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**NEPS, SHORT FIBRE CONTENT, HAIRINESS.**

**SCOPING STUDY for the CRDC**

Roger Hayhurst

Norton Corporate Svcs

Po Box 856

Green Waverley

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## **NEPS, SFC & HAIRINESS**

### **A short examination of the scope for CRDC funded research in this area**

#### **Introduction**

The objective of this study is to examine the scope for further research into certain quality characteristics of Australian cotton which are seen by many cotton industry participants as critical areas for improvement if the Australian fibre is to maintain its reputation for excellence, namely:

- neppiness
- short fibre content

Following the 1998 Conference Norton Corporate Services Pty Ltd was commissioned by the Cotton Research and Development Corporation (CRDC) to carry out a short study of around nine working days. Roger Hayhurst undertook this work during the period October/November 1998.

This study is intended to assist the CRDC decision making process regarding work in these areas.

A tendency for yarns made with Australian cotton to exhibit hairiness had also been commented on by the textile industry and the CRDC requested that this issue be considered also.

#### **Methodology**

The steps we took in approaching this task can be summarised as:

- consulting cotton users to verify that a problem does indeed exist
- understanding the lead up to, and the issues raised in, the Curran Report
- familiarisation with some of the research work already being done
- consultation on site with a series of growers, ginner, merchants and spinners
- other consultations with equipment suppliers, research bodies and ITMF delegates
- development of this document

John Curran's recent report touched on the nep and short fibre content issues; this study attempts to further explain why these characteristics are problematic and, more importantly, what can usefully be done.

The options for further action that are presented in section 5 of this document are essentially our views and are based mainly on our soundings in the consultation process described above and on our experience in, and exposure to, the cotton textile industry over some years.

We have attempted to produce a "scoping" document, ie. one which provides essential background and industry views as well as suggesting certain specific projects for the CRDC to consider. We accept that our findings are not exhaustive and that whilst some of our views may be supported, some may not. If the report attracts strong views either way which leads to decisive action then it will have served its purpose.

### **This Exercise in Context**

We see this short exercise as being Step 1 of three main steps in the preparatory stages prior to the actual execution of the R&D work.

- Step 1      Scoping out possible R&D effort in these areas, testing possible alternatives, initial gauging of industry thinking  
    ↓
- Step 2      Focusing phase. CRDC weighs alternatives, assesses relative costs/benefits, identifies potential participants and most importantly sells to industry  
    ↓
- Step 3      Decision phase. Board firms up the project briefs, selects the persons/organisation to deliver, approves funding.

↓

R&D Execution

### **Report Structure**

There is no summary of conclusions up front, instead we have opted to take the reader through some of the important background issues in the early part of the report leading up logically to the conclusions.

The question and answer format has been used extensively where this makes the point easiest to understand.

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## 1 DEFINITIONS

What do we mean by the terms neps, short fibre content and yarn hairiness?

**Nep** The Textile Institute defines a nep as:  
*a small knot of entangled fibres (in the case of cotton it usually comprises dead or immature cotton hairs)*

**Short Fibre Content (SFC)**  
*the percentage of fibres equal to or below 12.7mm (0.5 ins) in length*

**Yarn Hairiness**  
*the degree to which fibres protrude from the surface of a yarn diminishing the yarns lustre and smoothness*

## 2 UNDERSTANDING THE PROBLEM

2.1 In what way are these characteristics real problems?

Neppy yarns have an untidy surface appearance and a rougher handle than nep free yarns. However, it is in the finished (dyed) fabric where neps are at their most damaging. Here neps usually appear as white specks which have not taken up dyestuff like other fibres because (as the definition above says) they are usually made up of immature fibres. A representation of "white speck" nep is contained in the appendix (Bel Berger and Roberts).

SFC is problematic in that like neps excessive short fibre in a yarn detracts from its appearance; however the main cost to the user of high sfc cotton lies in loss of processing efficiency (because it leads to weak yarns) and loss of raw material yield.

Put simply, the producer of fine yarns for the premium end of the market usually combs the cotton to extract (and discard) fibres below a certain length. Thus cotton which has a high sfc, or a even a "long tail" distribution of short fibres, will result in higher waste levels.

Spinners are very focused on this as one would expect. The arithmetic is simple; in the production of combed yarns typically between 15 and 25% of the shortest fibres (which cost around 65 US cents per pound to purchase) are combed out and discarded. Higher sfc cottons require higher percentages to be combed out with the resulting economic loss.

Yarn Hairiness is for the most part an appearance problem however it can also become a technical issue particularly where fabrics undergo critical surface

treatments (eg printing) or when surface fibres displaced during high speed processing, accumulate in or on machinery and cause downtime.

