Grower adoption of clip preparation standards for AUSTRALIAN ALPACA FIBRE

A report for the Rural Industries Research and Development Corporation

by Ian J Knox and Peter R Lamb

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Foreword

Alpaca production is moving from an animal based industry to a fibre based industry. While alpaca fibre has some similarities to wool, many of its characteristics are unique. At the present time all fibre is bulk classed at considerable cost to growers and processors. The development of standards that can be implemented by producers at a shearing shed level will have a major positive effect on gross margins, and will allow Australian processors to produce top that is more highly specified and superior to Peruvian product with which it competes.

This project was funded from the Australian Alpaca Association and the Rural Industries R&D Corporation. The Australian Alpaca Cooperative Ltd, Elite Fibre Australia, The Gordon Institute of Tafe and CSIRO Division of Textile and Fibre Technology also provided funding.

This report, a new addition to RIRDC's diverse range of over 700 research publications, forms part of our Rare Natural Animal Fibres R&D program., which aims to facilitate the development of new and established industries based on rare and natural fibres.

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Peter Core
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Finally, thanks are due to the many people who helped to organise venues for the numerous workshops held in all states, and to the regional representatives who helped to disseminate information.

Abbreviations

AAA	Australian Alpaca Association
ALANZ	Alpaca and Llama Association of New Zealand
AFFMO	Australian Alpaca Fibre Marketing Organisation
ANTA	Australian National Training Authority
FD	Fibre Diameter
FLEECESCAN	A device developed by CSIRO to core sample whole fleeces. It also includes its own Laserscan.
NATCOM	National Committee of the Australian Alpaca Association
OCP	Objective Clip Preparation
OFDA	Optical Fibre Diameter Analyser
POB	Position of Break
PSV	Primary Skills Victoria
RTCA	Rural Training Council of Australia
RTO	Rural Training Organisation
SL	Staple Length
SS	Staple Strength
VET	Vocational Education and Training

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Executive Summary

The long-term prospects of the Australian alpaca industry will depend on the production and marketing of a high value fibre, which meets processors and consumers requirements. Australia's alpaca industry is still evolving but now has the capacity to produce sufficient quantities of fibre for small scale commercial processing. The current Australian alpaca herd stands at approximately 30,000 head starting from original live animal imports in 1988. Australia currently has the largest Alpaca herd outside of South America. Many of the decisions made concerning fibre type will have a significant impact upon the future fleece type and products of the industry.

World production is currently 4,000 tons but Michell D (1998) ‘The Alpaca Trace’, Proceedings The Australian Alpaca Industry National Conference ‘Crossing the boundaries, July 1998, Fremantle, suggests that world alpaca production needs to double to command the same attention as cashmere and insulate itself from the volatile fibre commodity cycles. South American classing standards are artisan based with the skill passed on from mother to daughter with no objective measurements involved.

The Australian Wool Industry has developed classing standards based upon objective clip preparation (OCP) and has developed measurements to aid processors in the prediction of Hauteur and Fibre Diameter in tops.

The Australian Alpaca Industry will need to develop a similar structure, based on the use of objective clip preparation standards, to obtain a competitive advantage against the low labour cost industries of South America. The production of highly specified top will allow Australian alpaca fibre to command a premium over South American fibre at the higher value end of the market. Much of the international trade has been based on undifferentiated bulk fibre at very low prices.

The industry is now at a crossroad; it is somewhere between a vibrant animal based industry and a commercial fibre industry. It is not yet clear whether this transition will take place without major structural changes, which could see dislocation of many smaller breeders. This project has attempted to draw the importance of producing a quality fibre to the attention of Australia’s alpaca producers. By conducting hands-on fibre workshops in all states of Australia, attended by over 300 people, it is considered that the profile of fibre, and the importance of clip preparation standards have indeed been raised. Processing trials conducted by CSIRO, produced positive results, with no major processing difficulties being encountered. Areas for additional work would be the investigation of less severe scouring conditions than used for wool and the optimisation of settings on the spinning frame, including twist, to maximise the performance of the longer, more slippery, fibre.

The measured and classer estimated values of fibre diameter indicated that classers had a limited ability to accurately assess mean diameter. Because of this the project was revised to assess the ability and potential advantages of an instrument such as Fleecescan to assist with classing the clip for diameter. Subjective classing was found to be adequate for dividing fleeces into a few micron categories with considerable room for error. The main advantages of using an instrument such as Fleecescan would be for producing lines to exact customer specifications and for feeding accurate fibre quality information back to the grower for breeding purposes.

Shed preparation would still be essential, and producers could be encouraged to separate fleeces (such as fine or medium lines) that were deemed suitable for measurement.

A code of practice of minimum clip preparation standards was developed for the industry. It was endorsed by the National Committee of the Australian Alpaca Association (NATCOM) in July 2001, and will be amended as seen appropriate by the industry. Significant progress has been made towards the introduction of an Alpaca Fibre Classing course, and extensive discussions have been held with the AAA Education committee and the Rural Training Council of Australia (RTCA). The

Competency Training Institute of Australia has completed a scoping study, commissioned by RTCA. It is anticipated that a nationally recognised course will be now developed by RTCA.

