



Final Report

Off Farm Series | Cotton Research & Development Corporation

Part 1 - Summary Details

CRDC Project Number: CTFT 12a

Project Title: Standardisation of Classing: The objective measurement of colour and trash of Australian Cotton

Project Commencement Date: **Project Completion Date:** June 2005

CRDC Program: Off-Farm

Part 2 – Contact Details

Administrator: CSIRO
Organisation: Cotton Textile Research Unit, CSIRO Textile & Fibre Technology
Postal Address: Geelong
Ph: **Fax:** **E-mail:**

Principal Researcher: Marinus H.J van der Sluijs
Organisation: Cotton Textile Research Unit, CSIRO Textile & Fibre Technology
Postal Address: Geelong
Ph: **Fax:** **E-mail:**

Supervisor:
Organisation:
Postal Address:
Ph: **Fax:** **E-mail:**

Signature of Research Provider Representative: _____

Part 3 – Final Report Guide (due 31 October 2008)

Background

There is consensus both locally and internationally that the measurement of cotton grade i.e., colour, trash and grade, by the traditional subjective classing should be replaced with objective measurements by high volume instrumentation (HVI). There are however, a number of technical and operating issues to overcome before objective measurement of fibre properties is accepted with confidence by the cotton trade.

One measure is to allow the classing sector to be assessed independently via rigorous round-robin trials so that individual classing houses can correct technical and operational shortcomings in their HVI practice. In this way the industry as a whole can work towards a better prediction of Australian classing grade by HVI measurement. To this end the Cotton Classers Association of Australia (CCAA) has decided to conduct formalised round-robin trials with the results analysed and interpreted by CSIRO Textile and Fibre Technology. The aim of the trials is to identify and remedy any significant differences in colour and trash between classing houses and HVI lines (types).

An initial round-robin trial (Appendix 1) was conducted during August 2004 and involved five classing houses and a research institute. Nineteen HVI lines and 250 samples were tested on the basis of colour only. This trial found significant differences between classing houses rather than between HVI types.

The CCAA decided to conduct a follow up round-robin trial incorporating formal checks on HVI operating software and calibration procedure by an Uster technician and with the inclusion of HVI trash measurements. The results of this trial are reported here.

Methods

Initially 19 Uster HVI lines out of a total of 26 HVI lines that are installed in Australia were considered for this colour and trash round-robin trial. However, only 15* lines in six classing houses (Table 1) were considered fit for operation and able to be calibrated by the Uster technician.

Table 1 Details of HVI Lines participating in Round Robin Trial.

Classing House	Uster 900 A	Uster 900 SA	Uster Spectrum
Auscott Marketing			1
Australian Classing Services	4	1	
Dunavant Enterprises	2		
Paul Reinhart			1
Queensland Cotton	2	1	
Weil Brothers			1

Two hundred samples representing a wide range of grades were prepared by the CCAA for the trial. Each sample was tested as per the recommended CCAA procedure (Appendix 2).

Sample results were averaged on the basis of HVI line and classing house. HVI lines and classing houses were identified as being significantly different if their results were more than two standard deviations outside the grand sample average i.e., the average value of all 200 samples.

Calibration

The HVI lines that participated in this test were updated with the latest software (version 4.09a) so that algorithms used in HVI software to predict classing grade from the colour and trash measurements were similar irrespective of colorimeter and camera type Integrated in the HVI line.

The attending Uster technician confirmed all HVI lines were properly set up prior to sample testing and personally oversaw the sample testing procedures to ensure that all classing houses followed the same procedure.

Colour Calibration

HVI lines were initially calibrated with their own set of colour tiles. Once this was done a reading was taken with the USDA AMS reference white tile, which is used to calibrate or check the percent reflectance (Rd). Deviations from the standard value of this tile for each HVI line are plotted in Figure 1. The bold red line in the Figure represents the standard Rd value (78.1) of the USDA AMS reference tile.

USDA calibration tolerances are +/-L00 Rd units; Figure 1 indicates that HVI lines 4,10 and 16 recorded significantly lower results and HVI lines 7,8 and 9 recorded significantly higher Rd readings. The higher recorded values for HVI lines 7, 8 and 9 were expected as these HVI lines represent the Uster Spectrum HVI lines that have colorimeters with a brighter light source.

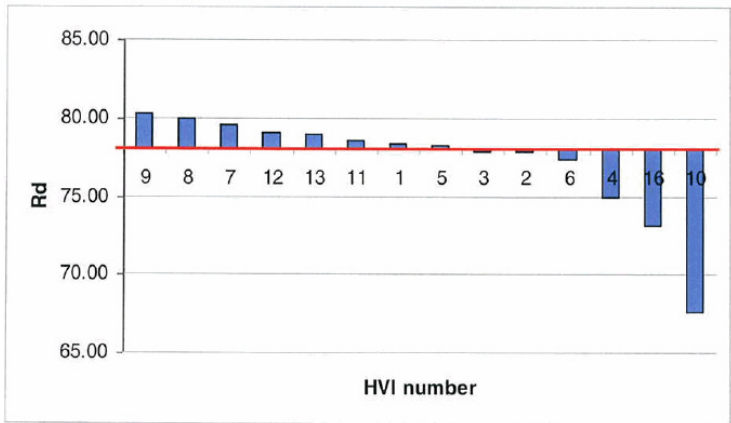


Figure 1 - Reflectance (Rd) values for the USDA AMS White Reference Tile for each HVI line in the Round-Robin Trial.

Figure 2 shows the deviation of yellowness (b+) values from the standard represented by the USDA AMS white reference tile for each HVI line in the trial. The bold red line in the Figure represents the standard yellowness (4.7) of the reference tile.

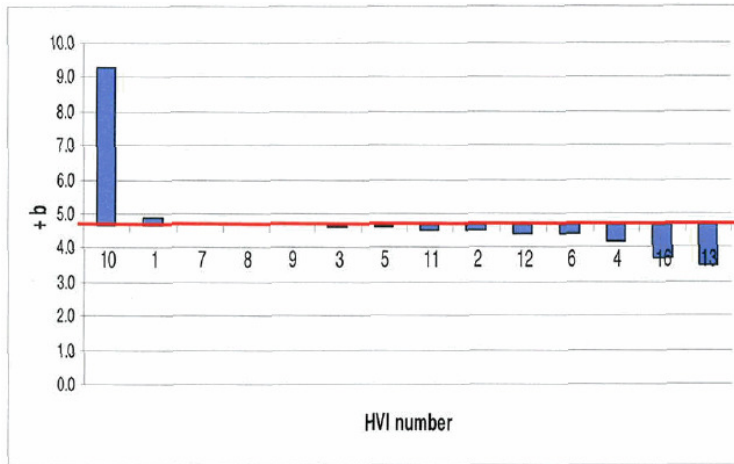


Figure 2 - Yellowness (b+) values for the USDA AMS White Reference Tie for each HVI line in the Round-Robin Trial.

USDA calibration tolerances for yellowness are +/-L00 b+ units; Figure 2 indicates that HVI line 10 recorded significantly higher values, and HVI lines 13 and 16 recorded significantly lower values.

Trash Calibration

The latest set of six 'cotton under glass' calibration tiles, plus the USDA AMS standard trash tile, were used to check each HVI line. Trash calibration was conducted as per Uster and USDA AMS recommendations and included use of the USDA AMS white reference tile as the white reference in the calibration. Figure 3 shows the deviation of trash (percent area of trash) values from the standard represented by the first (tile No. 1) USDA AMS 'cotton under the glass' calibration tile for each HVI line in the trial. The bold red line in the Figure represents the standard trash result (0.13%) for this tile.

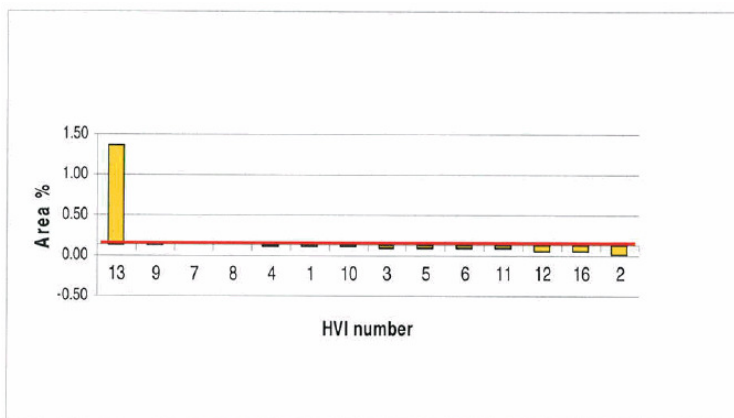


Figure 3 - Trash (Percent Area) values for USDA AMS 'Cotton under the Glass' Reference Tile No. 1 for each HVI line in the Round-Robin Trial.

USDA calibration tolerances are +/-0.050 units for percent trash area: Figure 3 indicates that HVI line 13 recorded a significantly higher reading, with all the other HVI lines reading within standard. Results for 'cotton under the glass' tiles 2 to 6 are not plotted but their values recorded on each HVI line tested in this trial are listed in Appendix 3. Figure 4 shows the

deviation of trash results from the USDA AMS standard trash tile for each HVI line. The bold red line represents percent trash area for this tile (1.76%).

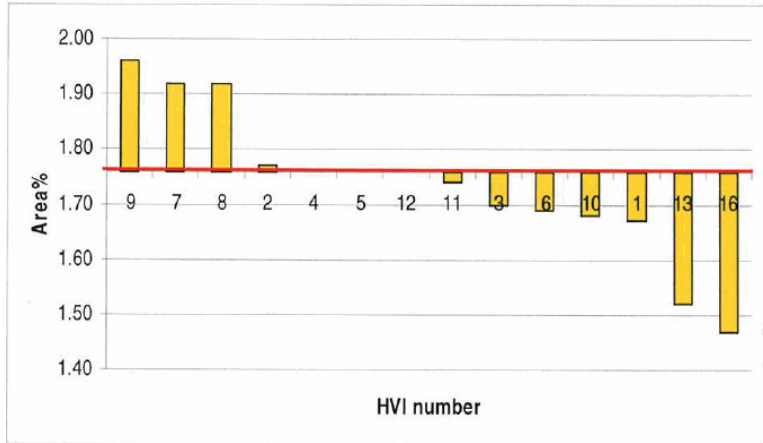


Figure 4 - Trash (Percent Area) values for USDA AMS Standard Trash Tile for each HVI line in the Round-Robin Trial.

Taking into consideration USDA calibration tolerances of +/-0.050 units; the recorded results vary substantially. HVI lines 1, 3, 6, 10, 13 and 16 recorded significantly lower values and HVI lines 7, 8 and 9 recorded significantly higher values.

It is noted that HVI lines 14 and 15 were not calibrated using the new calibration tiles as these were not available at the time. Although HVI line 16 was able to be calibrated the classing house made the decision to withdraw this machine from the round robin trial.

Calibration Findings

The calibration results show although the HVI lines were calibrated, significant variability in results exists. Possible reasons for this are given below:

- Trash camera/components are defective i.e., electrical connections are faulty and/or electrical noise is affecting readings.
- Calibration tiles need replacement or recalibration. Some tiles have not been replaced or re-calibrated for many years. The ceramic material they are made from changes over time and needs to be re-checked every two years.
- A common colour standard(s) needs to be obtained for checking HVI lines. Currently different sets exist for the Spectrum and 900 series. This will result in a common standard across all HVI line types for reference checking.
- All colorimeters need to be maintained. Colorimeters need to be kept free of lint and the glass between the sample and reflector needs to be replaced when damaged. Furthermore, only globes recommended by the manufacturers should be used. These globes are pre-tested before sale. Globes should be replaced twice per season to maintain consistent reflectance (Rd) values.