## 2.2 How big a problem are they?

### 2.2.1 To the textile chain

Neps represent a significant problem as today's consumer is sufficiently demanding to return goods to the retailer if the appearance is unsatisfactory. The retailer in turn exerts pressure for superior appearance on the apparel manufacturer, this pressure comes back up through the supply chain (fabric wholesaler → dyer → weaver or knitter → spinner) to the grower.

Can neps in the lint be fixed somewhere in the textile process chain?

No, this problem cannot be fixed. Where combing takes place however (in perhaps 20% of cotton yarns) some neps will be combed out in the waste.

Can neppy (or low maturity) cotton be directed to less critical fabrics?

No. Yarn and fabric production is a high volume, continuous process, not a batch exercise. Furthermore, the textile industry has a "horizontal" structure which makes channelling of cotton for certain end uses impractical. Typically, raw cotton is sold to the spinner who may sell yarn to a merchant who on sells to a weaver who has the fabric dyed on commission. The dyeing process might be three changes of ownership away from the yarn producer and could be six months after the cotton is entered into production.

Neps are more of a problem in ring spun than in rotor spun yarns. They tend to lie more on the surface of ring yarns and, as ring yarns are generally finer than rotor yarns neps are more noticeable.

High sfc is a significant problem in that it causes

- loss of processing efficiencies in spinning
- loss of yarn strength which in turn causes loss of efficiency in weaving and knitting
- excessive fibre losses in the spinning plant
- hairy yarns

There is nothing that can practically be done in the textile processes to rectify a sfc problem.

Yarn Hairiness is one of the manifestations of the sfc problem. However hairiness of itself is less critical than either neps or high sfc. It is mostly limited to woven fabrics made from ring spun yarns, not usually critical in rotor spun yarns or any knitted fabrics.

### 2.2.2 To the grower

A short term view might be that these problems are no real concern to the grower as they do not trigger any discount from the merchant nor do superior results trigger any premium.

This is not a safe approach to adopt, the fact is that the world marketplace will always discount cotton types which become associated with certain negative characteristics whether or not these characteristics appear on a merchants p&d sheet. Good examples would be those growths known for stickiness or those known for bale contamination risks. Australian cotton itself in the early 1980s was usually discounted against similar growths because the market had the perception that it was a weaker fibre, even though it was not discounted for strength in the merchants p and d sheets.

One particular difficulty for any grower and ginner concerned about nep and sfc is their relative difficulty to detect and measure easily, quickly and reliably.

## 2.3 Source of this Problem

### 2.3.1. Overview

The following table, gives a snapshot guide to answering this question at its simplest level. It attempts to indicate the relative importance of each source area. The main message is that these quality problems can stem from a variety of sources, the gin is by no means the only source of problems.

Source	Nep	Short Fibre	Hairiness
Fibre maturity	XXXX	XXXX	XX
Harvesting practice	XX		
Ginning practice	XXXX	XXXX	XX
Spinning plant practice	XX	X	XX

The table oversimplifies the situation particularly regarding neps. There are different types of nep with different causes.

In the work of P Bel Berger and G Roberts (CRDC) three main types of neps are described:

Biological,	caused by trash particles entangled in cotton;
Mechanical,	caused by some or all the mechanical actions on lint between the boll and usually the drawing process in the spinning plant;
White speck,	caused by thin walled or immature fibres.

Using these definitions:

- Biological nep manifests itself as dark specks in undyed fabrics which are sometimes able to be removed in the scouring processes preparatory to dyeing. To a large extent mechanical picking is one of the causes. Whilst the dyer may be able to scour out some of these biological neps, fabric is often traded in its undyed or greige state and the presence of biological nep will impose a commercial penalty on the fabric producer (who in turn will pass the penalty upstream to the yarn producer).
- Mechanical neps can be introduced in any cotton but it is immature cotton which is most vulnerable.
- White speck, as the name suggests, results in dyed product specked with undyed neps (see appendix 1), this either renders the fabric unuseable to the garment producer or discounts it to a "second".

The definitions of white speck and mechanical neps overlap somewhat. A mechanical nep will show as a white speck when it is made up of immature fibres (as is often the case).

### 2.3.2 Root Causes

Whilst low fibre maturity, harvesting and ginning practice are the main sources we must dig underneath this simple proposition to better understand the problem and to judge what measures we might be able to take.

Why do we have a lower than optimum fibre maturity?

Leaving aside all the complex factors (biological, agronomic, climate and the like) which is beyond the scope of this paper, one pick harvesting practice is a contributor.