The Australian Alpaca Industry faces a challenging future; continuing extension to enhance producer understanding of fibre characteristics and processor needs will help to ensure long term survival of the industry. For processing performance and fabric qualities the messages are very clear and similar to wool. Fibre diameter is overwhelmingly the most important property. Length is important but the key requirement is to avoid short and over-long fibres. Diameter distribution is of modest importance (with 5 units of CV(D) being worth 1μm) but there is a much bigger range of diameters present in some alpacas than in sheep. Strength does not seem to be an issue as tender alpaca is quite rare. Contamination, in all its forms must be avoided. Colour will always be an issue but for a commercial worsted mill colours other than white are potential contaminants and destroy flexibility.

The great opportunity for the Australian Alpaca Industry is to use the knowledge and instruments available for wool to maximise the rate of improvement and the market perception of Australian alpaca fibre.

1. Introduction

Until recently alpaca producer understanding of fibre specification and clip preparation standards has been low. There is an increasing awareness of fleece quality and type, which is being reflected in prices being paid for fine, dense animals. This project recognised the need, and implemented strategies, to raise the level of awareness of fibre quality issues with alpaca producers.

1.1 Project Overview

Until recently alpaca fibre has largely been a by-product of a live animal industry. Many enthusiastic statements have been made about the value of the fibre, and claims were often wildly exaggerated when compared to international prices. The industry has only recently produced sufficient quantities of fleeces suitable for commercial processing. Prior to this time fleeces had been sold to the handcraft industry, or stockpiled. The findings of this project will benefit alpaca producers, fibre marketers and fibre processors.

The project will allow Australian industry to develop its own fibre processing industry as superior clip preparation standards will allow the development of niche speciality markets for highly specified products. Both the customer (growers) and the clients (processors to consumers) will have a sound basis to value the product.

All alpaca fleece is currently rehandled at considerable cost to producers. Through the development of national classing standards, it will be possible to train and register growers to prepare fibre for sale at the time of shearing. Fibre could then be sent straight to a mill or broker. There should ultimately be large cash savings for growers preparing their own clips, and an improved understanding and ability to use objective performance records. This will aid selection decisions within herds, which will in turn improve the quality of the Australian clip. Many issues are facing alpaca producers. Alpaca fibre is highly variable and this variation causes its own unique problems. This project has developed a clip preparation framework that particularly helps fibre producers to classify their fibre in terms of fibre diameter, staple length and colour.

Alpaca fibre is a difficult fibre to assess subjectively, so it was necessary to check the effectiveness of subjective clip preparation methods, by objectively measuring samples and by fibre processing trials. Increasing grower fibre awareness and skills in clip preparation is seen as being essential for long term profitability and survival of the Australian alpaca industry.

1.2 Outcomes and Deliverables

Many people involved in the Alpaca industry have no prior experience with natural animal fibre. The project provided an opportunity to provide initial fibre training and to establish processes that will ensure the provision of nationally accredited training in the future. Three objectives were set. They were –

1. Develop minimum clip preparation standards for Alpaca fibre, and introduce them nationally.
2. Conduct processing validation trials to confirm suitable lines of alpaca to be combined for mill lots.
3. Support and encourage the development of nationally accredited owner classer training.

It is asserted that items one and two were accomplished, and item three is well developed, having received support from the Rural Training Council of Australia (RTCA), which has been proceeding with industry consultation. The following chapters will describe how each objective was addressed, and present detailed results, which will be discussed in relation to each objective. The implication of the outcomes on the Australian Alpaca industry will be assessed. Recommendations will be made on the activities or other steps that may be taken to further develop alpaca fibre awareness throughout Australia.

2. Methodology

The project was practically oriented and much of the work was conducted in an industrial setting. During the course of the project over 40,000kg of Alpaca fibre was classed on behalf of the Australian Alpaca Co-operative Ltd. The classing process was evolutionary, and, as processing requirements varied it was necessary to adapt lines accordingly. Fibre workshops were conducted nationally to allow an opportunity for both consultation and extension. Processing and classing validation trials provided an objective framework within which it was possible to develop appropriate clip preparation strategies, training and extension requirements.

2.1 National Fibre Workshops and Conferences

Fibre workshops were convened in South Australia, Western Australia, Queensland, New South Wales, Victoria and Tasmania, between July 1999 and July 2001. State representatives were appointed from the various regions to help disseminate information to their members. Fibre workshops in each State established the networks and personal relationships, which then allowed the effective use of other forms of media such as the Internet to disseminate information. An Alpaca fibre web page was established at http://www.ozrural.com for the duration of the project. The web page was well utilized, and requests were received on several occasions to reprint content in regional alpaca newsletters. It is anticipated that many of the participants in the workshops will participate in a nationally accredited owner classing program as soon as it is established. Conferences were also used to disseminate information on clip preparation standards, and the project results. Papers were presented at the Australian Alpaca Association conferences in Adelaide (Knox, I 1999) and Canberra (Knox, I 2000) and at the New Zealand Alpaca and Llama Association international conference in Christchurch (Knox, I & Lamb, P 2001).

