

Australian cotton: How good is it really?

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A survey has been conducted by the CSIRO's Textile and Fibre Technology Division (CTFT) with the support of the Australian Cotton Co-operative Research Centre (CRC) and the Australian Cotton Shippers Association (ACSA) to determine what customers of Australian cotton (the spinning mills) think about the quality and processing performance of Australian cotton.

As well as being valuable from a marketing perspective, the information will assist in shaping directions in research from breeding and growing through to ginning and classing.

The Australian cotton industry has grown from a crop of 65,000 bales in 1971 on 32,000 hectares, with yields being low and quality being poor, to a crop of 3,033,320 bales in 2002 on 404,000 hectares, with estimated export earnings of \$1,700 million in 2001-02.

Even though Australia produced only three per cent of the world's cotton fibre in 2002-03, it was the third largest exporter (after Uzbekistan and the US), making up over 18 per cent of the 2002-03 world export market.

Australian cotton is generally viewed worldwide as a quality fibre and is usually purchased with the intention of producing high quality yarns — normally combed ringspun for use in the woven and knitted apparel sector. Australian cotton is normally purchased for a premium and as such is expected to perform without any processing difficulties to produce a quality yarn and fabric.

Generally, it does perform as expected, but suppliers have been receiving com-

plaints and negative comments regarding certain aspects of Australian cotton.

The Curran Report in 1998 and anecdotal reports from merchants and mill managers have highlighted concerns regarding some aspects of Australian fibre quality. But direct impartial information from spinners has been lacking.

Although all stakeholders from growers through to spinners were consulted during the Curran Report, the response from domestic and international spinners to a questionnaire was only 38 per cent. The low response rate meant that the question of "What do spinners really think of Australian cotton?" wasn't answered.

So a proposal was submitted to the Australian Cotton CRC to conduct an in-depth survey of mills to properly measure their impressions of Australian cotton fibre quality. A major part of the survey was the

preparation of a questionnaire and interviewing in person the management and production staff of over 30 mills.

Conducting the interviews face-to-face ensured that all questions in the survey were answered consistently and meant that interviewees could discuss their answers in more depth. The interviews also provided a forum for additional information to be discussed and noted.

THE SURVEY

In conjunction with ACSA, CTFT prepared a questionnaire that was divided into two areas:

1. Background

This section contained 12 questions that asked mill managers to provide general information about the spinning mill.

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TABLE 1: Impression scale used to rank spinner's responses to survey questions

Scale Range	Impression
5	Good
4	
3	Indifferent
2	
1	Bad

TABLE 2: Spinners cotton fibre property requirements

Fibre properties	Preferred value	Performance of Australian cotton
Micronaire ¹	3.8-4.2	56% in 2002 and 34% in 2003 in 3.8-4.5 range ³
Length ¹	1.125 inches (28.6 mm)	76% in 2002 and 61% in 2003 1.125 inches and longer ³
Length uniformity ¹	> 81 %	In 2002-03 UNI averaged 82.1% with 24% ≥ 83% ⁴
Short fibre content ¹	< 8 %	In 2002-03 SFC averaged 10.1% with 20% < 8% ⁴
Strength ¹	> 29 grams/tex	54% in 2002 and 53% in 2003 greater than 29 grams/tex ³
Grade ¹	>31-3 Middling	94% in 2002 and 88% in 2003 graded 31-3 or better ³
Neps ²	250 neps/gram	In 2002-03 nep counts averaged 276 neps/g with 32% < 250 neps/g. Range extended from 164-496 neps/g ⁴
Contamination	Low/none	Considered some of the least contaminated in the world ⁵
Stickiness	Low/none	Considered one of the least affected by stickiness in the world ⁵

¹ As tested by HVI; ² As tested by the AFIS 720; ³ Fibre properties of the Australian crop (ACSA);

⁴ Results from mill samples; ⁵ ITMF Contamination Survey 1989-2003.

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2. Perceptions and needs

This section contained a further 19 questions of which 18 focussed on fibre properties (micronaire, staple length, length uniformity, short fibre content (SFC), strength, elongation, grade, colour, contamination, trash, neps, spinning ability, dyeing ability, maturity and fineness), identifying the minimum and maximum values to understand the relationship these properties had to yarn and fabric quality and processing performance for the mill.

The last question was a general question enquiring about any other concerns/issues which the spinners had and which they wanted to be included in the survey results.