In comparison with many of their overseas competitors Australian growers operate in a high cost environment. They compete on the basis of achieving the best efficiencies and this is how it has to be. Once over picking is the logical grower response to keep costs down, however it does mean that some bolls are picked before they are fully mature, lowering the average maturity of the pick.

It is not sensible to suggest adopting measures (such as working with a second pick) which, in the present pricing system, are uneconomic to the grower, that is no answer at all. This begs the question if quicker maturing or more even maturing varieties can be developed.

In what way are ginning practices at fault?

There is a wealth of research on this topic which shows the detrimental quality effect of: overcleaning at the gin, ginning fibres that are too dry or too wet and ginning with too high a throughput. As none of the people consulted disputed the

validity of these findings, they have not been reproduced here. It is important to note that the “wealth of ginning research” referred to above relates mostly to American varieties and conditions, not Australian.

## 2.4 Is this a new problem?

The “why now?” and the “is this the flavour of the month?” queries have been raised. The answer is: No, it is not a new problem; it is simply that more is being demanded of the Australian fibre than hitherto. This crop has progressed from being regarded by the market in the 1980s as;

*...a good, clean fibre with a good colour, a bit on the weak side but suitable for medium counts....*

to one that is expected to perform in fine combed yarns. Quite simply the bar has been raised!

Clearly another reason for recent increased focus on nep and hairiness is that the technology for objectively measuring these attributes is now available and is being extensively used. Importantly this new means of accurate measurement is also backed up by the compilation of industry wide benchmarks of the results. Thus cotton purchasers now have the objective means to select between raw cotton offers on the basis of their nep and sf content.

## 2.5 Market Considerations

The pressure on the Australian cotton industry to improve quality will not relax. The future market for Australian cotton will not be “spinners” in any general sense but will be particularly those spinners who are producing yarns for eventual consumption in the most sophisticated and demanding markets. As a non subsidised crop it will not be able to compete in the lower reaches of the market with the cheaper offerings from eg Pakistan, China and the CIS.

This means that the Australian Cotton Industry’s future prosperity will depend upon this cotton being used increasingly in finer and finer yarns with ever more critical end uses. In other words the present debate is just the start, we can expect our customers will increase their quality demands year on year.

One of the yarn producers consulted during the course of this project was producing 50s English (Ne50) combed ring yarn. Under normal circumstances this yarn would have been taken to world markets but because of the neppy appearance its use was in fact being restricted. This means there is a part of the market (in this case the high profile part) from which we are excluded. A discount in anyone’s language.

Technology developments in another field will also increase the markets scrutiny of our cotton. Whether we like to admit it or not, one of the attributes which is

helping to sell our, and American, relatively high priced cottons to spinners of premium yarns is the lack of "foreign" contaminants in the bale. Although the fibre quality of some of the CIS and Asian cottons benefits from hand picking and slower ginning, bale contamination lets them down. Now that video based contaminant detection and removal systems for spinning plants are improving and finding increasing acceptance with spinners, this relative competitive advantage we now enjoy in the market may be under threat.

The arithmetic is straightforward: a modest sized spinner producing 100 tonnes of combed yarns per week would consume around 14 million pounds of lint annually. If an Australian or US cotton at 68 cents can be replaced by a CIS cotton of good fibre quality but with possible bale contamination at 64 cents, a half million US dollar per year saving results. Put simply, this would buy a spinner a lot of sophisticated technology for contaminant detection and removal.

### **3 RELATIVE IMPORTANCE OF NEP, SFC AND HAIRINESS.**

Work on neps and sfc and (because of the part it plays in all this) maturity must take a higher priority than direct work on yarn hairiness at this stage.

Hairiness, where it occurs, is not a problem across all the market, it is usually limited to woven fabrics which are produced from ring spun yarns. Also it is a characteristic which can be as much influenced by spinning plant technical settings as ginning settings. Draft settings and their relationship to twist, levels of twist, type and condition of the drafting elements, rings and travellers all play a part.

### **4 FINDINGS**

During the course of this study many thoughts and observations were expressed by interested parties in various parts of the industry. Many of these are summarised here to illustrate the large cross section of opinion in the industry.

They are grouped by source area for ease of presentation. No particular order of importance is implied. Some of these points flow through to the options for further action canvassed in section 5, some do not.

#### **4.1 Gin related**

Most gins now are said to be doing a reasonable job in what has become a competitive part of the industry. In previous years growers had not concerned themselves sufficiently with the ginning process, now they are beginning to.

Neps and sfc are more influenced by variety and agronomic practice than by ginning practice. We are getting the crop ready quicker than previously, we are once-over picking and we are picking more aggressively.

The development of some of the process control technology might be of some help but so far the main influence of these developments has been limited to the economic issues of regulating moisture and trash content.