2.2 Development of Clip Preparation Standards.

For most of the duration of the project, fibre was being classed in Australia by the Australian Alpaca Cooperative in Geelong and by the Australian Alpaca Fibre Marketing Organisation Pty. Ltd (AAFMO) at Narrandera, NSW. At the time of writing, it is likely that the two groups will merge. Some grower groups and individuals also prepare and market their own fibre. Peru is the world's largest producer of alpaca, but the Peruvian industry is mainly cottage based, and the national clip is rehandled at various central locations. Anecdotal evidence suggests classing rates in Peru are about 50kg per person per day, a figure that would not be financially viable in Australia.

All of the fibre received by the Australian Alpaca Cooperative was classed at the Gordon Institute of Tafe, Geelong, for the duration of the project. Fibre was prepared according to the specific requirements of the Cooperative. Because the Cooperative receives the bulk of the Australian Alpaca clip, clip preparation standards were developed to suit its requirements. It was anticipated at the same time that any standards developed would also have ready acceptance nationally. To this end it was decided that the descriptions for fibre diameter classes, colour and length should allow for inevitable changes in processor specifications. Hence a Code of Practice for minimum clip preparation standards was developed through consultation with both producers and processors.

2.3 Code of Practice

Few people in Australia have had much experience preparing alpaca fibre for processing. A draft code of practice for minimum clip preparation standards was developed. The purpose of this document was to set out a framework for classification, and it was not intended to be an instruction manual or quality assurance manual. It was anticipated that such supplementary manuals could be produced as required. The code of practice was to be developed in consultation with industry participants, and it was also heavily influenced by the established practices of the Australian Alpaca Cooperative (appendix 3), which was the major receival house for fibre at the time.

A draft Code of Practice of minimum clip preparation standards was completed in March 2000. It was ratified by NATCOM in April 2001 (Appendix 1). Following the merger talks between the Cooperative and AAFMO in 2001, some lines have been changed by the Australian Alpaca Cooperative (appendix 4) , so the current status of the Code of Practice as an official AAA endorsed document is unclear. Most of the integrity of the document has been maintained, so it is considered that it is still a major source of guidance for alpaca producers. While it is desirable to have a national code of practice, lines will vary, nationally and internationally (see New Zealand code of practice, appendix 5) may vary.

2.4 Objective Validation of Classed Fleece Lines

As previously stated the Peruvian industry is based on the subjective assessment of fibre by artisans who handle small quantities of fibre daily. For successful objective clip preparation principles to be used in Australian clips, the relationship between objective and subjective classing parameters needed to be validated by processing trials. CSIRO Division of Textile and Fibre Technology Belmont, was to conduct these trials, and Elite Fibre Australia was also to be asked to participate.

Guidelines: Fine (F), and Medium (M) lines of Huacaya fleeces were sampled and tested. A small quantity of Suri fibre was also provided, but the quantity available was limited.

Trial Method: At the time of classing, 75 fleeces were divided into two portions. An experienced classer assessed one half subjectively and the other half was tested and classed according to the measured result. The Medium fleeces were classed into a good average length (AAA) and a short (AA) line. Two classers were always present for sampling to ensure that integrity was not compromised. This yielded 3 objectively classed lines. All the available Suri, which included some overgrown fibre, was placed in a fourth line. A sample of the remaining halves was taken and at the same time three classers independently estimated the fibre diameter of the halves. The samples were then minicored, solvent degreased and measured on the Laserscan. The finest one-third of the samples, with mean fibre diameters of less than 23.1μm, were grouped to form the objectively Fine lot, and the remainder (except for 6 lots over 30μm) were grouped to form an objectively Medium lot. The objectively and subjectively classed lines comprised only white fibre because of CSIRO contamination concerns. These sub samples made up 10kg (min) processing lots for CSIRO.

The six lots were processed to top. Measurements included SL, SS, POB using an ATLAS tester. The total number of samples was too small for a definitive TEAM-type analysis, but a comparison with the TEAM equation for Wool and recent improvements Topspec were made. CSIRO was to measure top and noil properties of lots processed both at Elite and CSIRO (it eventuated that top was not supplied from Elite). All lots (which covered a range in diameter and length) were taken through to yarn and compared with results expected for wool using Sirolan Yarnspec.

The measured and classer estimated values of diameter indicated that classers had a limited ability to accurately assess mean diameter. Because of this and the difficulties of assembling further processing lots, the project was revised to assess the ability and potential advantages of an instrument such as Fleecescan as a means for classing the clip for diameter.

2.5 Development of an Alpaca Fibre Classing Course

A number of alpaca specific training courses have been conducted in various regions throughout Australia. They have been conducted by the Australian Alpaca Association, Tafe Colleges and various other training providers, consultants and practitioners. They have varied from one day workshops and seminars to a state registered Tafe course (only registered for delivery in NSW). This project provided a focus to further progress the development of a nationally accredited course. Meetings and discussions were held with the Rural Training Council, industry groups and the education committee of the AAA to progress the development and implementation of a nationally accredited alpaca fibre-classing program.