Results

Colour

The grand average and standard deviation of Rd and b+ for all (200) samples was calculated. In theory there should have been 200 samples X 15 HVI = 3000 results but unfortunately sample 20 was not tested on six machines as it had been misplaced.

Reflectance

The grand average reflectance value (Rd) for all (200) samples was 77.4. Figure 5 shows the average Rd values for each HVI line with the red line indicating the grand mean. The error bars represent two standard deviations of the average Rd values for each HVI line. There is no significant difference between the Rd results, although the variations are substantial.

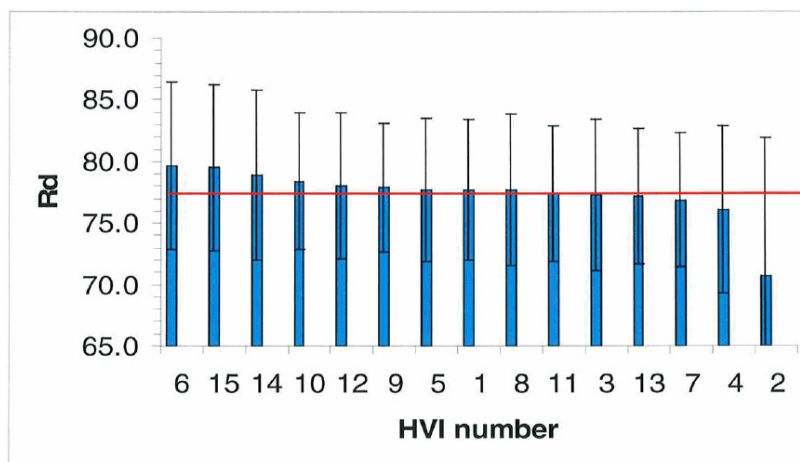


Figure 5- Rd values per HVI Line.

Reflectance per Classing house

The average percent reflectance value (Rd) with the error bars representing two standard deviations for the six classing houses is plotted in Figure 6. As can be seen in Figure 6 the results show that there is no significant difference in Rd results recorded by the six classing houses. Classing house 2 recorded higher Rd results due to the installation of a Spectrum.

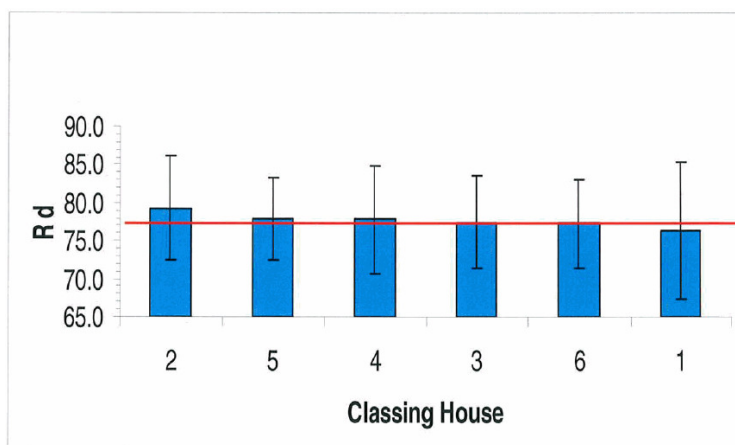


Figure 6- Rd values per Classing House.

Reflectance per HVI type

The average percent reflectance value (Rd) with the error bars representing two standard deviations for the three different HVI types is plotted in Figure 7.

As can be seen in Figure 7 there is no significant differences in Rd values recorded by the various HVI types, the 900 A lines recorded lower Rd values, which is due to the lower Rd results recorded by HVI line 2.

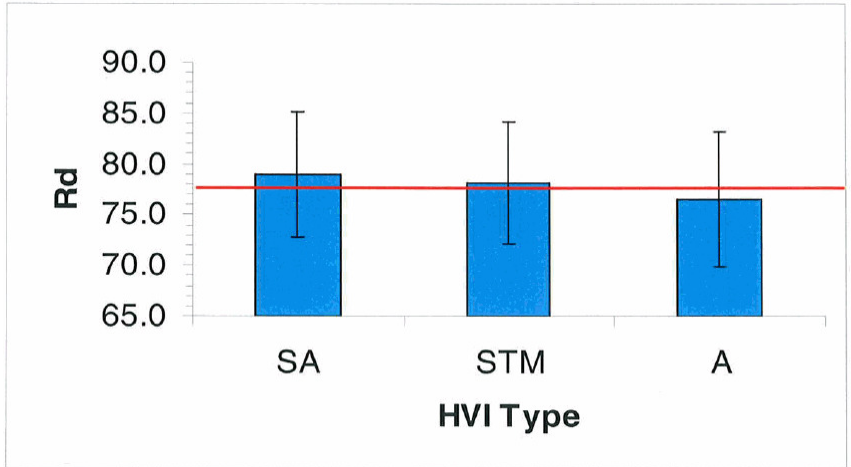


Figure 7 - Rd values per HVI Type.

Yellowness

The grand average yellowness (b+) for all (200) samples was 8.2. Figure 8 shows the average b+ values for each HVI line with the red line indicating the grand mean. The error bars represent two standard deviations of the average b+ values for each HVI line. There is no significant difference between the b+ results, although the variations are substantial. HVI line 2 and 12 recorded higher values and HVI line 8 and 11 recorded lower values.

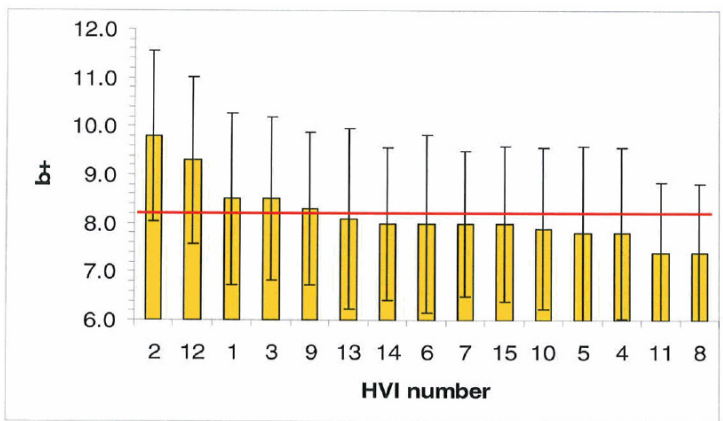


Figure 8 - b+ values per HVI line.

Yellowness per Classing House

The average percent yellowness value (b+) with the error bars representing two standard deviations for the six classing houses is plotted in Figure 9. The results show that there are no significant differences from the grand mean.

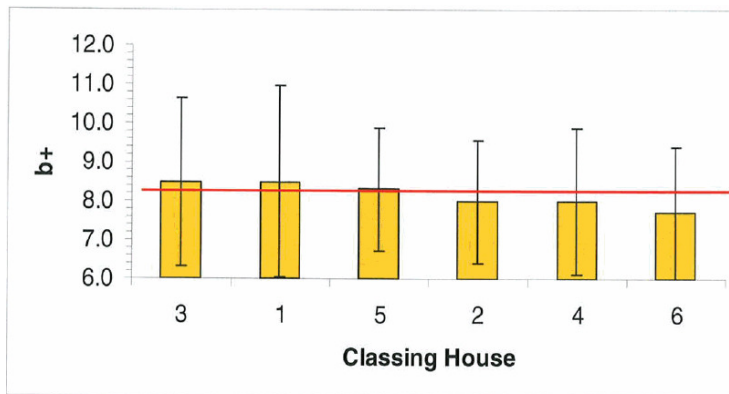


Figure 9 - b+ values per Classing house.

Yellowness per HVI Type

The average percent yellowness value (@+) with the error bars representing two standard deviations for the three different HVI types is plotted in Figure 10.

As can be seen in Figure 10 there is no significant differences in the b+ values recorded by the 900 SA and the Spectrum, with higher b+ values recorded by the 900 A, which is due to the higher b+ results recorded by HVI line 2 and 12.

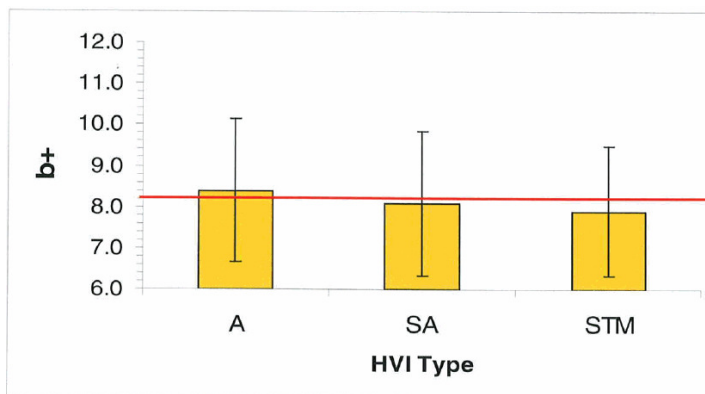


Figure 10 - b+ values per HVI Type

Trash

Trash Area %

The grand average trash area (%) for all (200) samples was 0.98 %. Figure 11 shows the average trash area for each EIVI line with the red line indicating the grand mean. The error bars represent two standard deviations of the average trash area values for each HVI line. There are significant differences between the trash area results. Only HVI line 1 and 3 recorded no significant differences from the grand mean. HVI line 211 and 13 recorded significantly higher results and all the remaining HVI lines recorded significantly lower results from the grand mean.

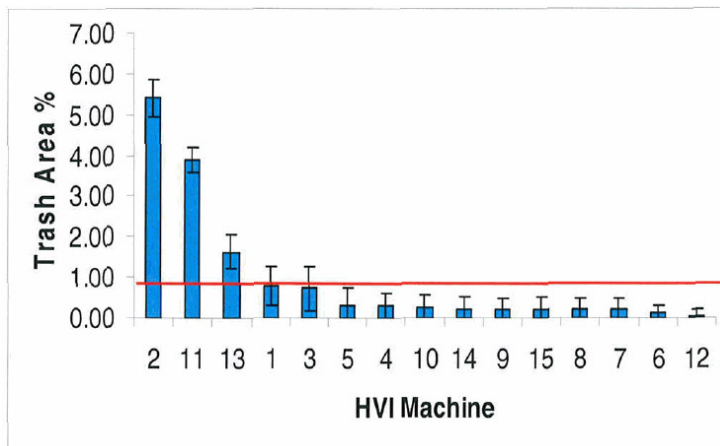


Figure 11 - Trash Area % values per line.

Trash Area % per Classing house

The average trash area with the error bars representing two standard deviations for the six classing houses is plotted in Figure 12. The results show that significant differences exist between the classing houses. Classing house 2, 4, 5 and 6 recorded significantly lower trash area results from the grand mean.