Much continues to be said about how the "pricing structure" of the industry goes against reducing the amount of work on the fibre during ginning. Grade is one of the main determinants of the price the grower will attain for his cotton so the ginner will be processing to achieve the highest grade. What we now know is that this pursuit of the highest possible grade can harm the quality outcome at the yarn and fabric stage.

Ginning is a capital intensive business, so throughput and thus ginning speeds will tend to be pushed higher. This is to be expected, the spinner who is the next step on the supply chain does likewise. The key difference is that the spinner has a lot of good, quick tests available to him so he can see when increased speeds begin to produce problems for the "next one in line," in his case the weaver, knitter or dyer. The ginner does not have this facility, he cannot measure quickly and objectively what effect speed, or other ginning parameters have on nep and sfc which are important to his "next in line." Only visual changes can be quickly assessed.

Reviewing our approach to the p and d sheets was an option contained in the Curran report. Some would argue that the grade/length price signals are now out of date for the market we are in.

As an example, a grower gains relatively little between selling a Middling and a SM or a GM, in this circumstance a ginner could sacrifice a potential SM or GM cotton by pushing up ginning rates and maintaining an output of middling. Rather than pressuring producers to enhance quality the system appears to reward "base" or middling cotton.

Is our base of Middling used on our p and d sheets appropriate. Would a lower-grade base (as in the US) result in less of a "grade at all costs" approach.

Can we consider a ginning laboratory in Australia. A 3 million bale crop justifies one and there is clearly much work to be done. Should we be content to rely on "feeding off" the US ginning research effort.

## 4.2 Spinning Related

The traditional benchmark information used by the world textile industry (the Uster Statistics) now links fibre quality parameters such as nep, sfc and trash to yarn quality.

Using this tool a spinner of say Ne 40 combed, who aims to be in the best quartile of producers worldwide knows he has to achieve a result of around 17 neps per gram and 3% sfc by weight in the yarn. He can then track this requirement back through each process in the plant. In this particular example the statistics suggest he should be specifying a maximum of around 180 neps per gram and 7.5% sfc in the bale.

Whilst most purchasers are not yet specifying in this manner, it is only a matter of time.

## 4.3 Grower Related

The growers consulted all understand there are issues to resolve but are locked in by the present pricing system. They are wary about cotton quality measures such as nep and sfc which may end up being "*another means to discount us.*"

This scepticism is probably the greatest challenge ahead in making real progress, however, the alert grower will be looking beyond the short term message of the merchants p and d sheet to the more meaningful messages that the spinner, weaver and garment consumer is sending him.

*What are consumers telling growers?* The world's consumers of "close to skin" clothing and textiles (garments, bedlinen and towels) account for almost all consumption of premium cotton, other cotton uses are insignificant. These consumers give out many messages but the clearest one of all is that six years ago 49% of the fibres that these people pulled through the supply chain were cotton, by 2005 this figure might well be down under 45%. By 2005 the ITMF predicts polyester will have moved past cotton as the single most preferred fibre. This is a sobering thought for growers.

Against this backdrop of a tightening market growers need to have more and better information about the quality questions raised further down the supply chain. Total reliance on merchants (whose priorities may have a different slant) to keep them informed is not enough. The growers long term prosperity depends on having a presence in the high quality market. The merchant's prosperity it could be argued, depends on achieving the required trading margin whether he is trading high or low quality cotton. It is quite probable that the trader makes more of a margin on the lower grades than the higher ones.

One grower outlined nep tests they had carried out on lint picked under the same conditions at three different machine picker speeds, the result was predictably more neps in the lint as the picking speed increased. So, some growers are getting involved in these questions.

The risk of losing grade through rain and being discounted is a far more potent signal to the grower at the moment than the benefits of waiting for a higher maturity before picking.

#### **4.4 Equipment Supplier Related**

Zellweger Uster market the gin process control equipment Intelligin which aims to improve the quality of ginning by closely monitoring the process and making adjustments. This is a welcome development but its use has so far been restricted to 8 gins in the USA with another 10 coming on stream for the 1999 season.

The company will not market this product in Australia before 2000.

It is said that, at this stage the system is being used more as a tool to optimise the gin turn out of weight rather than quality. Nevertheless, it appears to have the potential to increase the information available, in real time, to the ginner, so it is a beginning.

The same company markets the AFIS equipment. There are two installations in Australia at this time, both in merchants testing facilities. Their use is somewhat limited by the relative slowness of the test in comparison with the customary HVI tests.

The Premier company is expected to bring its nep testing equipment to market in the near future. It is anticipated that this equipment will be able to test nep at the same rate as the HVI line. This development might be the key to the vital requirement for the industry, that of accumulating reliable test data.