2.6 Conclusion

By applying a multi-faceted approach incorporating extension and fibre research, it was possible to increase grower's knowledge and appreciation of alpaca fibre considerably, and in turn this knowledge has been shared throughout the industry. To date formalised nationally accredited training is not available, but the processes have been initiated which will ensure it is in the near future. It is indeed now likely that a variety of alpaca specific training will be available in addition to fibre training. These issues will be further considered in the following chapters, which will discuss clip preparation guidelines, processing trials and education in turn.

3. Clip Preparation Standards

Until the mid 1990s most of the alpaca fibre produced in Australia was either stockpiled or sold into the craft market. The establishment of the Australian Alpaca Cooperative and AAFMO gave rise to a need for a more uniform approach to clip preparation standards. Other industry participants also produce a variety of textile products and garments from locally produced and imported fibre, so a range of requirements and specifications has started to emerge. Although Australia is the worlds largest producer of merino wool, and a major producer of mohair, production of alpaca is still extremely limited, and it faces the additional challenges of a fragmented clip which may need to broken into a dozen colours, a variety of lengths and has an average fibre diameter ranging from about 18 to 40 microns. An extensive series of workshops, seminars and conferences provided an opportunity to both share and exchange information with alpaca breeders and fibre processors. This shared information in turn aided the development of a draft code of practice of minimum clip preparation standards.

3.1 Clip Preparation Workshops

The original alpaca that were imported into Australia in the late 1980s early 1990s came from Chile, Bolivia and later Peru. At the time animals fetched very high prices. Marketing campaigns included statements such as ‘Alpaca - Fibre of the Gods’, and there was a widespread perception developed that all alpaca fibre was exotic. Once fibre testing became widespread it was established that a typical animal averaged about 28 microns. While other characteristics such as length, colour, lustre, and crimp have some significance fibre diameter is by far the most important. This is demonstrated by the large difference in price currently offered by the Australian Alpaca Cooperative based on fibre diameter. Prices range from $60/Kg for fibre less than 20 microns to $1/Kg for fibre more than 30 microns. It would seem reasonable that alpaca should be classified as a rare animal fibre, rather than an exotic one, particularly when compared to exotic fibres such as cashmere or ultrafine wool.

Explaining and demonstrating the significance of fibre diameter was a central extension role in presentations at conferences and workshops. Presentations were given at the AAA conference in Fremantle (WA), Glenelg (SA), Canberra (ACT), and at an ALANZ conference in Christchurch (NZ). Practical ‘hands on’ exercises were used to allow participants to handle fibre at the conferences. Up to 40 samples were provided and participants were invited to subjectively guess the average fibre diameter, length and colour. A simple answer sheet was developed to allow responses to be compared (Appendix 7). Length and colour were appraised fairly well but as would be expected fibre diameter assessment was more difficult. Most people were able to place fleeces into fine, medium and strong categories (i.e. within a 5 micron range) with a reasonable degree of accuracy, but tighter specification proved very unreliable. These preliminary findings were used to develop a draft code of practice, which then received input from processors, other interested parties and feedback from alpaca producers.

Over 250 people attended the state workshops and provided feedback. Workshops were conducted at Oakbank (SA), Adelaide (SA), Launceston (TAS), Fremantle (WA), Caloundra (QLD), Goulburn (NSW), and Geelong (VIC). Issues discussed have included processor requirements, objective measurement, education opportunities and the need for clip preparation standards. Other issues such as the relationship between the show ring and commercial fibre production have also generated a lot of interest.

The draft code of practice was presented for comment at the workshops that were held in Western Australia, South Australia, Victoria, Tasmania, New South Wales and Queensland. At these workshops it was also established that there was widespread support for developing formal fibre training, which was then followed up with the AAA education committee and the Rural Training Council. To gain support for a nationally accredited fibre-training program, industry endorsement was initially sought for the code of practice, as it would provide a common national minimum standard that could be assessed.

3.2 Code of Practice

The draft code of practice was first presented at the AAA conference in Freemantle in 1998. It was endorsed by NATCOM in 2001 (Appendix 1). The code of practiced was developed in the belief that the object of classing is to maximise the returns to the grower on the one hand, and to make economical, specified mill lots on the other.

Standards and basic principles were set out. The code was not intended to be an instruction manual or quality assurance program. It is anticipated that such publications will be produced separately, if they are required. Common sets of branding descriptions are used, but the code of practice does NOT strictly prescribe line contents as mill requirements vary. Australian prices for fibre have been very high by international standards. There has been some reluctance to import Peruvian top, even though there is a shortage of fine/medium white fibre in the Australian clip. Good clip preparation standards are seen as one way to differentiate Australian fibre, and to allow it to compete with foreign sourced fibre in the future. The majority of the Australian clip has to date been delivered to the Australian Alpaca Cooperative Ltd, so the classing procedures used by the Coop were largely incorporated into the code of practice. Fibre was also dispatched to AAFMO (a grower owned alpaca fibre broker at Narrandera, NSW) and some individual alpaca producers are involved in the production of textiles and garments from Australian and Peruvian top. It was anticipated that agreement would be reached between all parties on standardised descriptions for alpaca fleece lines although the requirements of buyers would inevitably vary.