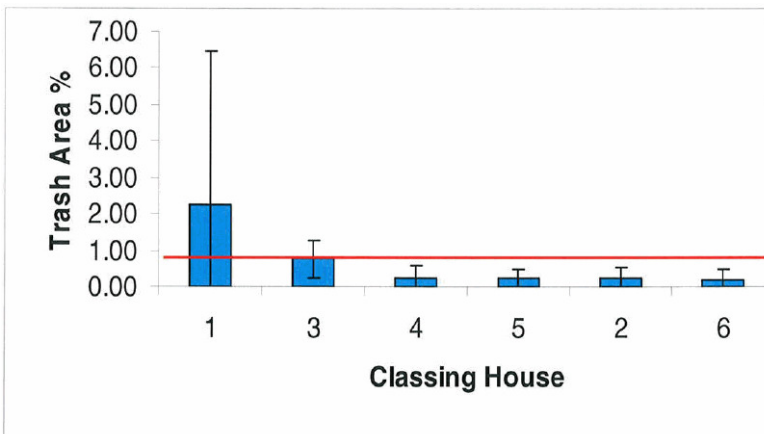


Figure 12 - Trash Area % values per Classing House.

Trash Area % per HVI Type

The average trash area value with the error bars representing two standard deviations for the three different HVI types is plotted in Figure 13. The results indicate that the Spectrum and 900 SA lines recorded significantly lower results than the grand mean and the 900 A lines. The higher results recorded by the 900 A lines is mainly due to the results recorded by HVI line 2 and 11. When these two HVI lines are excluded from the data set the average trash area results for the 900 A lines is 0.64 % which is still significantly higher than the 900 SA and Spectrum.

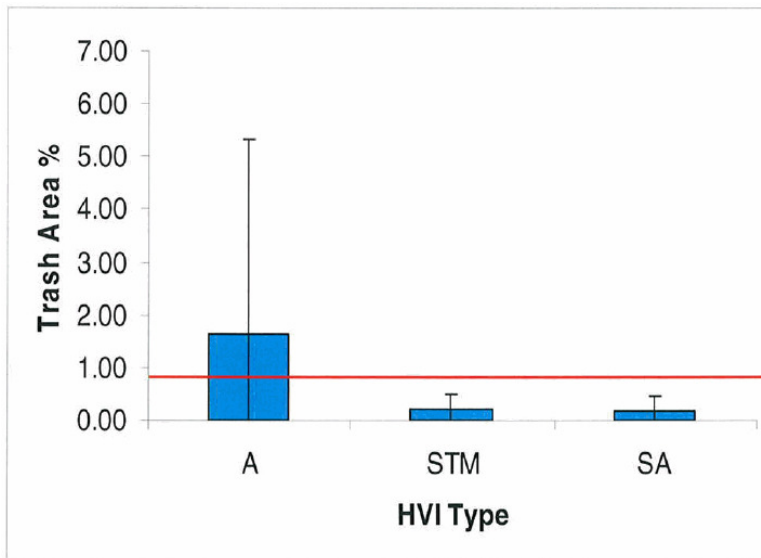


Figure 13 - Trash Area % values per HVI Type.

Trash Grade

The grand average trash grade for all (200) samples was 3. Figure 14 shows the average trash grade for each HVI line with the red line indicating the grand mean. The error bars represent two standard deviations of the average trash grade for each HVI line. There are significant differences between the trash grade results. HVI line, 2, 11 and 13 recorded significantly higher results and HVI line 6 and 12 recorded significantly lower results from the grand mean. These results are not surprising as these HVI lines were highlighted in the trash area results.

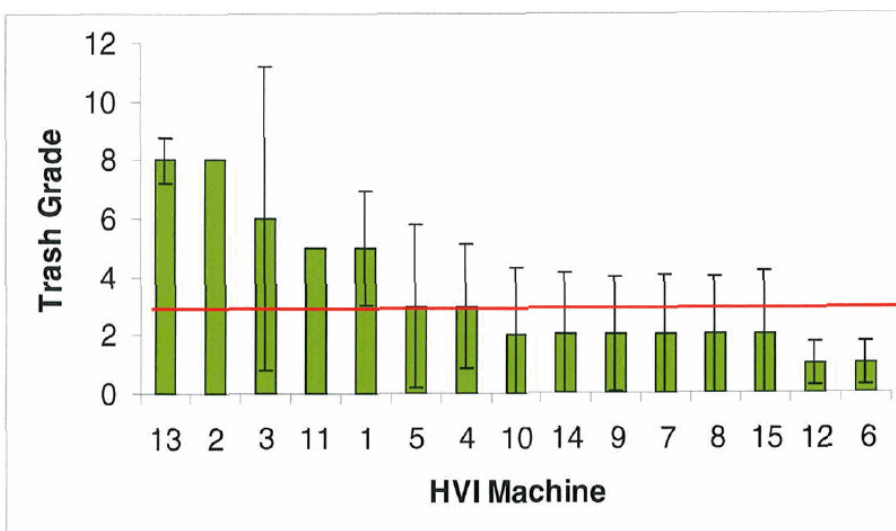


Figure 14 - Trash Grade values per HVI line

HVI line 2 and 11 have no error bars as the lines recorded constant values (i.e. line 2 recorded a constant trash grade of 8 and line 11 a constant trash grade of 5) for all 200 samples, which suggests that these two lines have some operational issues when calculating trash grade.

Trash Grade per Classing house

The average trash grade with the error bars representing two standard deviations for the six classing houses is plotted in Figure 15. There are no significant differences from the grand mean. It is however apparent that four classing houses recorded similar trash grade results. Classing house 1 and 3 recorded higher but similar trash grade results. This is due to the higher recorded values for HVI 2 3, 11 and 13.

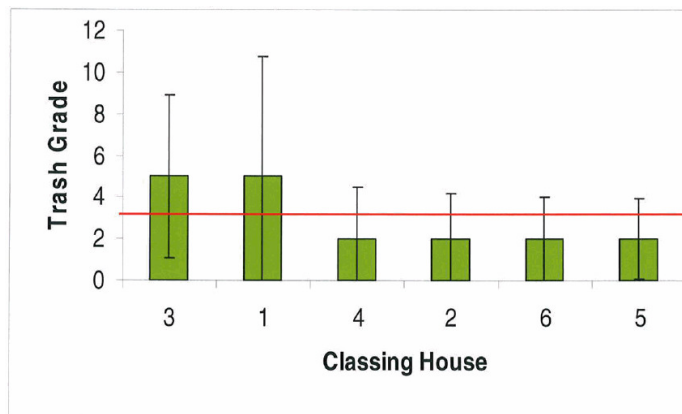


Figure 15 - Trash Grade values per Classing House

Trash Grade per HVI Type

The average trash grade value with the error bars representing two standard deviations for the three different HVI types is plotted in Figure 16. The results indicate that the 900 SA lines recorded significantly lower results. The 900 A lines recorded higher results due to the higher trash grade values recorded by HVI line 2,3,11 and 13

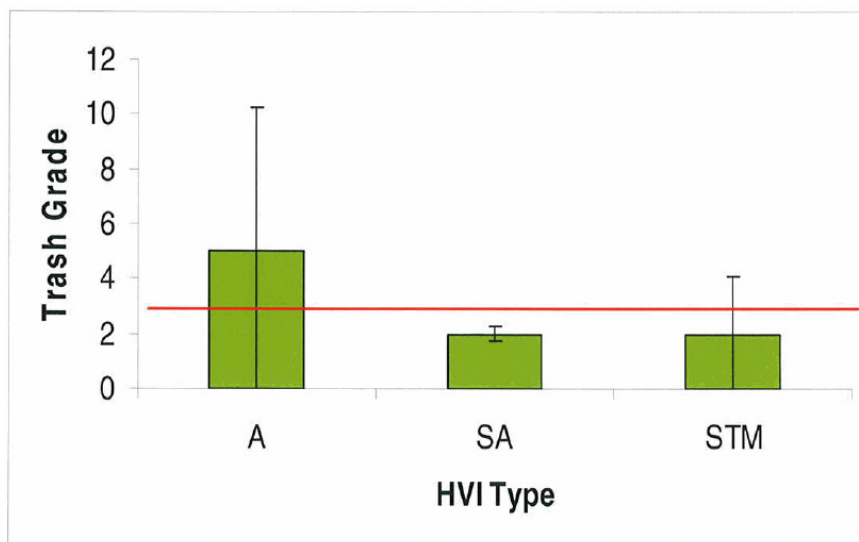


Figure 16 - Trash Grade values per HVI Type.

Trash Count

The grand average trash count for all (200) samples was 31. Figure 17 shows the average trash count for each HVI line with the red line indicating the grand mean. The error bars represent two standard deviations of the average trash count for each HVI line. There are significant differences between the trash count results. HVI line 13 recorded a high of 89, and HVI line 12 recorded a low value of 5.

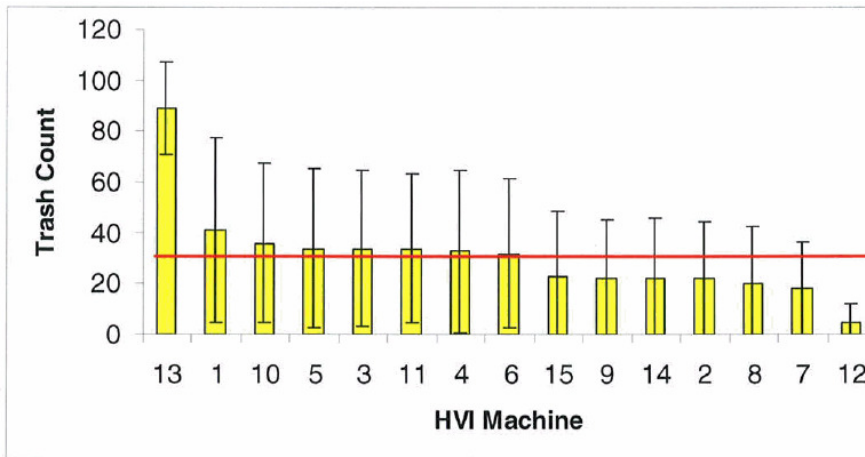


Figure 17 - Trash Count values per HVI line.

As expected the HVI lines that recorded significantly higher results for trash area and grade also recorded higher trash count results. Trash count per Classing house The average trash count with the error bars representing two standard deviations for the six classing houses is plotted in Figure 18. The results show that there are no significant differences from the grand mean. It is noted that three classing houses recorded higher but similar trash count results and three classing houses recorded lower but similar trash count results.

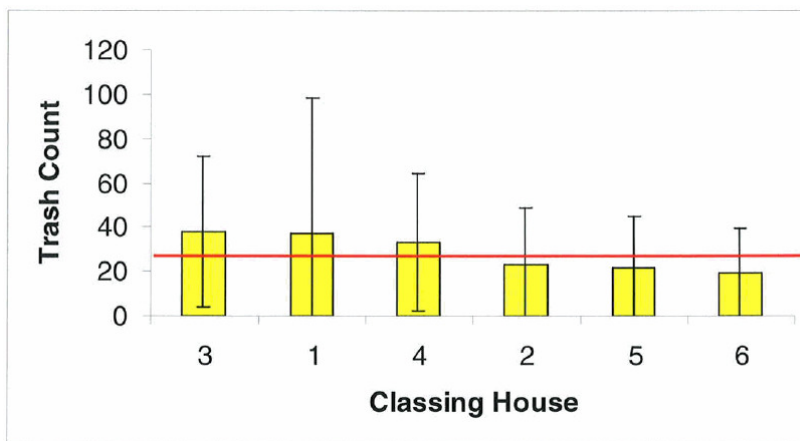


Figure 18 - Trash Count Values per Classing House

Trash count per HVI Type

The average trash count value with the error bars representing two standard deviations for the three different HVI types is plotted in Figure 19. The results indicate that there are no significant differences from the grand mean in trash count results per HVI type. Spectrum limes recorded lower trash count readings than the 900 A and 900 SA lines.