#### **4.5 Merchant Related**

Whilst the effort to improve quality of the crop in general must be pursued, there is some danger that increased preoccupation with such problems as nep and sfc will give the market a reason to discount us.

The approach of our conducting research in a joint venture with the USDA (our main competitor) may go against us in the marketplace.

It was said that less of the nep and sfc problems stem from ginning than is commonly supposed; the general conditions of the growing season are the

greatest influence. Tests carried out on lint from the (favourable) 1998 year showed the following general trends:

- 20% less neps/gram than in the 1997 year
- longer staple by around one 32nd
- micronaire range up from 3.5/4.2 to 3.8/4.5
- SFC down by 4%

There is an, as yet very small, number of spinners who will pay some premium for lint ginned according to their recommendations (eg only one or no lint cleaners).

This is happening on a small scale both here and in the US and it illustrates just how the present system is failing key customers. The approach being taken appears to be as follows:

- a certain grower produces cotton of a quality that he and the ginner would normally expect to come out as say an SM using two lint cleaners
- the spinner wants it ginned with one or no lint cleaners, under these conditions it will be say Middling
- the grower or merchant will agree to do this for the spinner provided he pays for SM

For now, this is an option some spinners are using but it is clear that a pricing system that is predominantly grade based is flawed.

The above example illustrates the "quality corner" the industry has been backed into; unless the spinner contrives to interfere with and change the approach that the grower and ginner would *normally prefer to take*, he would receive a lower quality product.

## 5 CONCLUSIONS

We have presented below our views on which areas the CRDC should direct its efforts and resources. (Equipment brands that have been mentioned are for ease of understanding only, not necessarily recommendations).

### 5.1 Information

One of the clearest signals to come from this exercise is that there is a serious information gap in the industry. Addressing this should be a high priority for the CRDC. The information gap exists at two broad levels:

- A) below refers to the need for cotton industry participants to have at least a general understanding of the supply chain on which their businesses ultimately rest and
- B) refers to the need for availability of a body of hard test data on neps and sfc

A) Growers and ginners need to be better informed about:

- how the yarn and fabric market works
- quality priorities for yarn and fabric producers
- the significance of some of the recent technology developments beyond their normal areas (spin, weave, dye, knit etc)
- research efforts already in place

Action

⇒Develop and organise a series of information sessions for growers and ginners, to be presented on location, not as mail outs. Some of the material in this document could be reworked to form the basis for such presentations. To be developed and delivered with an 'informing' and neutral focus so the risk of being bogged down in pricing issues and politics can be minimised. This measure could include arranging for interested growers and ginners to visit a relevant spinning (and knit/dye) plant in Sydney or Melbourne. A ginner/spinner-fabric producer seminar might also have a place in this informing phase. These measures may be able to be organised through (or overseen by) the RCMAC.

It is possible that whilst addressing the knowledge gap referred to above, with a modified approach we could also tackle the knowledge gap at the opposite end of cotton's supply chain, eg retailers and merchandisers. It appears funding could be available to address this if we were to approach the problem as one of 'training people in the whole cotton pipeline.'

B) A body of reliable test data is lacking, this means opinions, perceptions and hearsay about neps and sfc are the order of the day. Until there is more good, reliable and well understood technical information available relevant to Australian varieties and conditions, the only quality signals to most growers will be from the present pricing system which, as we have argued, is fast becoming out of date.

It will be difficult to undertake any work in developing modifications to the present pricing system (see 5.2 below) without good base information.

Action

⇒CRDC should consider funding a project that installs an AFIS system (or its equivalent such as Premier) in a gin and provide the staff (eg a graduate student project), to run tests on cotton from different growers, varieties, ginning conditions etc. The information gathered could be reported in a manner that does not compromise anyone commercially and then **made available generally**. Joint grower/ginner/spinner technical oversight of the project. Could the RCMAC be involved in managing such a project.

Not a cheap project (providing the right conditioning and management could cost more than the equipment). Ginners could see such an approach as interfering with their operations, on the other hand some may welcome being at the forefront of an important initiative that they don't have to fund.

An approach such as this must of necessity ensure that the people managing and operating the equipment have the skills and understanding to set, calibrate, maintain and run it and interpret results.

Action

⇒ Run a series of cooperative mill\* trials. Support a grower/ginner/spinner (even weaver and dyer) consortium to do some controlled trials, the results of which could be disseminated to the industry at large (eg via the conference).

⇒ One of the aims of this consortium approach should be to establish the best 'cleaning balance' between gin and spinning plant. This is a key question to answer.

A consortium would be a planning challenge but the following of certain varieties through different picking and ginning conditions to finished fabric would provide valuable feedback. Local and/or overseas spinners, weavers etc could be used. Needs careful, unbiased management.