Since the endorsement of the code of practice by NATCOM, AAFMO and the Australian Alpaca Cooperative have had merger talks and have agreed to change their length descriptors, so it is anticipated that the code of practice may be changed to reflect this. Processing requirements have changed regularly in the last couple of years. For this reason it was (and still is) considered that the code of practice should be general rather than prescriptive so descriptions can still be applied when line specifications change.

3.3 Development of the Draft

Because the Australian Alpaca Cooperative receives the majority of Australian alpaca fibre, its practices influenced the production of the code of practice. Fibre despatched to the Cooperative comes from all Australian states; by road; by rail; and by post. A small lot may be just a few fleeces, the largest about fifteen bales (approximately 2,000kg).

When received the fibre is classed for length, colour and fibre diameter. A description system, similar to that used for classing Australian wool, was developed to aid the sorting and repackaging of fibre for processing.

Length was denoted as AAA (good length), AA (short length), or OG (overgrown). The length terms A, B and C were rejected because traditionally, in the wool industry they were associated with specific lengths of wool of a particular ‘Type’. The wool industry no longer uses ‘Types’, having replaced them with a system called AWEX ID. Fineness was denoted as Superfine (SF), Fine (F), Medium (M), and Strong (S). It was not considered to be desirable to attribute specific micron ranges to these descriptors, as it was likely that different processing requirements would dictate different ranges from time to time.

At the time of writing the length requirements (of the Australian Alpaca Co-operative Ltd.) have been redefined several times, as have the colour requirements.

Fineness categories have been redefined at least three times in recent years. In 1999 for example Fine was in the range of 20 – 24.9 microns, Medium 25 – 29.9 microns and Strong 30 microns and over.

In late 2000 the lines were changed to Superfine – less than 20 microns, Fine 20 – 22.9 microns, Medium 23.1 - 27 microns, Strong 27.1 – 32 microns and Extra Strong over 32 microns.

In October 2001 the lines were again changed to Superfine less than 20 microns, Fine 20 – 23 microns, medium 23 – 26 microns, Strong 26 - 30 microns and Extra Strong over 30 microns.

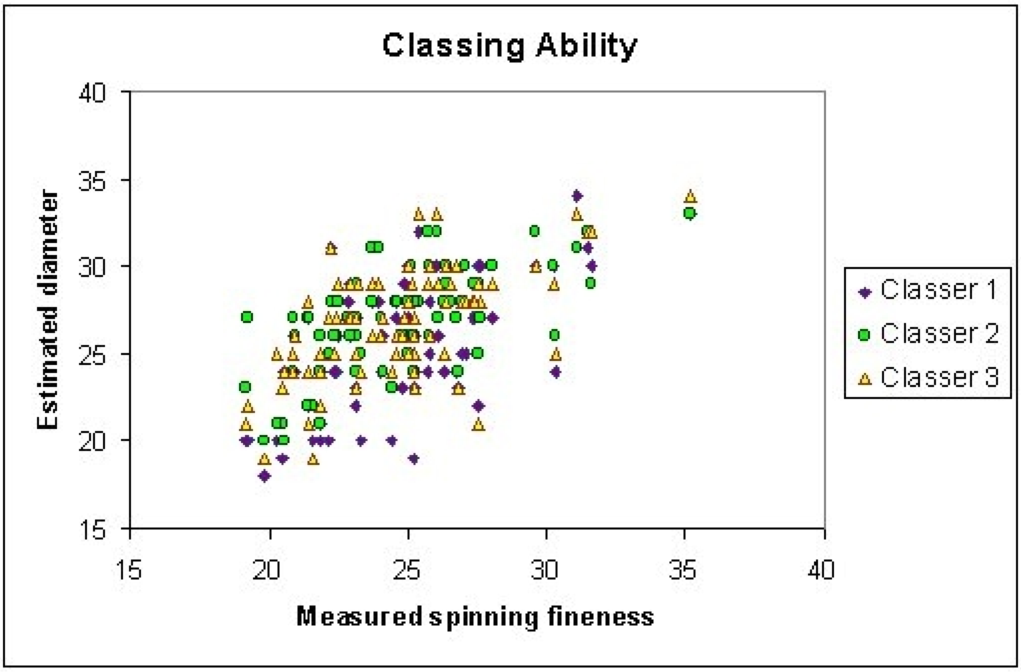
All standard Australian Alpaca Association (AAA) colours could be used (12 colours). In 2001 the Alpaca Coop consolidated some colours to try to build large usable lines (White (W), Light Fawn (LF), Black (BLK), Silver Grey (SG) and Other (O - everything else combined), but they have since reverted to using most colours. Not all alpaca producers are members of The Australian Alpaca Co-operative Ltd, but being a major player in the Australian alpaca fibre industry, it is in a position to influence AAA policy.