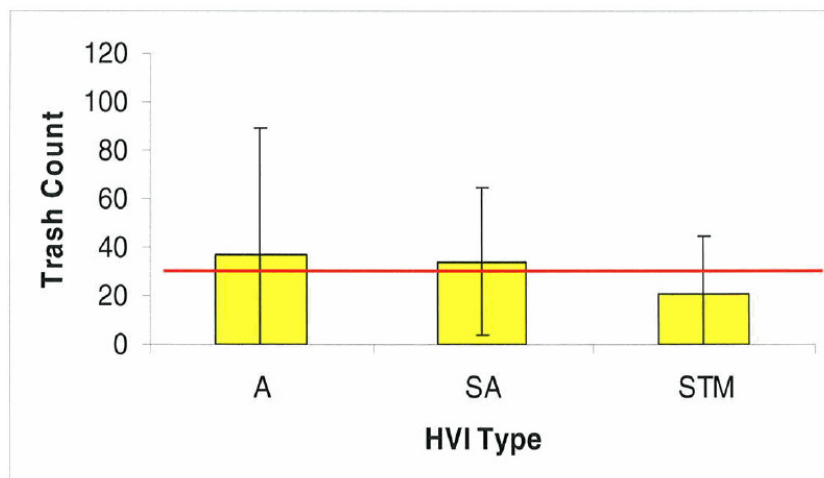


Figure 19 - Trash Count values per HVI Type

The higher readings recorded by the 900 A lines are due to the fact that the lines that recorded significantly higher trash count values are all 900 A lines.

Classing

At the pre season meeting held in February 2005 the CCAA members visually classed the samples to the 2005 USDA Classing Boxes.

Subjective classing compared to Objective classing

The results are given in Appendix 4. There are big differences between the objective and subjective measurements which can be explained by the big differences in 'X, Reflectance (Rd) and % Yellowness (b+) values recorded by the various HVI lines for the various samples. Of concern is that some of the samples tested on various HVI lines did not have a classing grade (CG) recorded.

Recommendations

It is recommended that all future Round-Robin Trial incorporate the following;

- Calibration recommendations as stipulated on page 5.
- CCAA to ensure that all relevant HVI lines participate in trials.
- HVI lines to test all samples.
- The CCAA to prepare fewer samples from a single bale, which will eliminate variation due to sample differences.

Although the transporting of samples to the various classing houses did not seem to have an effect on the results it is recommended that virgin samples be forwarded to classing houses which will ensure that samples are not compromised by transporting to classing houses. The samples to be tested with a number of repetitions

Conclusion

The results from this Round-Robin Trial show that there now seems to be an improvement in the colour results obtained by the HVI lines. There were no significant differences in % Reflectance (Rd) and 0 : Yellowness (b+) results obtained by the various HVI lines.

The trash readings, which were tested for the first time, show that there are significant differences in the three trash measurement results (% Area, Trash Grade and Trash Count) as recorded by the HVI lines. This is perhaps not surprising as trash results as recorded by I-IVI lines were previously not used for classing purposes and were thus not maintained. The results from this Round-Robin Trial show that individual classing houses will need to correct technical shortcomings of their HVI lines to ensure that CCAA Round the industry as a whole can work towards a more consistent prediction of Australian classing grade by HVI measurement.

To further highlight the need for improvement, the Rd and b+ results recorded for each HVI line were used to determine the classer's colour grade and grade, using the updated USDA colour chart (Appendix 5). The CG results were inserted into a P&D sheet used in Australia (assuming an exchange rate of AUD\$1.00 = US\$0.78).

Table 20: Grade per HVI Line

Line number	Reflectance Rd	Yellowness b+	Trash Grade	Classer Grade	USDA Grade	Points/Pound	Discount
1	77.7	8.5	5	31-5	M	-700	44.87
2	70.7	9.8	8	42-8	SLM	-2000	128.21
3	77.3	8.5	6	31-6	M	-1300	83.33
4	76.1	7.8	3	41-3	SLM	-700	44.87
5	77.7	7.8	3	31-3	M	0.00	Base
6	79.7	8.0	1	31-1	M	0.00	0.00
7	76.9	8.0	2	31-2	M	0.00	0.00
8	77.7	7.4	2	41-2	SLM	-700	44.87
9	77.9	8.3	2	31-2	M	0.00	0.00
10	78.4	7.9	2	31-2	M	0.00	0.00
11	77.4	7.4	5	41-5	SLM	-800	51.28
12	78.0	9.3	1	31-8	SM	-1300	83.33
13	77.2	8.1	8	31-2	M	0.00	0.00
14	78.9	8.0	2	31-2	M	0.00	0.00
15	79.5	8.0	2	31-2	M	0.00	0.00
Avg.	77.4	8.2	3	31-3	M	0.00	Base

Table 20 shows that of the 15 HVI lines that participated in this Round- Robin Trial only eight recorded results which were not to the detriment of the grower. The remaining seven HVI lines all gave results to the detriment of the grower. Follow up Round-Robin Trials and the forthcoming Check Tests during the ginning season will further determine uniformity of objective classing results and the Audit of the classing houses to determine compliance to BMP classing practice should help to ensure that growers and customers of Australian cotton have confidence in fibre quality results quoted to them.



Final Report

Off Farm Series | Cotton Research & Development Corporation

Part 1 - Summary Details

CRDC Project Number: **CTFT 12b**

Project Title: Standardisation of Classing: The Compliance of Classing Houses to Best Management Practices

Project Commencement Date: **Project Completion Date:** June 2005

CRDC Program: Off-Farm

Part 2 – Contact Details

Administrator: CSIRO
Organisation: Cotton Textile Research Unit, CSIRO Textile & Fibre Technology
Postal Address: Geelong
Ph: **Fax:** **E-mail:**

Principal Researcher: Marinus H.J van der Sluijs
Organisation: Cotton Textile Research Unit, CSIRO Textile & Fibre Technology
Postal Address: Geelong
Ph: **Fax:** **E-mail:**

Supervisor:
Organisation:
Postal Address:
Ph: **Fax:** **E-mail:**

Signature of Research Provider Representative: _____

Part 3 – Final Report Guide (due 31 October 2008)

Background

If Australia is to maintain its reputation as a consistent supplier of high quality cotton it will need to ensure that classing houses in Australia consistently specify their cotton. To do this the cotton classing sector will need to be assessed independently to determine their compliance to the draft Best Management Practice (BMP) for Classing, version 212, Handbook, compiled by the Cotton Classers Association of Australia (CCAA), via a formal audit. This will allow individual houses to make technical and operational corrections to their practice so that ultimately the industry can achieve consistent and better prediction of classing grades.

To this end the CCAA has decided to conduct audits of the classing houses of their members through the agency of the CSIRO Textile and Fibre Technology (CTFT), an organisation which is considered to be independent.

The results of this audit are reported here.

Methods

There are currently 10 Classing Houses in Australia, of which nine agreed to be audited to the BMP handbook for classing. The audit was conducted in the second and fourth week of May and involved a visit by CTFT to the classing houses listed in Table 1 and assessing their compliance to the requirements listed in the draft BMP handbook for classing.

Table 1 Details of Classing Houses participating in Audit.

Classing House	Location
Auscott Limited	Sydney
Australian Classing Services	Wee Waa
Dunavant Australia	Brisbane
Paul Reinhart (Australia)	Toowoomba
Queensland Cotton	Brisbane
Weil Brothers Cotton(Aust.)	Toowoomba
Volcot Australia	Moree
Carrington Cotton Classing	Goondiwindi
ProClass	Goondiwindi

Results

The audit findings will now be presented and discussed following the same format used in the BMP handbook for classing.

Sample Management

Sample size

All classing houses commented that the size of the bale sample and wrapping of the bale sample is an issue, mainly at the start of a new season but also during the season. It is felt that the classing houses have no control over this and it is suggested that the requirements for sample size should be included in the BMP handbook for ginning.

The following issues were raised by the classing houses;

- Not all ginning companies supply cotton samples for testing in rolls, as required by the classing houses. Some of the gins supply cotton in bags.
- The number of cotton samples supplied in a roll should be 50-70, for ease of handling, but at times up to 100 samples are wrapped in rolls.
- There is variability in bale sample weight and size. Samples that are too small cannot be tested on the HVI lines.

Sample conditioning

Of the nine classing houses audited eight condition samples before testing. Of these, seven have rapid conditioning equipment (e.g., Rapidcon) installed and four rely exclusively upon these systems to condition their samples. The other classing houses use passive conditioning (storing of samples in controlled conditions (Relative Humidity of 65 % +/- 3 and Temperature of 21 degree Celsius +/-1.5) for 24 hours before testing) to condition their samples and only use rapid conditioning in emergency or back up. The classing houses using passive conditioning have large air conditioning units installed and have single and double interlocking doors to maintain the conditions in the area where fibre testing takes place.

Sample retention

Every classing house has its own policy regarding sample retention, which is influenced by their clients and the space available for storing the samples.

Classing Room

Wall & Ceiling Colour

The paint used on the walls of eight classing rooms is a Dulux paint called Ghost Gum, which is a light grey colour and recommended by the USDA. However, the walls of classing house No. 4 were found to be a light blue undertone. It is worth noting that Dulux have apparently renamed the Ghost Gum colour and is now known as Lewis.

Lighting

The illumination in lux (lux (symbol: lx) is the SI derived unit of illuminance or illumination) at the working surface of the classing tables was measured at all the classing houses using two instruments;

- The Tecpel530 Light meter (lux)
- The National Digital Lux meter BN-2000 LTE.

Two of the classing houses have their own light meters and the readings from these meters were very similar to the National digital meter used by the auditor.

The readings recorded show that all the classing rooms are well above the minimum requirement of 860 lux, with the values ranging from a low of 1120 lux to a high of 3380 lux (as recorded by the National Digital Lux meter). Table 2 gives the average readings recorded at the classing tables used by the classing houses to class cotton.

Table 2 Average illumination readings in lux in classing rooms

Classing house	1	2	3	4	5	6	7	8	9
Tecpel	2240	1200	960	1070	2467	1180	1500	1165	1100
National	2550	2200	1600	1168	2782	1380	1630	1307	1200

All the classing rooms are installed with light fixtures containing GE Chroma 75 fluorescent lights to provide the lighting required. The interior of all light fixtures has a white finish and all light fixtures have glass/perspex panes in place to diffuse the light.

Of the nine classing houses only five have air conditioning units installed that can set and maintain conditions accurately. These classing houses monitor conditions closely with the aid of computer programs and temperature and humidity charts. Two classing houses also do physical checking of temperature and humidity using instruments such as the whirling hygrometer and by measuring moisture content of samples with a moisture meter to ensure that the moisture content is within 6.25 - 8.25 %.

The classing houses using rapid conditioners to condition samples also have air conditioning systems installed but these units are not very accurate.

Sample Testing

Equipment - set up, calibration and use

All classing houses with High Volume Instruments (HVI) calibrate them every morning with USDA calibration cotton (as per Table 3) and then recheck their lines on a regular basis throughout the day by using a check test cotton to ensure instruments are reading accurately. If a HVI line fails a check test the HVI line is recalibrated using USDA calibration cotton.

The listed fibre properties of calibration cottons currently used by the classing houses are listed in Table 3. All the classing houses use Upland calibration cotton to calibrate the HVI lines when testing Australian cotton with the exception of classing houses Nos. 1 and 7, which use Extra Long Staple (ELS) cotton(long strong) to calibrate the HVI lines for Upland cotton.

A number of classing houses have ELS calibration cotton in stock and is used to calibrate the HVI lines when testing Pima cotton.