\*From February 1999 we will have available in Australia for the first time a world class processing facility at the International Fibre Centre in Victoria. This would be the ideal resource to use for spinning, weaving/knitting and dyeing work.

## 5.2 Pricing Mechanism

The predominantly appearance-based pricing mechanism is the fundamental weakness in the system as it no longer fully reflects the values that the growers' real customers place on the cotton, and in many cases gives to the grower and ginner what can only be described as dubious signals.

The Curran report made it clear how the present p and d sheets fail to adequately recognise cotton which is superior to the 'base,' also it was suggested (Curran p 44) that a standardised p and d approach be considered. Such an approach might not be viable in a marketplace where merchants compete for growers' business (also it may not be legal).

The difficulties involved in bringing about change will be many and there will no doubt be opposition. Nevertheless it is clear that change is needed if we are to get full value from research dollars being spent.

Also, we should not lose sight of the possibility that, introducing useful measurements into the purchasing price mechanism and into the marketing system to spinners, that are based on complex and expensive technology (AFIS, Premier and others etc), might give developed country cotton exporters (Australia, US, Greece) an advantage over the less developed competition whose access to, and ability to exploit, such technology might be limited.

Research into viable alternative pricing mechanisms that could build other parameters (nep, SFC, maturity) into the pricing mix alongside grade, colour and length, is needed. These could not be forced into use, but could in time provide the basic groundwork for change.

#### Action

⇒ Trial premium and discount sheets that more truly reflect cotton's value to its ultimate users by including nep and SFC considerations should be developed and then trialled on dummy runs.

This would of necessity be a long term project. The work done by Schlafhorst (appendix 2) did not receive comprehensive support when it was suggested some years ago, it may well have been 'too much change and too quick' however it did illustrate that a new approach is not beyond us.

### 5.3 Joint Venture Research

Despite some misgivings in the industry about working with competitors we should continue and enhance work of this type. A wealth of work has been, and continues to be, undertaken in the US which we need to know about and have access to. The main competitor for our industry is not so much US cotton or even anyone else's cotton but other fibres entirely.

Can we enter into arrangements with other than the USA. Comparisons with a lower cost, slower picking and ginning country could be valuable in terms of establishing the facts about quality comparisons between cotton produced under Western high tech conditions and that produced under the practices prevailing in a developing country economy.

#### Action

⇒ Continue with present plans with the ginning research. and

⇒ Consider a wider joint venture involving say three countries, even four. Could a collaborative project between Australia and the US and perhaps Greece (as the main developed country producers) and one of the main developing country producers (say Uzbekistan) be designed and managed.

## 5.4 Gin Research Centre

There is enough scrutiny of, interest in and investment in, the ginning process to justify an Australian Ginning Research Laboratory. The USA has three such centres. Australian varieties and conditions are different to those in the US and work carried out and managed here might well prove to be more relevant to our interests. Difficult to justify in former years but an industry that is set up to be a consistent three million bale+ exporter should consider it.

### Action

⇒ Research the feasibility of establishing a Gin Research Laboratory here. Not only cost issues but the benefits to be gained, the amount of grower and ginner support and whether its focus should be completely independent or should be pitched to complement the direction of US gin research work.

It would be important to ensure that the work of such a centre was focused downstream (towards yarns and fabrics) as well as upstream to the grower.

Would such a research laboratory have to be a "physical" site? Would lateral thinking allow us to utilise real gins for research in the eight or nine months that they are stopped. If such an approach were possible, fixed cost savings would be considerable.

## 5.5 Fibre Maturity

Better fibre maturity; will bring about a reduction in neppiness of itself. Seed variety development aimed at achieving a more favourable maturity outcome (as well as the usual focus of yield, length strength etc) should be supported.

In a once-over picking environment, a tighter 'spread' of the timing of wall development (maturing) across the plant, could be as useful as a higher maturity level of itself.

### Action

⇒ Enhance efforts to develop agronomic practices aimed at improving maturity and to develop faster and more even maturing varieties.