The rating scale ranges from one to five (see Table 1) with five representing a good impression of the fibre property, a three rating indicating the fibre property was neither good nor bad and a one rating indicating a bad impression of the fibre property. A rating of three meant one of three things:

- That the fibre property did not cause any problems in the mill;
- That there was no issue with regards to the quality of that parameter; or,
- That there was no understanding of that fibre property by the mill.

The information gathered in the interviews was further enhanced by objective measurements on fibre samples gathered from bale laydowns at each mill. Samples were collected four times over the past year using a formal sampling procedure developed by CTFT, which was demonstrated during the visit to each mill.

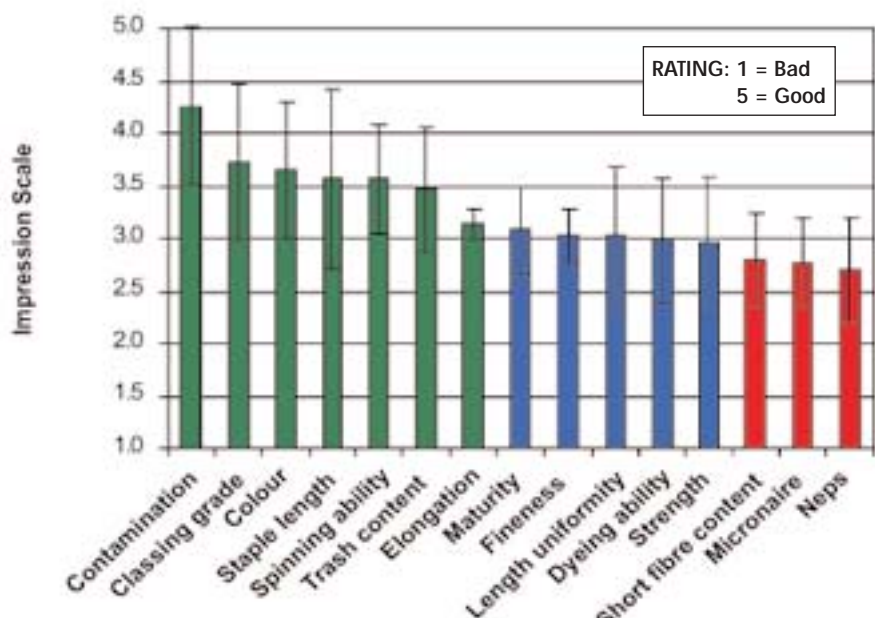
These tests provided an independent and objective benchmark of the actual fibre quality being used in each mill, and allowed for direct comparison with samples of cotton from other countries (such as the US and China) being used by the mill in the same laydown as Australian cotton.

COUNTRIES SURVEYED

The countries and mills selected for the survey were representative of users of Australian cotton. The survey also included Australian spinning mills which traditionally have consumed around five per cent (about 150,000 bales) of the total crop.

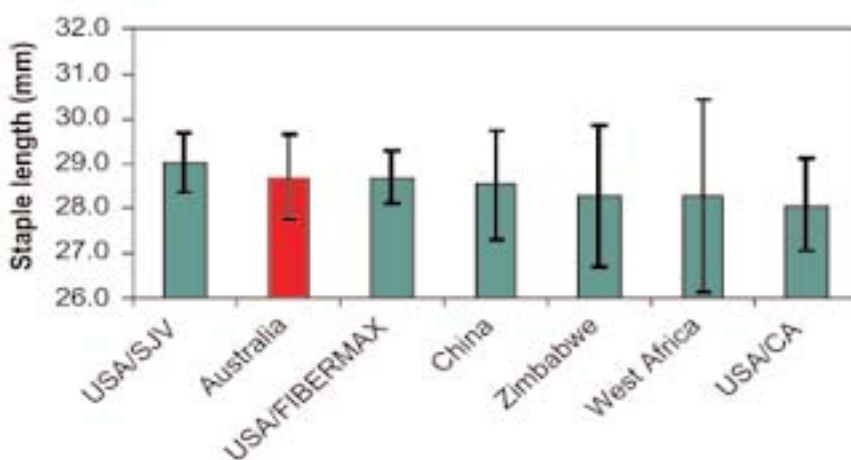
Export figures released annually by ACSA and those published in *The Australian Cottongrower Cotton Yearbook* show that 75 per cent of the Australian crop is exported to Asia and mainly to four countries — Indonesia, Japan, Thailand and South Korea. It is also interesting to note that all four countries are

FIGURE 1: Spinners impressions of Australian cotton fibre quality



Fibre properties in the impression scores less than three are highlighted in red.