Table 3 – Details of calibration cotton used by classing houses

Classing house	1	2	3	4	5	6	7	8	9
<i>Upland Cotton</i>									
Long strong									
Micronaire	4.04	4.19	4.13	4.27	4.06	*	*	4.04	4.06
Strength (g/tex)	33.2	33.7	32.9	33.3	32.8	*	*	33.2	32.8
UHM mean Length	1.168	1.167	1.163	1.155	1.186	*	*	1.168	1.186
Uniformity Index	83.4	83.5	83.4	83.3	83.6	*	*	83.4	83.6
Short weak									
Micronaire	4.18	4.20	4.20	4.17	4.17	*	4.04	4.17	4.04
Strength (g/tex)	23.4	23.3	23.3	23.6	23.6	*	24.2	23.6	24.2
UHM mean Length	0.945	0.955	0.955	0.951	0.951	*	0.978	0.951	0.978
Uniformity Index	78.0	78.1	78.1	78.0	78.0	*	79.8	78.0	79.8
<i>ELS Cotton</i>									
Long strong									
Micronaire	3.80	*	*	*	4.36	*	4.30	4.43	*
Strength (g/tex)	38.3	*	*	*	41.9	*	41.9	41.8	*
UHM mean Length	1.303	*	*	*	1.360	*	1.361	1.364	*
Uniformity Index	84.0	*	*	*	85.2	*	85.2	85.5	*
<i>Micronaire</i>									
High	5.60	5.61	5.60	5.51	5.58	4.58	5.51	5.05	5.51
Low	2.67	2.70	2.70	2.51	2.67	3.54	2.68	2.60	2.51

Testing Frequency

All classing houses generally test every second or third sample in a module. This frequency is changed if the quality of a particular module is found to be below base grade.

Module Averaging

There are currently three module averaging methods used in Australia;

Method 1

Bale averaging; where every second bale is tested and the average of these two tests is applied to the bales between.

This method is currently being used by one classing house.

Method 2

Module average; where the average values of tested bales in a module are applied to bales that are not tested.

This method is currently being used by six classing houses.

Method 3

Module averaging where every second bale is tested and the average value of the module is applied to all bales in the module.

This method is currently being used by one classing house.

These methods are currently being assessed by CTFT who will make a recommendation to the CCAA on a single module averaging method to be used by the Australian cotton industry.

Use of agreed standard - USDA

Classing rooms use USDA Standard Grade boxes to class cotton. Eight of the nine classing rooms are using the current grade and spotted boxes dated 06/30/2005. Classing house No. 6 uses outdated grade boxes and classing house Nos. 1, 4 and 6 use outdated spotted boxes.

Generally the classing houses purchase only the most relevant grade boxes (due to high price charged by USDA) applicable to Australian cotton, which tend to be boxes describing grades 11, 21, 31, 41 and 51. Two of the classing houses have current grading boxes for Pima cotton. Spotted cotton is classed according to the USDA Standard Spotted Grade boxes with the majority of classing houses using current 23, 33, 34, 43 and 53 grades.

Eight of the nine classing houses report micronaire values in the ranges stipulated in the BMP handbook. Classing house No. 1 reports micronaire values in the G5 range using 4 categories instead of the three stipulated in the BMP handbook.

Check Testing

Eight of the nine classing houses are currently participating in the check test program. The classing house not participating has been encouraged to participate and it is hoped that this will happen. Classing houses with a number of HVI lines have been encouraged to include all their HVI lines in the check test.

Check test procedures are being abided by all the participating classing houses.

On completion of the check test program results will be analysed and will be reported at the CCAA meeting in August this year. Classing house Nos. 1, 2, 4, 5 and 7 participate in the USDA Round Tests and classing house Nos. 1, 4, 5 and 7 participate in the Bremen Round Tests. Classing house No. 8 has indicated it will participate in both round tests from 2006.

Data Transfer

All the classing houses using HVI lines for testing fibre quality comply with the minimum requirements for data transfer as stipulated in the BMP handbook for classing.

General Comments

- All classing houses maintain copies of the BMP Handbook and the ITMF HVI User Guide.
- A number of classing houses felt the CCAA Review Process for handling classing disputes should be included in the BMP handbook.
- All classing houses will need to improve on record keeping as it is vital that they are able to prove that tasks are being done.
- The Illuminance readings in lux show that all the classing rooms are well beyond the minimum stipulated lux and the question is can you have too much illuminance?
- Moisture measurement should be considered preferably by measuring moisture of fibre samples by dry oven gravimetric method as moisture meters are notoriously inaccurate.
- It is noted that HVI lines break down frequently with the Uster Spectrum lines being particularly troublesome.
- There is definitely a need for some HVI technical training, which will allow the classing houses to deal with the day to day operational and maintenance issues encountered with the HVI lines.
- A number of classing houses conduct stickiness tests by spraying cotton samples with Indicator AB.



Final Report

Off Farm Series | Cotton Research & Development Corporation

Part 1 - Summary Details

CRDC Project Number: CTFT 12c

Project Title: Standardisation of Classing: Module Averaging

Project Commencement Date: **Project Completion Date:** June 2005

CRDC Program: Off-Farm

Part 2 – Contact Details

Administrator: CSIRO
Organisation: Cotton Textile Research Unit, CSIRO Textile & Fibre Technology

Postal Address: Geelong

Ph: **Fax:** **E-mail:**

Principal Researcher: Marinus H.J van der Sluijs
Organisation: Cotton Textile Research Unit, CSIRO Textile & Fibre Technology

Postal Address: Geelong

Ph: **Fax:** **E-mail:**

Supervisor:
Organisation:
Postal Address:

Ph: **Fax:** **E-mail:**

Signature of Research Provider Representative: _____

Part 3 – Final Report Guide (due 31 October 2008)

Background

Module averaging was introduced in the US in 1991 as a means of improving the accuracy of instrument strength readings and to compensate for the natural variability of cotton. Under the USDA system every bale in a module is instrument tested and the results averaged on a module basis. The success of this initiative resulted in the expansion of Module Averaging in 1994 to include additional instrument measurements such as micronaire, length, and length uniformity. The classes assigned quality characteristics such as leaf grade and extraneous matter are not averaged, and each bale stands on its own for these characteristics.

Systems of module averaging have also been adopted in Australia during this time, ostensibly to provide information on bales that are not measured by the instruments. There are currently three module averaging systems in use in Australia. As part of the standardisation of classing program the Australian cotton industry needs to adopt a single module averaging system. The Cotton Classers Association of Australia (CCAA) requested the author to conduct a statistical analysis of the three module averaging systems currently in use in Australia. The aim of the analysis was to highlight the pros & cons of each system. The analysis will be considered by the CCAA who will then make a recommendation to CEAC who will ultimately decide on a single module averaging system to be adopted by the Australian Cotton Industry in 2006.

Methods

The analysis was conducted on a data set of 113 modules, comprising 2424 bales. The data set was obtained from Auscott Limited and Australian Module Averaging Classing Services and covers a wide range of cotton quality. See Table 1 for further details.

Table 1- Details of Module and Bale dataset

Quality	No. Modules	No. Bales
'Border line length'	20	394
'High micronaire'	55	1133
'Average quality'	38	897

All the bales in the modules were 100% tested to enable a direct comparison with the three module averaging systems currently in use in Australia. The three systems work as follows:

- *System A* - Bale averaging; where every third bale is tested and the value is applied to the bales in between, which have not been tested. This system is currently being used by one classing facility.
- *System B* - Module averaging; where the average values of tested bales (every third bale) in a module is applied to bales that are not tested. This system is currently being used by six classing facilities.
- *System C* - Module averaging where every third bale is tested and the average value of the tested bales is applied to the module. This system is currently being used by one classing facility.

When the cotton quality is deemed borderline cotton, as determined by the P & D sheets, every second bale will be tested. On request of the grower 100% HVI testing will also be done. The three module averaging systems were applied to the three module sets used in this study, which had been 100% HVI tested - see Table 2. Tested values were discarded for each set in order to examine each module averaging system. In the case of the 'borderline length' and 'high micronaire' modules the individual results for every second, rather than every third, bale was used.

In the case of modules representing 'average Australian quality' every individual result for every third bale was retained and the 3 different module averaging systems used to determine the results for the other bales whose individual results were discarded. Further analysis was done where individual results for every second bale was retained and the 3 different module averaging systems used to determine the results for the other bales whose results were discarded.

Results

The grand average, standard deviation, coefficient of variation and 95% confidence limits were calculated for each module averaging system i.e., A, B & C.

'Border line length' Dataset

Averages for micronaire, strength length and length uniformity determined for the 100 % tested modules and Module Averaging systems A, B and C are listed in Appendix 1. There is no significant difference between the average results for micronaire, strength, length and length uniformity; although the variations for the 100 % tested bales are substantial when compared to System A, B and C.

Figures 1 and 2 show individual bale length and strength results for module number 1008854. The Figures illustrate there is no variability when using System C and that variability increases going from System B to System A to 100 % tested bales in a module.

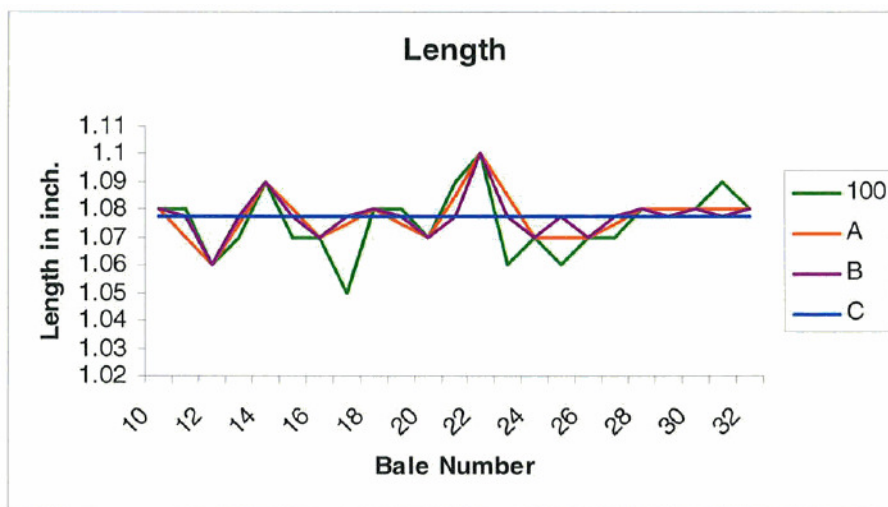


Figure 1 - Length values for module 1008854 using different systems

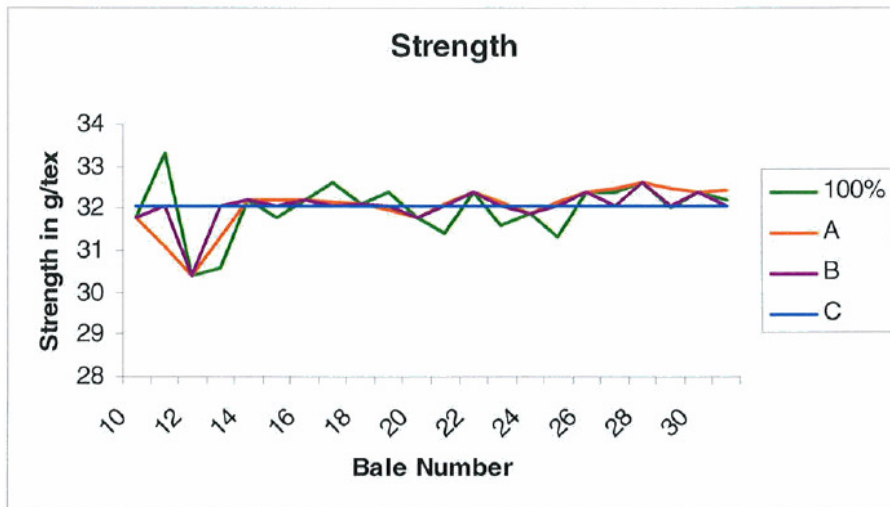


Figure 2 - Strength values for module 1008854 using different systems

'High micronaire' Dataset

The grand average micronaire, strength length and length uniformity for the 100 % tested modules and Module Averaging system A, B and C are listed in Appendix 2. There is no significant difference between the average results for micronaire, strength and length; although the variations for the 100 % tested bales are substantial when compared to System A, B and C. Figure 3 and 4 shows the individual length and strength bale results for module number 44719. From the Figures it is apparent that there is no variability when using System C and that variability again in System B is less than System A, which is less than 100 % bales tested in a module.