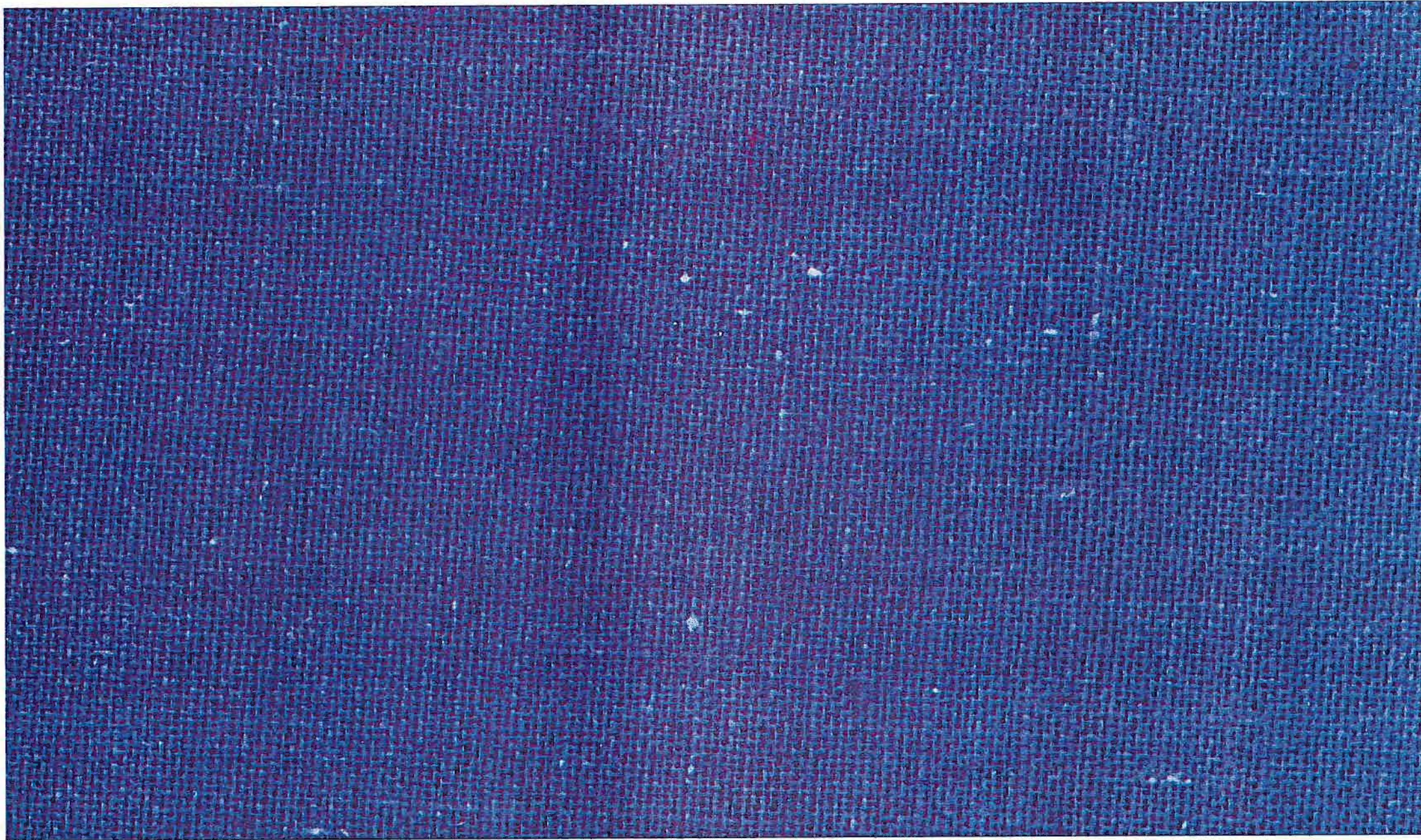
## 5.6 Test Equipment

Most testing and classing of cotton is carried out by merchants who are responding to a need to move cotton to the market as quickly as possible. It is clear that current classing and testing practice revolves around efficient testing and reporting at "HVI speed"

Building quality parameters such as nep and SFC counts into the pricing system will depend to a large degree on reliable testing *at HVI speed*. Is there scope for the Australian industry to partner equipment development efforts in some way?

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**APPENDIX 1**



**APPENDIX 2**

### 3.4.6. Cotton Utilization and Marketing Aspects

On the subject of how to get finer, stronger, and cleaner cottons to market in the needed quantities, much has been said and written. Most experts agree:

- that the work of many cotton breeders has proven that cottons with greater fineness, yet good maturity and good strength can indeed be grown in most US regions without sacrificing reasonable yield
- that the present cotton classing system or loan chart is a deterrent to growing new and superior varieties because of inadequate property assessment and penalties imposed on certain properties
- that new scientific and reliable methods must be introduced to correctly identify all cotton fiber properties essential to modern spinning technologies on a high speed, high volume basis
- that these methods (expanded HVI lines) must be used universally and with confidence by producers, merchants and spinners
- that based on transparent property profile, cotton can be produced and marketed with incentives placed on those properties which are needed for high-tech manufacturing instead of continuing ossified, but familiar traditions

Experts have pondered how the true value of cotton in the modern world could be assessed and expressed to arrive at a workable and equitable valuation system of cotton, based on total HVI measurements.