The examples demonstrate why there was a reluctance to prescribe colours, length or fineness categories in the code of practice. The number of length categories has also been increased recently to five. With 12 possible colours, five fineness categories and five length categories a major industry dilemma may well be – too many lines, with too little quantity in each – particularly as the majority of the clip falls into the Strong and Extra Strong classes. In recent years the amount of white fibre received has increased. Most of the processing demand is for white medium and fine, while most production is coloured and strong and extra strong.

3.4 Objective Validation of Classed Fleece Lines

An estimate of the ability of classing was made by having three "classers" estimate the diameter of the 75 small lots and to compare these with the subsequently measured values.
A plot of the classer diameter values is shown in Fig. 1 in comparison with the measured value of spinning fineness. The spinning fineness takes into account both the mean diameter and diameter distribution and has been shown by theory and experiment to give better agreement with the measured value of bending stiffness and assessed softness.

Figure 1: Ability to Separate Fibre By Classing



The weighted mean spinning fineness values of the top third (25) lots, as selected by the classers, were 23.21, 23.23 and 23.01 µm compared with the value of 21.46 µm based on measurements. The standard deviation between the measured and classer estimated values averaged 3.2µm. The classers were within 3µm of the measured value 63% of the time and within 6µm 92% of the time.

The measurement error (standard deviation) was estimated, from repeat measurements on several new samples, to be 0.7µm.

Subjective classing can achieve satisfactory results when separating significantly different fibre. As with previously published results for wool (Charlton and Whiteley 1963) shown in Table 1, better results could be achieved with objective measurement. Claims of classer's ability to separate fleeces on fibre diameter are often overstated.

Table 1: Mean Diameter of Sale Lots (Whiteley 1963)

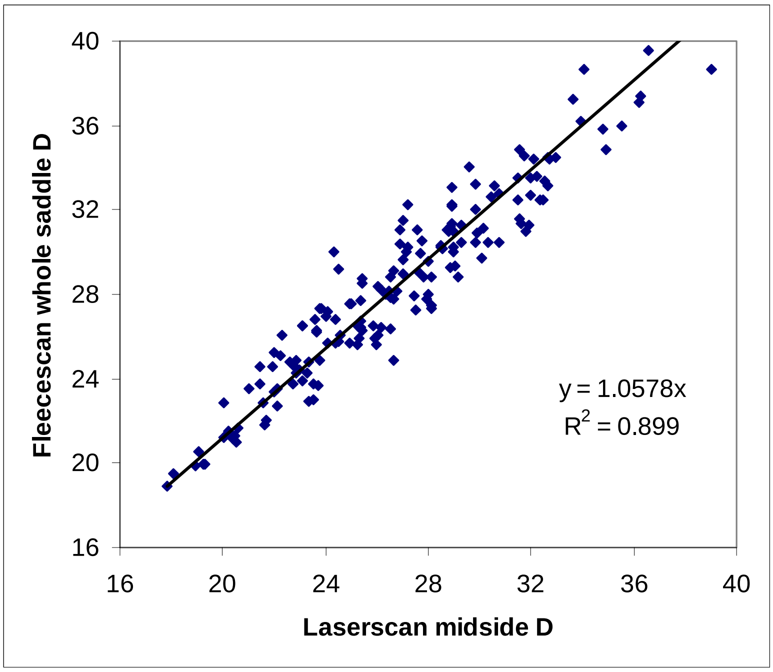
		Mean diameter (microns) **17 18 19 20 21 22 23 24 25 26 27 28 29 30 31**
Visual Quality Number	**70's**	**2 33 52 64 53 18 7**
	64's	**11 18 33 45 21 3**
	60's	**2 13 56 70 52 22 6 1**
	58's	**8 16 22 21 26 20 9 6 1**

Alpaca is more variable around an animal than wool and the questions then arose of whether a mid-side sample measurement offers much improvement over a classer estimated value, and whether it would be more practical to make a whole fleece measurement. In order to test this, 260 midside samples and fleeces were supplied from a stud in the Geelong region. The samples were mini-cored and tested by Sirolan Laserscan (2000 snippets) at CSIRO Belmont and by OFDA at the International Fibre Centre, Deakin University, Waurn Ponds.

The corresponding fleeces were also measured on a Sirolan Fleecescan unit. This machine compresses the whole fleece and takes a multiple mini-cored sample that should be representative of the whole fleece. Four tests (2000 snippets each) were performed on each fleece, with the fleece rotated in two directions between each pair of samples taken without movement of the fleece. Each sample was washed in solvent and then manually submitted to the machine's own Laserscan. Not all of the midside samples could be matched with corresponding fleeces, so some were discarded leaving 247 sets of measurements.