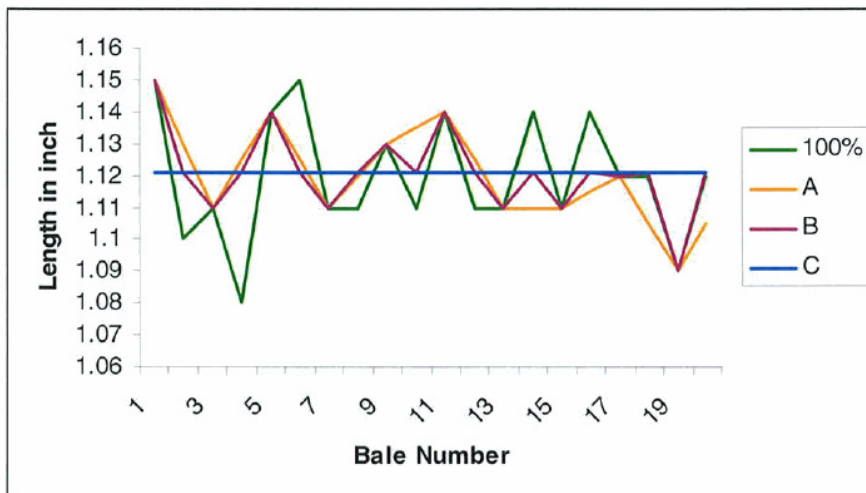


Figure 3 -Length values for module 44719 using different systems

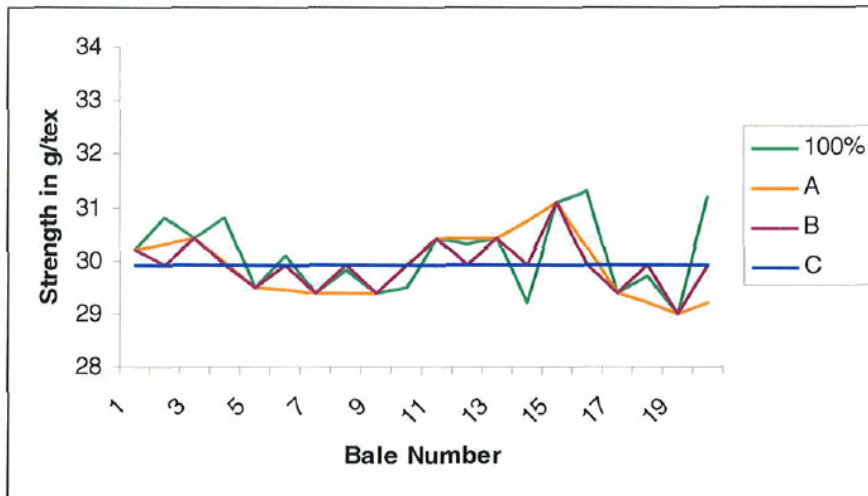


Figure 4 - Strength values for module 44719 using different systems

'Average Australian quality' Dataset

The grand average micronaire, strength length and length uniformity for the 100 % tested modules and Module Averaging system A, B and C are listed in Appendix 3. There is no significant differences between the average micronaire, strength and length results, although the variations for the 100 % tested bales are substantial when compared to System A, B and C. Figure 3 and 4 shows the individual bale results for module number 1015261. From the Figures it is apparent that there is no variability when using System C and that variability again in System B is less then System A, which is less than 100 % bales tested in a module. The results also show that there is a slight improvement in the variability of the micronaire, strength, length and length uniformity results when every second bale is tested instead of the traditional system where every third bale is tested.

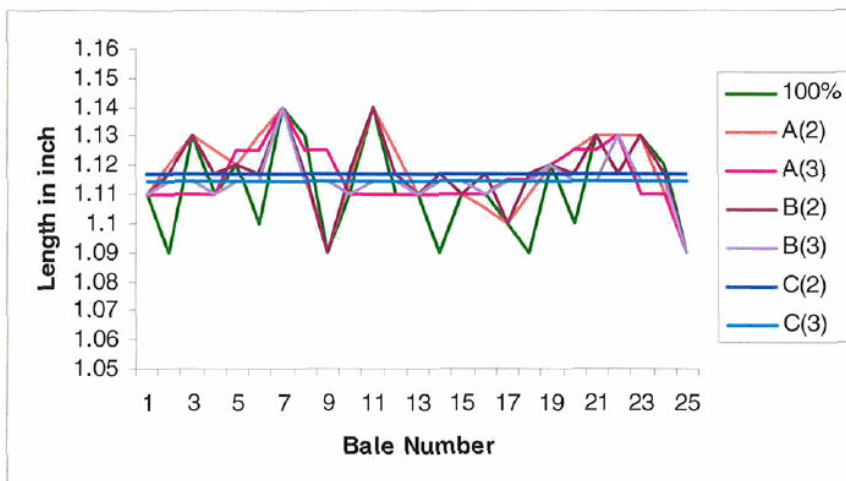


Figure 5 -Length values for module 1015261 using different systems

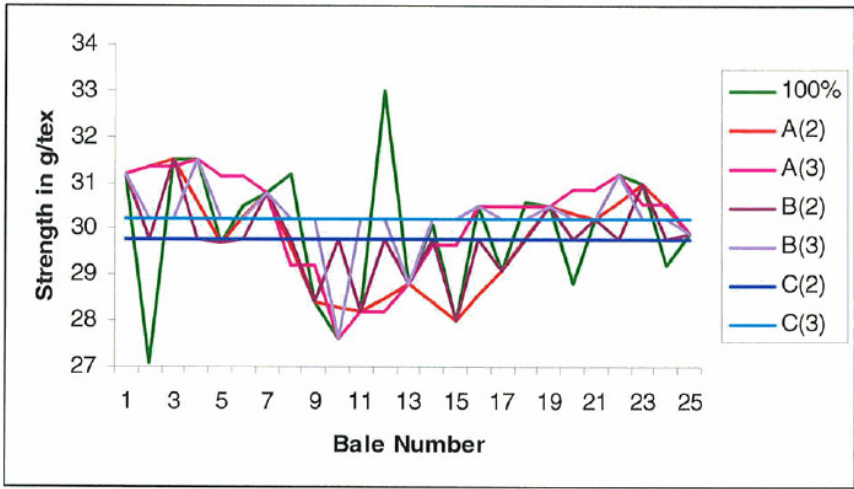


Figure 6 - Strength values for module 1015261 using different systems

Conclusion

The results clearly show module averaging systems do compensate for instrument variability and for the natural variability of cotton. It is further apparent that in all cases, with the exception of system C, the variability in results is reduced using System B over System A and the 100 % tested bale values.

From this analysis it is recommend that system B be adopted as the module averaging system to be used in Australia. The reasons are as follows:

The results for cotton with various quality characteristics show that system B has less variability then system A.

The majority of classing facilities are already using system B which will make the adoption of this system by the Australian industry easier. It is further recommended, that as is the case with the USDA, that module averages be assigned to outlier bales, outlier values defined as per Table 2 unless such bales were the first or last bale of the module or when the number of outlier bales in a module exceeds twenty percent of the total number of bales tested.

First and last bales of the module that have values measuring outside the permitted range (and bales outside the range when there is more than 20 % of the total number of bales tested in the module) should be reported as outliers and should not be used in determining the module average. Outlier bales are assigned their own individual instrument readings. All outlier bales should be recorded and reported by each classing facility on an annual basis. As a guideline the table below shows the range of measurements that are allowed by the USDA taking into account instrument variability and the natural variability of the cotton fibre.

Table 2- USDA Permitted Outlier Range

Measurement	Permitted Range
Length	0.04 inches
Strength	3.0 g/tex
Micronaire	0.3 units
Length Uniformity	2.0 %



Final Report

Off Farm Series | Cotton Research & Development Corporation

Part 1 - Summary Details

CRDC Project Number: CTFT 12c

Project Title: Standardisation of Classing: Check testing

Project Commencement Date: **Project Completion Date:** June 2005

CRDC Program: Off-Farm

Part 2 – Contact Details

Administrator: CSIRO
Organisation: Cotton Textile Research Unit, CSIRO Textile & Fibre Technology

Postal Address: Geelong

Ph: **Fax:** **E-mail:**

Principal Researcher: Marinus H.J van der Sluijs
Organisation: Cotton Textile Research Unit, CSIRO Textile & Fibre Technology

Postal Address: Geelong

Ph: **Fax:** **E-mail:**

Supervisor:
Organisation:

Postal Address:

Ph: **Fax:** **E-mail:**

Signature of Research Provider Representative: _____

Part 3 – Final Report Guide

Background

Check tests form an important part of the Cotton Classers Association of Australia (CCAA) program to ensure that Australian cotton is accurately and consistently specified. During the 2005 season there were 27 High Volume Instrument (HVI) systems installed in Australia. Of these instruments 24 are manufactured by Uster Technologies Incorporated comprising four models i.e., 900 Automatic, 900 Semi Automatic, 900 B and Spectrum. Two instruments are manufactured by Motion Control and one instrument by Premier.

The check test program involves forwarding two samples of cotton weekly to the CCAA members for testing, both subjectively and objectively on a weekly basis during the ginning season with the analysis and interpretation of results conducted by CSIRO Textile and Fibre Technology (CTFT). It is a requirement (as per draft Best Management Practice (BMP) for Classing, version 212, Handbook) that all members of the CCAA participate in the check testing program and that all their measuring instruments operational during the ginning season should be incorporated in the check testing program.

The aim of the check test program is to determine the long term reproducibility of each instrument. If an instrument is found to be out of tolerance the classing facility is notified and corrective action will be taken by the classing facility.

Methods

There are currently 10 Classing facilities in Australia, of which nine are members of the CCAA and agreed to participate in the program. The CSIRO Division of Plant Industry also participated. See Table 1 for list of facilities participating in the check test program for 2005.

Table 1 Details of Facilities participating in Program.

Facility	Location
Auscott Limited	Sydney
Australian Classing Services	Wee Waa
Dunavant Australia	Brisbane
Paul Reinhart (Australia)	Toowoomba
Queensland Cotton	Brisbane
Weil Brothers Cotton(Aust.)	Toowoomba
Volcot Australia*	Moree
Carrington Cotton Classing	Goondiwindi
ProClass	Goondiwindi
CSIRO Plant Industry	Wee Waa

*No installed instruments

During the 2005 ginning season 14 check test samples were sampled and tested as per the recommended CCAA procedure (Appendix 1 and 2).