FIGURE 2: Staple length of mill samples



among the world's leading exporters of textiles, and with the exception of Japan, also the world's leading exporters of clothing.

Thirty-one mills across the five countries were surveyed — eight from Japan, eight from South Korea, seven from Thailand, four from Indonesia and five from Australia. The mills surveyed used more than 810,000 bales of Australian cotton annually.

RESULTS

Mill survey

In the majority of mills visited, Australian cotton is blended with other growths from around the world including cotton from the US — particularly from the San Joaquin Valley (SJV) and other regions in California, Zimbabwe, China, Uzbekistan

and various countries in West Africa. On average, Australian cotton made up 50 per cent of the bale laydowns in the mills surveyed, although the amount of Australian cotton in bale laydowns ranged from 10 per cent through to 100 per cent.

The average impression ratings for each fibre property surveyed are plotted in Figure 1, with the bars indicating the standard deviation of the mean.

Looking at the average impressions it is apparent that Australian cotton is rated highly on fibre properties such as:

- Contamination, including biological contaminants such as stickiness and seed coat fragments (4.3);
- Classing grade (3.7);
- Staple length (3.6);

- Colour (3.6);
- Spinning ability (3.6);
- Trash Content (3.5);
- Maturity (3.1); and,
- Extension (3.1).

The mill responses indicated that the other fibre properties such as maturity, fineness, dyeing ability, strength and length uniformity are generally not an issue, or less of an issue to spinners as these fibre properties all had a rating of 3.0.

Although contamination has been rated as the most favourable fibre property of Australian cotton, concerns have been raised that incidences of some contaminants are increasing.

The spinners' concerns raised in this survey are supported by the ITMF contamination survey for 2003.

This shows that, as is the case world wide, contamination of Australian cotton is on the increase — from five per cent in 1989 to 13 per cent in 2003 — but it is still considered one of the least contaminated growths in the world.

SOME CONCERNS

There are concerns regarding fibre properties such as:

- High nep (2.7);
- Short fibre content (2.8); and,
- High micronaire values (2.8).

Neps

Neps in particular remain an adverse feature of Australian cotton. Neps affect the appearance of cotton yarns and fabric and are usually associated with lower yarn strength, poorer spinning performance and a more irregular yarn.

The appearance of dyed or printed fabrics is negatively influenced by the presence of neps. These often comprise immature or 'dead' fibres, which don't absorb dye and reflect light differently and appear as spots or 'flecks' on finished fabrics. This causes fabrics to be downgraded or rejected, as there are no cost effective means of covering or removing them once they are present in fabric.

Micronaire

The higher micronaire of Australian cotton over the past two to three years was also an issue with mills, particularly those that spin fine count yarns (Ne 40 and finer). In order to spin a quality yarn without processing problems, a minimum number of fibres is required in the yarn cross section. So the thicker the fibres (as indicated by micronaire), the more difficult it is to spin fine yarns.