The agreement between the two instruments, measuring the same cores, was very good showing a standard deviation of 0.74µm for lots of mean diameter less than 33µm; compared with a repeat measurement on the same core by the same instrument (Laserscan) of 0.18µm.The Huacaya mean was 28.2µm and the Suri mean 29.2µm which was considered to be typical of the Australian clip. A close relationship was found between the midside samples and Sirolan Fleecescan results (Fig. 2). The average diameter for the whole saddle samples was found to be 1.57µm coarser than the average for the mid-side sample. This finding is in excellent agreement with that of Hack et al (1999) who used manual grid sampling of the whole saddle. A fit to the data, constrained to go through the origin, gave D(whole saddle) = 1.0578 * D(mid-side) with an r^2=0.90. The standard deviation of the measurement error of repeat samples without rotating the fleece was 0.67µm and 1.15µm for repeat measurements with rotation. The estimated standard error on the average of the four measurements is 0.47µm.

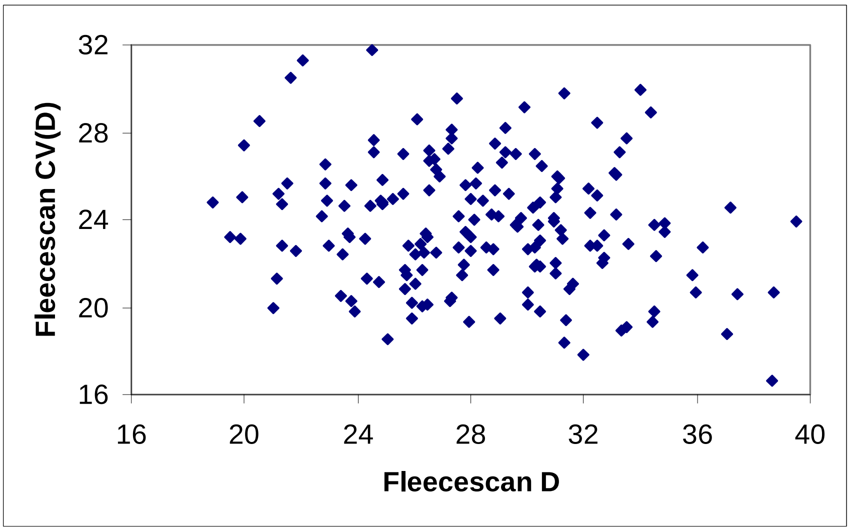
Figure 2: Midside Sample vs. Sirolan Fleecescan



The error in using a mid-side measurement to predict the whole saddle diameter was made using the above formula assuming the average whole saddle value was correct. The standard deviation of the error was 1.37μm. This would imply that more than 95% of predicted values would be within 3μm of the correct value. Given that a bale will contain around 100 saddles this level of accuracy, which is only slightly worse than the 1.15μm standard deviation of a single whole saddle measurement (counting 2000 snippets) is adequate for grouping fleeces into sale lines.

The relationship between the mean fibre diameter (D) and CV(D) was examined (Fig. 3).

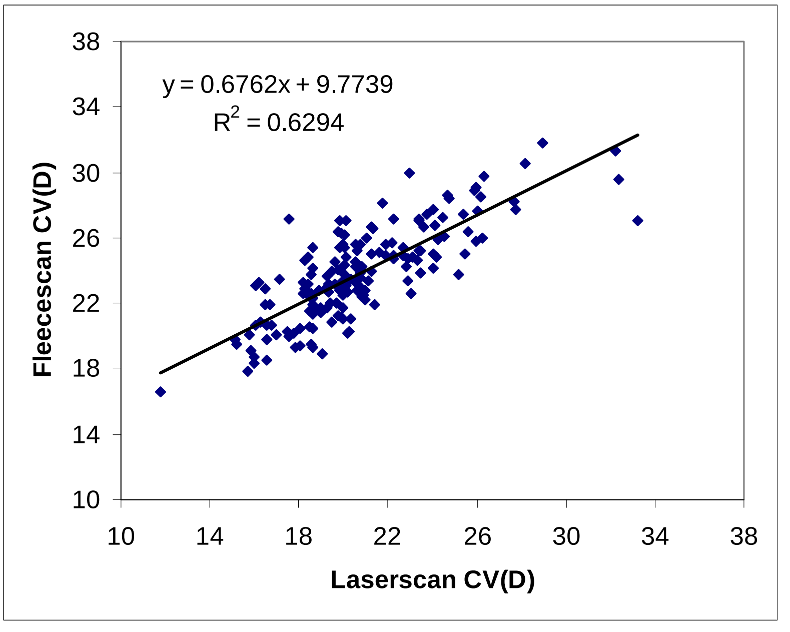
Figure 3: CV(D) vs. Mean Diameter for whole saddles



CV(D) is the co-efficent of variation of fibre diameter and so is a measure of the range of diameters present. This result is surprising in comparison with wool where the CV(D) of sale lots has been observed to average about 10.5 + D/2. Here the whole saddle CV(D) is larger and, if anything, decreases with increasing diameter. The midside CV(D)s showed a similar spread but with a lower mean (20.8% vs.. 23.7%).

The question arises as to whether the midside CV(D) is a good predictor of the whole saddle CV(D). The data (Fig. 4) indicate that it is a reasonable predictor and that low midside CV(D) values are increased more by the variation from the rest of the saddle.