Objective Classing

The reproducibility of the instruments are judged using the following tolerances as recommended by the CCAA; length +/- 0.02 inches, uniformity index +/- 1.0 %, micromire +/- 0.1 units, strength +/- 1.5 gpt, Rd +/- 1.0 units and b+ +/- 0.5 units. These tolerances are a lot tighter than the ones used by USDA and suggested by CSITC, the reason being that the crop in Australia is considered to be more uniform.

Figure 2 gives a breakdown of the number of instruments participating in each check test. The figures show that at the beginning of the season 19 or 70 % of the installed instruments participated in the program with the number of instruments participating reducing to 10 instruments or 37 % at the end of the season. Check Test 12 was sent out when the season had already finished which explains why only 5 or 19 'XI of the installed instruments participated.

Table 2 Number of instruments participating in Check Tests

Check Test Number	Number of instruments
1	19
2	17
3	17
4	15
5	15
6	14
7	10
8	16
9	10
10	15
11	13
12	5
13	10
14	10

The average reproducibility for length, length uniformity, micronaire, strength and colour for the 14 check tests was calculated. It must be noted that all check test results received by CTFT during 2005 were included in calculating the average reproducibility results, no results were omitted even if they were way out.

Results

The average reproducibility for length, length uniformity, micronaire, strength, Rd and b+ is shown in Figure 1. The average reproducibility for length is 84 %I, length uniformity 78 %, micronaire 85 %, strength 83 %, Rd 51 % and b+ 84 %. When one compares these results with the average reproducibility values for the USDA for the 2003 and 2004 season, Table 3, we note that with the exception of length uniformity and colour i.e., 'X, Reflectance (Rd) and 'X, Yellowness (b+), the results are better than those recorded by the USDA. The CCAA is in the process of conducting instrument colour trials to address a number of technical and operational shortcomings and it is hoped that once these issues have been the reproducibility of the colour results from instruments will improve.

Table 3 CCAA results compared to average USDA results

#	Sample 1					Sample 2				
	34	35	36	37	38	34	35	36	37	38
1	*	*	1	4	2	*	*	2	4	*
2	*	*	1	6	*	*	2	5	*	*
3	1	3	2	*	*	*	1	4	1	*
4	*	1	2	3	*	*	1	3	2	*
5	*	2	3	*	*	*	*	1	4	*
6	*	*	3	2	*	*	*	1	3	1
7	*	1	4	1	*	*	*	3	3	*
8	*	1	3	1	*	*	1	4	*	*
9	1	*	2	2	*	*	*	2	2	1
10	*	3	2	*	*	*	*	2	3	*
11	*	*	3	2	*	*	1	3	1	*
12	*	*	2	2	*	*	*	*	4	*
13	*	*	*	5	*	*	*	*	4	1
14	*	*	3	1	1	*	*	2	3	*

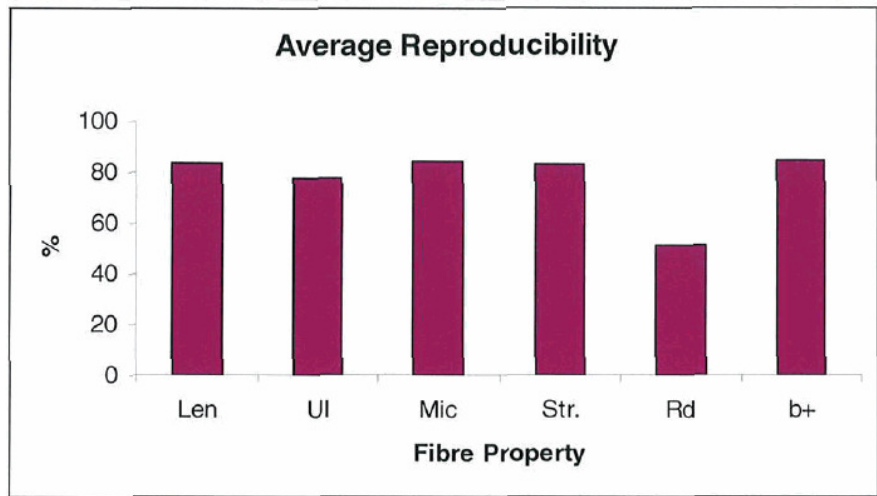


Figure 1 - Average Reproducibility for instruments participating in check test program.

Figure 2 shows the average reproducibility for the past 5 seasons (2001 - 2005). The figure shows that in all cases the average reproducibility for 2005 is lower than the average for the previous year, with the biggest concern being the Rd results.

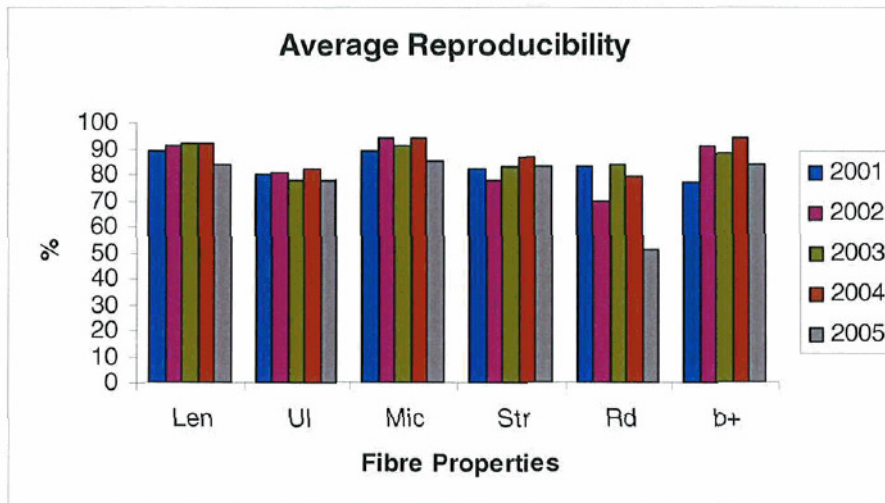


Figure 2 - Average Reproducibility for last five years.

The results (not included in this report as all classing facilities have copies of weekly check test results) showed that the average reproducibility results for strength was affected by lower readings from an individual instrument, possibly due to conditioning as the classing facility uses rapid conditioning to condition samples before testing. The average reproducibility result for Rd was not only affected by substantially lower readings from an individual instrument but also by low average reproducibility results for check test number 2 (47 %), number 4 (47 %), number 7 (35 %) and number 9 (30 %). This may be due to the fact that three of these samples were collected from a gin run.

The samples collected for the check test program were collected from either a single bale or a gin run as per Appendix 2. Six samples were collected from a single bale and 8 from a gin run.

The results in Figure 3 show that the average reproducibility values from samples collected from a single bale are in all instances, with the exception of b+, better than the results from samples collected from a gin run. The reproducibility values show that the origin of the samples may have an impact on the reproducibility results and will be monitored in the future.

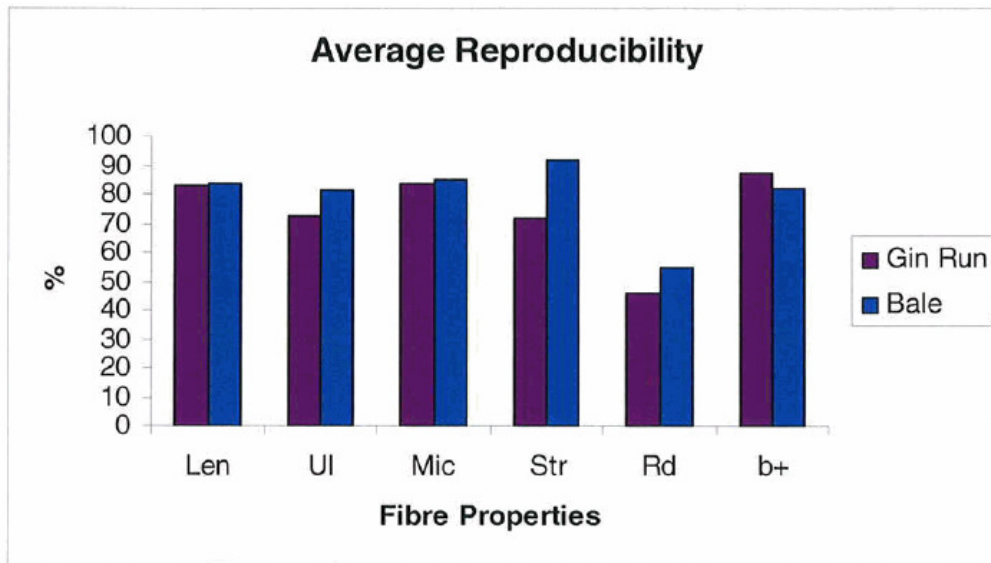


Figure 3 - Average reproducibility for samples collected from gin run or single bale.

Subjective Classing

A further part of the check test program also requires the classing facilities to visually class and record the colour grade, leaf grade and extraneous matter according to the USDA Standard Grade boxes and to hand staple the cotton against USDA length standards.

Table 4 gives a breakdown of the number of classing facilities participating in the subjective classing of each check test. The figures show that of the nine classing facilities, seven or 78 % participated at the beginning of the season with the number of classing facilities participating reducing to 5 or 55 % at the end of the season.

Table 4 - Number of classing facilities participating in Check Tests

Check Test Number	Number of Instruments
1	7
2	7
3	6
4	6
5	5
6	5
7	6
8	5
9	5
10	5
11	5
12	4
13	5
14	5

Table 5 to 7 gives a breakdown of the visual classing results for the two samples. As expected the classing results show similar colour and trash grades and also similar hand staple results.

Table 5 - Visual classing of colour grade

#	Sample 1					Sample 2				
	11	21	22	31	41	11	21	22	31	41
1	3	4	*	*	*	1	6	*	*	*
2	1	6	*	*	*	2	5	*	*	*
3	4	2	*	*	*	*	*	*	3	3
4	0	6	*	*	*	4	2	*	*	*
5	2	3	*	*	*	*	2	2	1	*
6	*	3	*	2	*	*	*	*	5	*
7	*	5	1		*	*	4	*	2	*
8	*	3	*	2	*	2	3	*	*	*
9	5		*	*	*	*	3	*	2	*
10	4	1	*	*	*	*	*	*	4	1
11	*	4	1	*	*	1	3	*	1	*
12	*	1		3	*	*	4	*	*	*
13	*		4	1	*	*	2	1	2	*
14	2	3	*	*	*	*	*	4	1	*

Table 6 - Visual classing of leaf grade

#	Sample 1					Sample 2				
	1	2	3	4	5	1	2	3	4	5
1	*	5	2	*	*	1	5	1	*	*
2	1	2	4	*	*	1	6	*	*	*
3	*	6	*	*	*	*	*	2	4	*
4	*	2	4	*	*	3	3	*	*	*
5	*	1	4	*	*	*	1	4	*	*
6	*	5	*	*	*	*	*	1	3	1
7	*	5	1	*	*	*	3	3	*	*
8	*	1	4	*	*	1	3	1	*	*
9	5	*	*	*	*	*	1	4	*	*
10	1	4	*	*	*	*	*	3	2	*
11	*	*	5	*	*	*	4	1	*	*
12	*		4	*	*	*	3	1	*	*
13	*	2	3		*	*	2	3	*	*
14	2	3	*	*	*	*	*	4	1	*

Table 7 - Visual classing of hand staple

#	Sample 1					Sample 2				
	34	35	36	37	38	34	35	36	37	38
1	*	*	1	4	2	*	*	2	4	*
2	*	*	1	6	*	*	2	5	*	*
3	1	3	2	*	*	*	1	4	1	*
4	*	1	2	3	*	*	1	3	2	*
5	*	2	3	*	*	*	*	1	4	*
6	*	*	3	2	*	*	*	1	3	1
7	*	1	4	1	*	*	*	3	3	*
8	*	1	3	1	*	*	1	4	*	*
9	1	*	2	2	*	*	*	2	2	1
10	*	3	2	*	*	*	*	2	3	*
11	*	*	3	2	*	*	1	3	1	*
12	*	*	2	2	*	*	*	*	4	*
13	*	*	*	5	*	*	*	*	4	1
14	*	*	3	1	1	*	*	2	3	*

Conclusion

The average results for instrument testing for the 2005 crop continue the trends of the past four years. Although the average results for 2005 are slightly below the results achieved for 2004, the reproducibility of micronaire, length, and strength compare favourably with USDA results with length uniformity and specifically colour (Rb and b+) being somewhat more variable. It is anticipated that the current focus on objective instrument measurement of colour will improve reproducibility. As expected the subjective determination of grade was very consistent.

