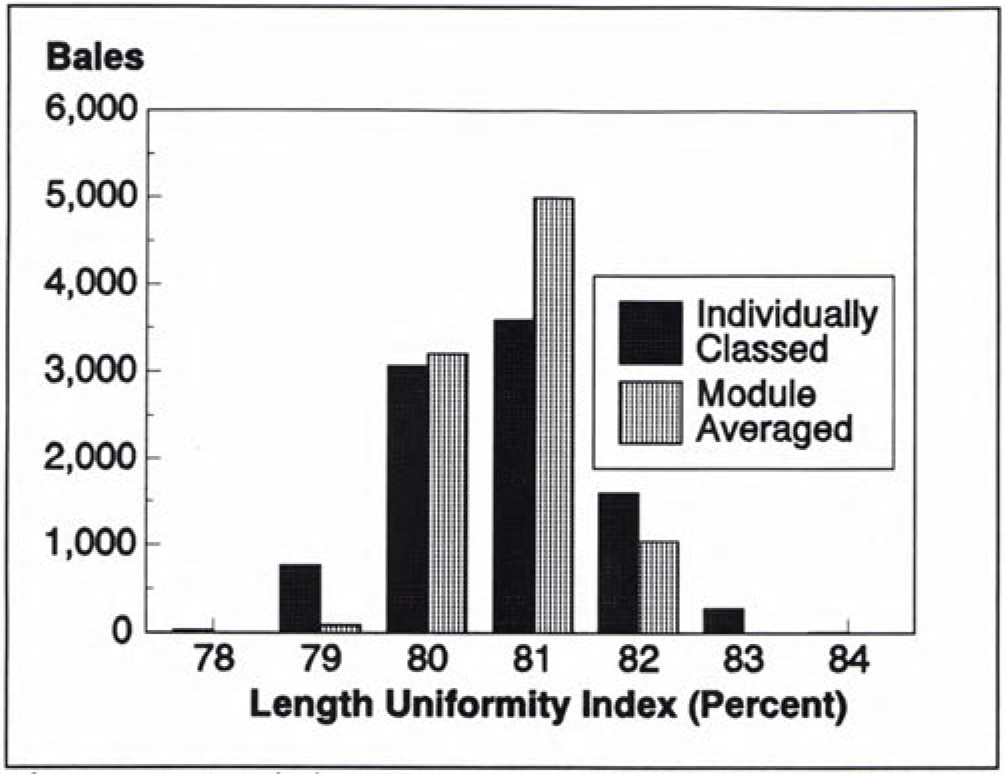

Figure 4. Individual bale and module averaged length uniformity distributions.

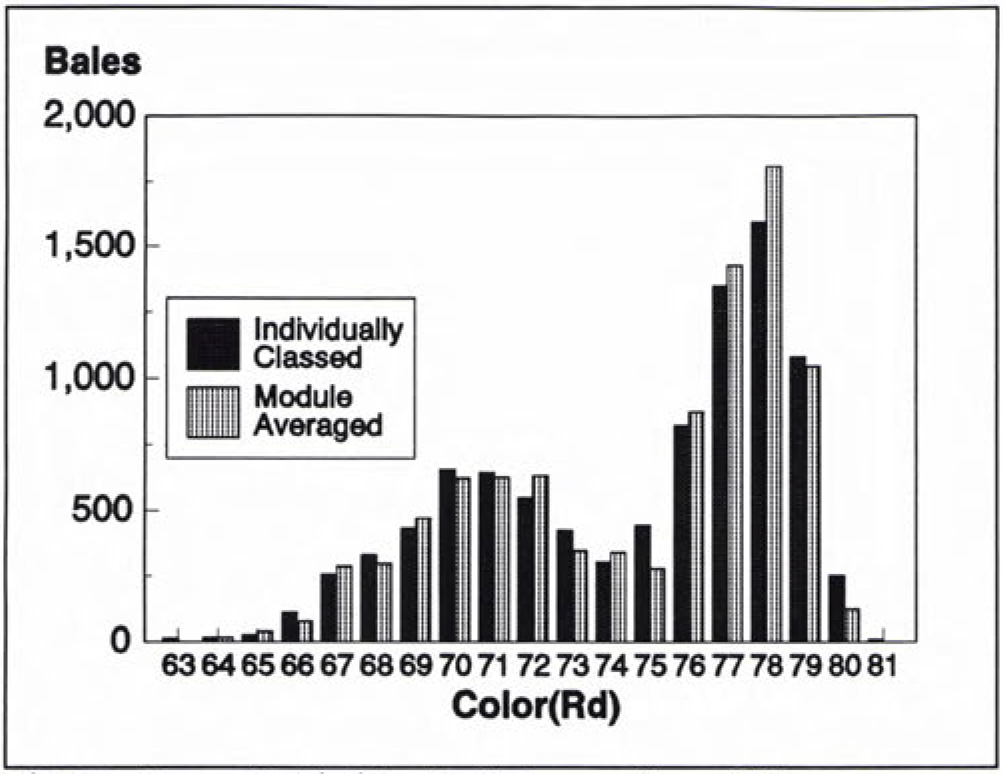

Figure 5. Individual bale and module averaged Color(Rd) distributions.