FIGURE 3: Short fibre content of mill samples

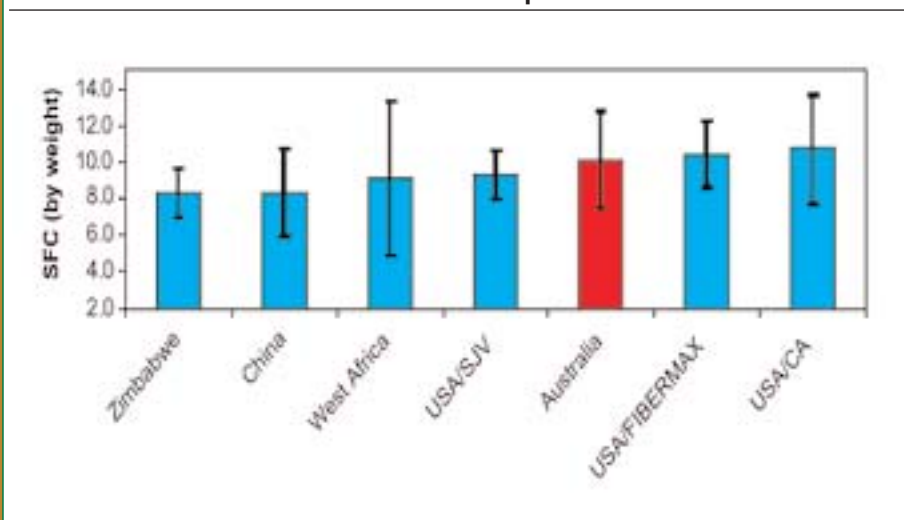
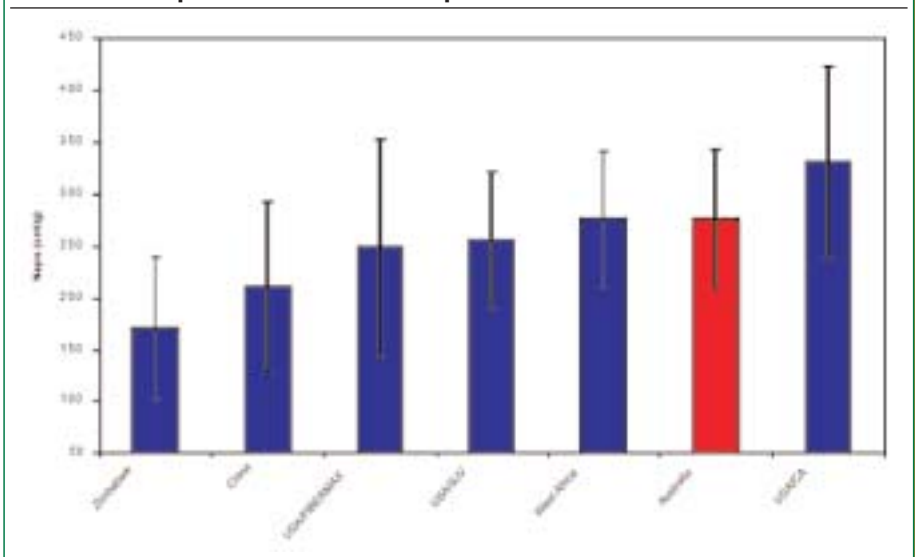


FIGURE 4: Nep content of mill samples



Short fibre content

Excessive short fibre content is also perceived as a problem in Australian cotton. Short fibre content is taken to refer to those fibres shorter than 12.5 mm. Excessive short fibre content leads to (especially in medium to fine counts) poorer spinning performance, an increase in yarn irregularity, a decrease in yarn tenacity, increases in yarn hairiness and fly generation (fibres liberated to the atmosphere in the mill) and more rapid deterioration of fabric appearance.

With regards to nep and short fibre content, there was a general comment from many spinners that there had been an improvement in these properties in recent times, although at the same time there was a lack of consistency in these properties between contracts supplied to spinners.

It should also be noted that the

'improvement' in the impression of nep and short fibre content in Australian cotton coincides with the production of high micronaire cotton that is less prone to neping and fibre breakage — that is, short fibre creation.

OTHER ISSUES

Other concerns raised by the mills surveyed included:

- Most of the spinners weigh either all or a percentage of cotton bales on arrival. Spinners were concerned that the actual bale weights were often lower than the invoice weights.

- Variation in bale sizes and densities causes problems when the bales are opened in the blowroom. Bales of different densities open to different heights in a bale laydown and this leads to variations in blending.

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- Spinners felt they should be supplied with more information regarding the cotton they buy — such as fibre properties of each bale, the area/region where the cotton was grown and where/how it was ginned.

- Spinners appreciated the technical assistance that was provided by US Cotton Incorporated technicians and felt that a similar service for Australian cotton would be worthwhile.

- They wanted faster responses to complaints.

- Consistency of supply. Some spinners noted that there is sometimes a large variation in fibre quality from the beginning to the end of season.

- Exporters, in particular to Europe, are starting to be pressured into producing eco-friendly products and thus need assurances that the cotton used is produced under similar conditions (BMP and/or Eco-labelling).

- The attitude of merchants towards local Australian spinners was considered poor, especially in light of the service they (had) performed in reporting the quality of Australian fibre from a spinner's perspective.

- There is a perception that the quality of Australian Pima is poor.

MILL LAYDOWN SAMPLES

As indicated earlier, the mills that participated in the survey were also asked to collect samples from their bale laydowns to provide an independent and objective benchmark of the fibre quality being used in each mill.