It is unfortunate that all members did not fully participate in this year's check test program. It must be stressed that in order for the check test program to be relevant all classing facilities and all the installed instruments used during the ginning season should participate in the program. As a member of the CCAA one is required to participate in the check test program and it is also a requirement of the BMP for classing.



Final Report

Off Farm Series | Cotton Research & Development Corporation

Part 1 - Summary Details

CRDC Project Number: CTFT 12e

Project Title: Standardisation of Classing

Project Commencement Date: **Project Completion Date:** June 2005

CRDC Program: Off-Farm

Part 2 – Contact Details

Administrator: CSIRO
Organisation: Cotton Textile Research Unit, CSIRO Textile & Fibre Technology

Postal Address: Geelong

Ph: **Fax:** **E-mail:**

Principal Researcher: Marinus H.J van der Sluijs
Organisation: Cotton Textile Research Unit, CSIRO Textile & Fibre Technology

Postal Address: Geelong

Ph: **Fax:** **E-mail:**

Supervisor:
Organisation:

Postal Address:

Ph: **Fax:** **E-mail:**

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Part 3 – Final Report Guide

Background

There is a consensus both locally and internationally that the measurement of cotton grade i.e., colour and trash, by traditional subjective classing should be replaced with objective instrument measurements. All instrument measurements currently utilised by the Australian cotton industry are from High Volume Instrument (HVI) systems. There are currently 26 instruments installed in Australia, that class about 40 %I of the crop. Of these 24 are manufactured by Uster Technologies Incorporated¹ and comprise four models i.e., 900 Automatic (DOS based), 900 Semi - Automatic (DOS based), 900 B (CPM based) and Spectrum (Windows based). Two instruments are manufactured by Motion Control (CPM based). Considering the wide range in model age, model type and operating system it is thus understandable that a number of technical and operating issues need to be overcome before objective instrument measurement of fibre properties is accepted with confidence by the cotton trade.

If Australia is to maintain its reputation as a consistent supplier of high quality cotton it will need to ensure that merchants/classing facilities in Australia consistently specify their cotton. To do this the Australian Industry will need to allow its cotton classing sector to be assessed independently so that individual classing facilities can correct technical and operational shortcomings in their practices.

To this end, the Cotton Classers Association of Australia (CCAA) has decided to conduct a program that entails formalised and rigorous instrument colour trials, check testing and auditing of classing facilities to determine compliance to Best Management Practice (BMP) for classing, with independent analysis, interpretation of results and auditing conducted by CSIRO Textile and Fibre Technology (CTFT).

The aim of this program is to identify and remedy significant differences between classing facilities so the industry can work towards more consistent and transparent measurement of Australian fibre quality.

Methods

There are currently 10 Classing facilities in Australia, of which nine are members of the CCAA and agreed to participate in the program. The CSIRO Division of Plant Industry also participated. See Table 1 for list of facilities participating in the check test program for 2005.

Table 1 Details of Facilities participating in Program.

Facility	Location
Auscott Limited	Sydney
Australian Classing Services	Wee Waa
Dunavant Australia	Brisbane
Paul Reinhart (Australia)	Toowoomba
Queensland Cotton	Brisbane
Weil Brothers Cotton(Aust.)	Toowoomba
Volcot Australia*	Moree
Carrington Cotton Classing	Goondiwindi
ProClass	Goondiwindi
CSIRO Plant Industry	Wee Waa

*No installed instruments

During the 2005 ginning season 14 check test samples were sampled and tested as per the recommended CCAA procedure (Appendix 1 and 2).

Check Testing

The check test program involves forwarding two samples of cotton, collected by a classing facility at random from a bale or gin run, to the classing facilities for testing, both subjectively and objectively on a weekly basis during the ginning season. The main aim of the checktest is to determine the long term Table 2 Number of instruments participating in Check Tests reproducibility of each HVI measuring instrument. If an instrument is found to be out of tolerance the classing facility is notified and corrective action will be taken by the classing facility.

This year 14 check test samples were sampled and tested according to CCAA procedures. Tlx reproducibility of the instruments are judged using the following tolerances as recommended by the CCAA; length +/- 0.02 inches, uniformity index +/- 1.0 %, micronaire +/- 0.1 units, strength +/- 1.5 gpt, Rd +/- 1.0 units and b+ +/- 0.5 units. These tolerances are a lot tighter than the ones used by the USDA and suggested by CSITC, the reason being that the crop in

Australia is considered to be more uniform.

The results for the 2005 [4] crop continue the trends of the past four years. Average values for micronaire, length, length uniformity and strength fall within the set tolerances with the results for colour being somewhat more variable. Feedback has been given to the classing facilities on the performance of their individual instruments.

Instrument Colour Trials

As an initial step the industry has proposed that the traditional method of subjective classing of colour and trash be replaced by objective instrument measurement by the relevant instruments in HVI lines.

Before the industry can change to objective testing there are some issues that need to be attended to. The main technical issue is gaining agreement between the different models irrespective of colorimeter and camera type used in the instruments. The main operational issue is the way the instruments are operated from calibration through to routine maintenance and the way the instrument results are reported.

To this end two instrument colour trials were conducted by the CCAA and analysed by CTFT in August 2004 and December 2004 [1] to determine and measure the significance of any differences between classing facilities for instrument colour and trash results. These trials were conducted only on instruments manufactured by Uster Technologies Inc. which are DOS based or have Windows operating systems.

The initial colour trial, conducted during August 2004, found that there were significant differences in colour i.e., % Reflectance (Rd) and % Yellowness (b+) results between classing facilities rather than between instruments. A follow up trial conducted during December 2004, which included formal checks on instrument operating software and calibration procedure by an Uster technician (with trash measurements included) showed an improvement in the colour results obtained by these instruments although individual classing facilities still need to correct technical shortcomings of their instruments to ensure that the industry as a whole can work towards a more consistent prediction of Australian colour by instrument measurement.

The trash results indicated that there are significant differences in the three trash measurement results (%I Area, Trash Grade and Trash Count) as recorded by the instruments.

The audit of the nine classing facilities, was conducted in May 2005 by CTFT via an initial formal audit.[2] to determine their compliance to the draft BMP for Classing, version 212, Handbook, that was compiled by the CCAA, with reference to the International Textile Manufacturers Federation (ITMF) HVI User Guide and USDA recommendations

Items audited were::

Sample size

Samples delivered to Classing facilities have to be of a standard size and wrapped in a particular way to protect the samples and ensure safe working conditions for its personnel.

Sample conditioning and humidity management

Before testing samples need to be conditioned to ensure that the moisture content is within 6.75 - 8.25 %.

Of the nine classing houses audited eight condition samples before testing. Of the eight, four rely exclusively on rapid conditioning equipment (e.g., Rapidcon) to condition their samples. The other classing houses use passive conditioning (storing of samples in controlled conditions (Relative Humidity of 65 %, +/- 3 and Temperature of 21 degree Celsius +/-1.5) for 24 hours before testing) to condition their samples.

Every classing house has its own policy regarding sample retention, which is influenced by their clients and the space available for storing the samples.

Wall colour

The paint stipulated to be used on the walls is Dulux paint called 'Ghost Gum' which is a light grey colour.

Lighting

The illumination in lux (the SI derived unit of illuminance or illumination) at the working surface of the classing tables should be a minimum of 860 lux and measured using a National Digital Lux meter BN-2000 LTE instrument.

All the classing facilities must have light fixtures installed containing the recommended GE Chroma 75 fluorescent lights to provide the lighting required. The interior of all light fixtures must have a white finish and all light fixtures must have glass/perspex panes in place to diffuse the light.

Equipment - set up, calibration and USE

All classing facilities with instruments must calibrate every morning using USDA calibration cotton and then recheck their instruments on a regular basis throughout the day, using check test cotton to ensure instruments are reading accurately. If an instrument fails a check test the instrument is recalibrated using USDA calibration cotton.

All the classing houses use Upland calibration cotton to calibrate their instruments with the exception of two classing facilities that use Extra Long Staple (ELS) cotton (long strong).

A number of classing facilities have ELS calibration cotton in stock which is used to calibrate the instruments when testing Pima cotton.

All classing houses generally test every second or third sample in a module. This frequency can be changed on request if the quality of a particular module is found to be borderline cotton.

Use of agreed standard - USDA

Classing facilities must use current USDA Standard Grade boxes to class cotton. The classing facilities only need the most relevant grade boxes applicable to Australian cotton, which tend to be boxes describing grades 11, 21, 31, 41 and 51 and spotted grade boxes describing grades 23, 33, 34, 43 and 53.

Check Testing

It is a requirement that all members of the CCAA participate in the check testing program and include all their measuring instruments in this program. A summary of the 2005 Check testing program is presented earlier in this article.

Classing facilities are also encouraged to participate in the USDA and Bremen Round Tests. There is a minimum requirement for data transfer.

Results

The initial audits show that all the classing facilities generally comply with the requirements of the classing handbook. A more in depth follow up audits will determine whether classing facilities will be certified as BMP Classing facilities.

Module Averaging

Module Averaging was introduced in Australia in the mid 1990's as a means of improving the accuracy of instrument readings for strength, micronaire, length and length uniformity and to compensate for the natural variability of cotton. Three module averaging systems were in use in Australia and as part of the standardisation of classing program the Australian cotton industry needed to adopt a single module averaging system. The three systems have been assessed [3] and a recommendation by the CCAA on a single module averaging system was endorsed by CEAC and will be implemented for the 2006 crop.

International Collaboration

Many cotton growing countries are addressing similar issues as the World moves more towards objective instrument based cotton classing systems despite only 30 % of the world's cotton being instrument classed. The International Cotton Advisory Committee (ICAC) recently established a task force on the Commercial Standardisation of the Instrument Testing of (CSITC). This move, aimed at achieving international standardisation, has the strong support of the International Textile Manufacturers Federation (ITMF), the International Cotton Association (ICA), and major trading countries including Australia. A successful outcome will reduce commercial risk to all links in the cotton market chain.

Four Australian classing facilities have just participated in a CSITC pilot trial that seeks to review accuracy and precision levels in current instrument testing procedures. This work was supervised by USDA and the Bremen Fibre Institute and provides a further example of Australia's effective international collaboration.

This program of check testing, instrument trials and auditing will continue in 2006 to ensure that all classing facilities in Australia consistently and accurately specify our cotton to the benefit of the grower and spinner.

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