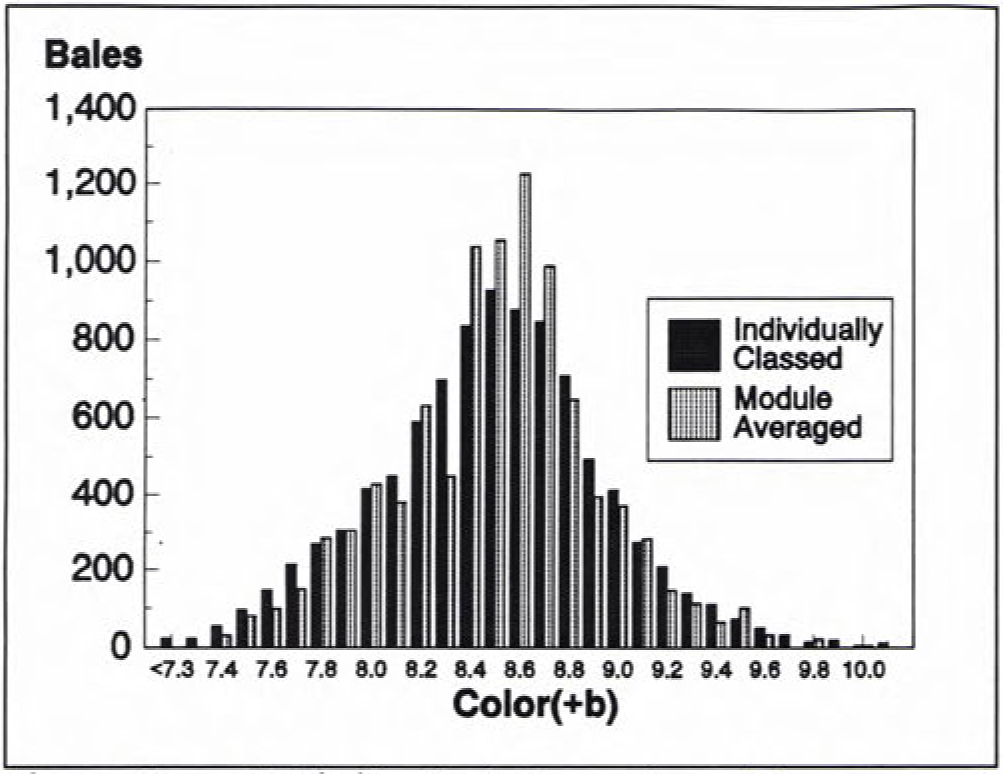

Figure 6. Individual bale and module averaged Color(+b) distributions.

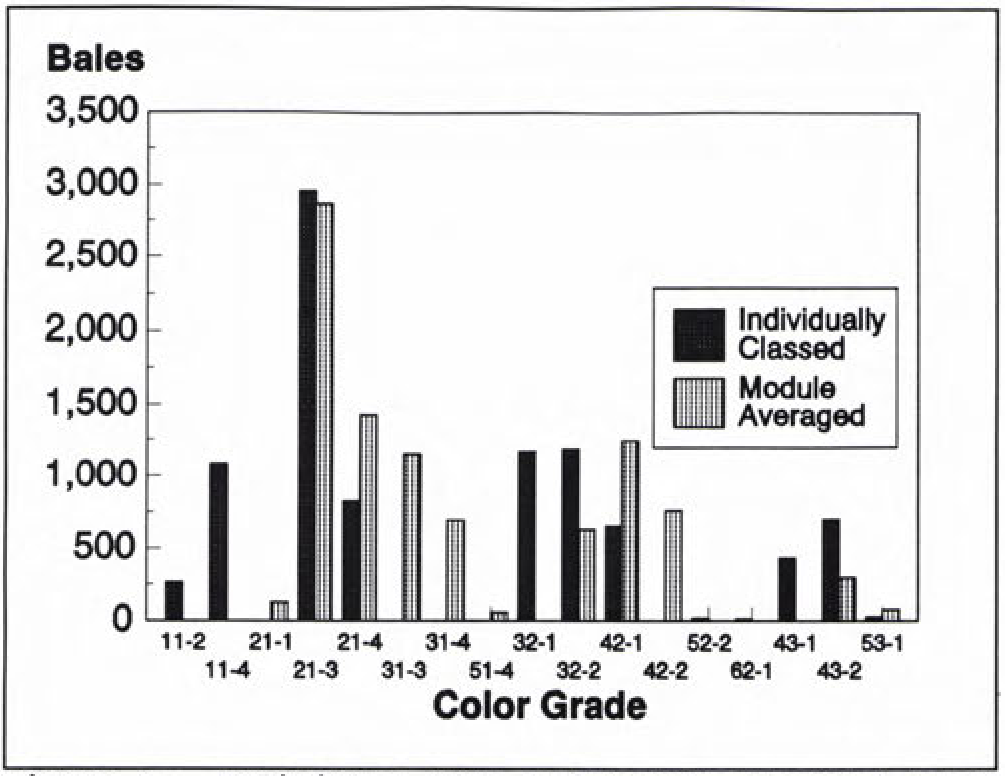

Figure 7. Individual bale and module averaged color grade distributions.