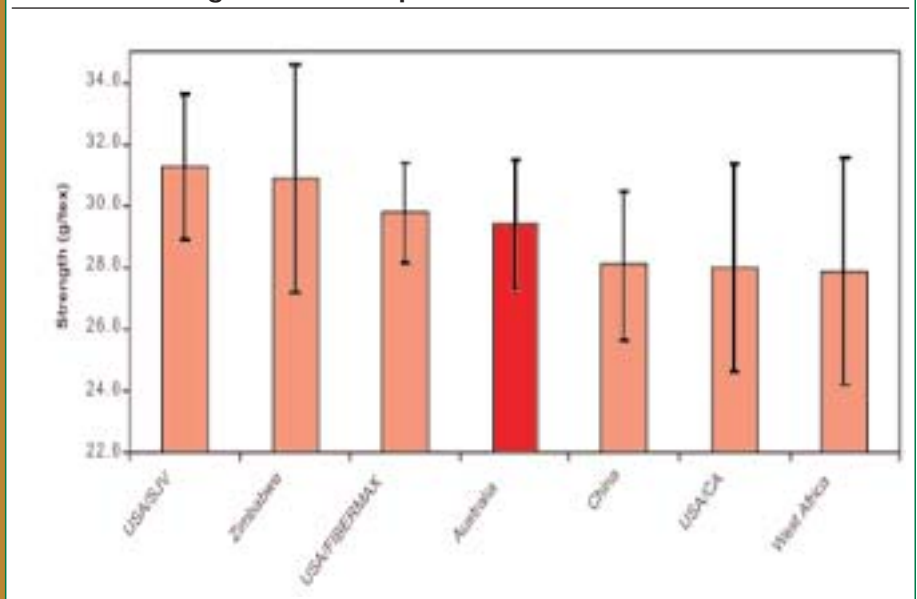
This enabled Australian cotton quality to be compared directly with the quality of cotton from other countries.

Samples collected by the mills were sent to CTFT where results were verified and collated before forwarding the samples onto Auscott for HVI and nep testing. In total 131 different cotton samples representing over 60 laydowns were received from mills in 16 months from October 2002.

A breakdown of these samples by origin reveals: 62 samples of Australian cotton, 36 samples of US cotton, 15 samples of Chinese cotton, nine samples of Zimbabwean cotton, five samples from West African countries, three samples from Uzbekistan and one sample from Greece.

The proportion of Australian cotton in the participating mill laydowns varied widely from 10 per cent through to 100 per cent with the average percentage over the past 16 months being a little over 50 per cent.

FIGURE 5: Strength of mill samples



During 2003 the effects of the drought were evident on the percentage of Australian cotton in mill laydowns. In the sampling period from October 2002, the proportion of Australian cotton in mill laydowns progressively reduced — by around 10 per cent from October 2002 to September 2003 and a further five per cent to February 2004. Australian cotton was replaced mainly by US and Chinese cotton.

In most cases Australian cotton was used in laydowns for medium to fine count ring spun yarns, although yarn counts as coarse as Ne 8 were spun from Australian cotton. The finest counts spun from Australian cotton were Ne 60 with the average count being Ne 30 with a large number of the mills using Australian cotton producing Ne 40 combed ring spun yarn.

For these latter mills, fibre fineness, length and SFC are particularly important and the high micronaire of the past two years has had a serious impact on these mills. Nep count is less important in these mills because the combing action removes neps. But where combing is not used, nep count becomes important because of the way this property affects yarn and fabric appearance.

Figures 2, 3, 4 and 5 show how Australian cotton rates on the basis of length, SFC, neps and strength respectively, with six other growths it was blended with in mill laydowns.

Australian cotton does not achieve a number one ranking in any of these properties, although it ranks second behind SJV cotton in terms of staple length. Australian cotton ranked low in (had high levels of)

SFC and neps and was ranked middle in terms of strength behind SJV, Zimbabwean and Californian grown Fibermax.

In the second column of Table 2, the preferred sales contract standards of mills that were surveyed are listed and in column 3 the performance of Australian cotton in meeting these standards is shown — measured from ACSA data and the bale laydown samples.

CONCLUSION

While there is no doubt that Australian cotton is viewed as a quality fibre by overseas mills, the results of this survey make it apparent that in order for Australian cotton to keep this status and continue to obtain a premium, a significant and sustained focus on improving fibre quality is required.

Micronaire, nep and short fibre content stand out as the first priorities. Fibre strength, an extremely important parameter to spinners, also needs to improve. In addition, the consistency of these and other properties delivered over a sales contract needs to improve.

Finally, the drought and the substantially smaller crop have forced our traditional customers to explore other growths of which there are many. This combined with the increased supply of US and Brazilian cottons with improved quality relative to Australian cotton will, no doubt, make recapturing volume in our traditional markets more difficult.

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