To this end, in 1988, the author offered a "thinking model" which has its roots in thousands of cotton samples from all over the world tested in the Schlafhorst laboratories (Fig. 90).

Proposed Valuation of Cotton Properties											
A (temp) Micronaire			A Fineness			B Maturity			C Length		
Only if mature! Eventually to be replaced by next tables A and B			To replace micronaire!			To replace micronaire in combination with fineness			Data from HVI Line in inches or from Fibrograph		
Data from HVI Line			From FMT Method in millitex			From FMT Method in %					
			Future faster instrument in HVI Line requires corresponding adjustment			Future faster instrument in HVI Line (NIR or other) requires corresponding adjustment					
above	5.0	-25	230 & above	-25		60% & below	-20		.80 & below	-12	
	5.0	-20	225	-20					.85	-10	
	4.8	-15	215	-15		65	-15		.90	-8	
	4.6	-10	205	-10		70	-10		.95	-6	
	4.4	-10	195	-5		75	-5		1.00	-4	
									1.05	-2	
	4.2	0	185	0		80	0		1.10	0	
	4.0	+5	175	+5		85	+5		1.15	+2	
	3.8	+10	165	+10		90	+10		1.20	+4	
	3.6	+15	155	+15		90	+10		1.25	+6	
	3.4	+20	145	+20		95	+15		1.35	+10	
	3.2	+25	135	+25		100% & above	+20		1.40 & above	+12	
	3.0	+30	125	+30							
below	3.0	+35	120 & below	+35							

Fig. 90

For the present, it is suggested that micronaire be used until such time as it can be replaced by the combined measurement of fineness and maturity. The strength readings from HVI line data could be used, although they are on the average 25% higher than the widely accepted 1/8" Stelometer reading. HVI length data would be satisfactory.

The 0-line represents the average of all cottons measured worldwide. The percentage premiums and discounts on each property reflect the advantages or disadvantages for any spinner regardless of what yarn-making method he employs, as well as the true value of the fiber for his individual end product.

Measurement of short fiber content, color, trash, and dust would replace the obscure and much disputed "grade" which is currently subjective and very much subject to manipulation in the gin and in the distribution channels (Fig. 91). If a good and fast method for assessing stickiness could be found, it should be added to the value profile (Fig. 92).

Proposed Valuation of Cotton Properties							
D Short Fiber Cont.		E Color		F Trash Content		G Dust Content	
To replace "grade" I Data calculated from Fibrograph in % by weight of fibers below 1/2"		Presently from "grade" I		To replace "grade" I Data from new Shirley Trash Separator in % of particles coarser than 500 micron		To replace "grade" I Filter dust from new Shirley Trash Separator in % of particles between 50 and 100 micron	
Eventually to be substituted by faster method in HVI Line		To be replaced by color index in HVI Line with corresponding adjustments		Eventually to be substituted by faster method (PMP, Spinlab) in HVI Line		Eventually to be substituted by faster method (PMP, Spinlab) in HVI Line	
22 or above	-15			6.0 or above	-14	1.0 or above	-6
20	-12			5.5	-12	.9	-5
18	-9	Gray	-6	5.0	-10	.8	-4
16	-6	Light Gray	-4	4.5	-8	.7	-3
14	-3	Tinged	-2	4.0	-6	.6	-2
				3.5	-4	.5	-1
12	0	Spotted	0	3.0	-2	.4	0
10	+3	Bright Spotted	+2	2.5	0	.3	+1
8	+6	White	+4	2.0	+2	.2	+2
6	+9			1.5	+4	.1 or below	+3
4	+12			1.0	+6		
2 or below	+15			.5 or below	+8		

Fig. 91

The measurement of fiber elongation, a by-product of fiber strength determination, should be added to this list because fiber/yarn elongation (work-to-break) is important in high-speed processing and in determining fabric properties (Fig. 92).

Proposed Valuation of Cotton Properties							
H Strength		I Elongation		J Stickiness		K	
Data from HVI Line in g/tex		Data from HVI Line in %		Data from Perkins' Method			
When using data from 1/8" ga Stelometer adjust accordingly				Search for faster method in HVI Line, possibly NIR			
below 16	-25	below 3	-20	.30 & higher	-6		
16	-20	3	-15	25	-4		
18	-15	4	-10	20	-2		
20	-10	5	-5		0		
22	-5	6	0	.15			
24	0	7	+5	.10	+2		
		8	+10	.05	+4		
26	+5	9	+15	.05 & below	+8		
28	+10	above 9	+20				
30	+15						
32	+20						
above 32	+25						

Fig. 92

This would give a total of eleven individual fiber property assessments.