Figure 4: CV(D) whole saddles vs. midsides

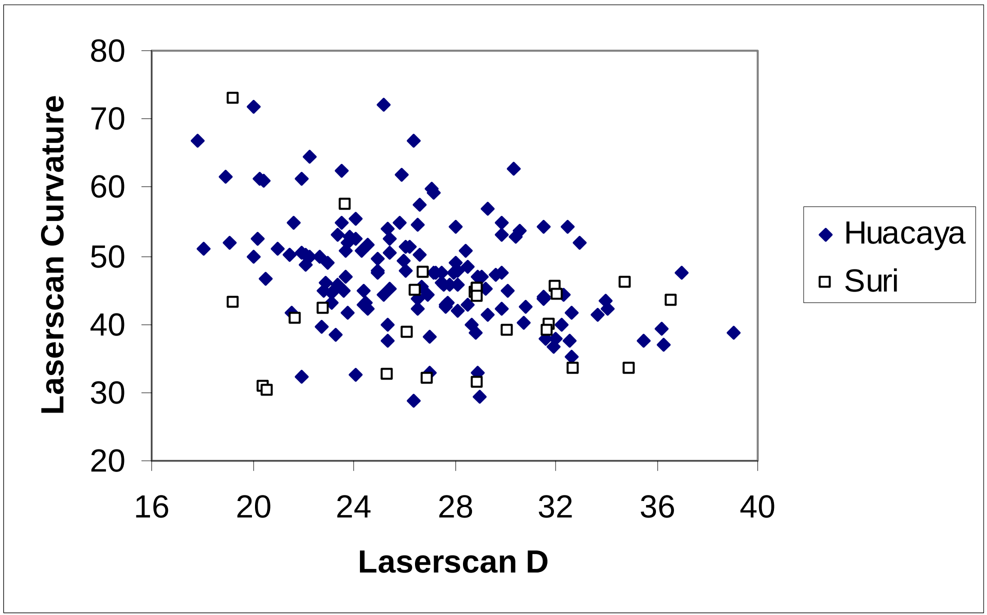


It was thought possible that the size of the midside CV(D) might be an indicator of how much the whole saddle mean diameter might be coarser than the midside, but no relationship was observed. This implies that the variation around the saddle is independent of the variation within a staple.

Alpaca fleece is quite difficult to assess for average fibre diameter subjectively. Unlike wool alpaca fibre has little crimp, and herds mainly consist of small numbers with no major consistent bloodlines. When objective clip preparation (OCP) was first introduced into the Australian wool industry in the 1970s it relied on the ‘Mob Flock Concept’, which meant if all the sheep (the flock) on a property came from the same bloodline, and were run under the same conditions (i.e. in a Mob) then their wools would be similar. Alpaca currently do not fit these criteria, and there can be expected to be large variations in the fibre between animals in the same herd. This is shown in Figure 5 where, for animals from the one stud, the average fibre curvature for the saddle is plotted against mean diameter. Curvature (in degrees/mm) is a measure of how rapidly the fibre bends and so is closely related to crimp. The Suri curvature values tend to be lower but do not form a distinct population.

These trials indicated that it was possible for experienced classers to achieve acceptable results within the designated categories, but the estimates were also prone to considerable error. The above result (Fig. 5) indicates that using crimp to assess diameter is likely to be misleading. It would be desirable if all alpaca fleeces could be objectively tested prior to classing, particularly if very tight specifications are required. The following chapter presents the results of the subsequent processing trials, which used the various lines of classed fibre.

Figure 5: Curvature vs. mean diameter for whole saddles



As a guide for classing a midside measurement is probably sufficient and it seems likely that these measurements, using the appropriate multiplication factors, could give sufficiently accurate measurements for both assigning saddles to particular lines and for predicting the mean values of diameter and diameter distribution for those lines. Accurate whole saddle values can be determined using Fleecescan although it would appear desirable to improve the representativeness of the sampling procedure. The 95% confidence limits on the predicted whole saddle values from a single midside measurement were 2.7µm for mean diameter and 3.5% for CV(D) which suggests that breeding selection would benefit from more accurate measurement.

4. Processing Performance

Six lots of pure alpaca fleece samples were then assembled using subjective and objective techniques. They were taken through to top in the wool processing mill at CSIRO Textile and Fibre Technology. Some problems were encountered in sliver cohesion in carding, particularly with the Suri lot, but it should be possible to overcome this problem with known technology. The tops were then taken through to yarn. No significant problems were encountered except that the ends-down rate in spinning was unexpectedly high. However, some simple modifications to spinning frame settings greatly improved spinning performance. The yarn properties were only approximately consistent with that expected for wool, the alpaca lots, particularly the Suri, appeared to need more twist to overcome the apparently lower fibre cohesion.

The ability of individuals to estimate fibre diameter by classing, was separately assessed, and compared to measured results prior to commencing the processing trials.

4.1 Selection of Lots

Six lots were prepared as outlined previously. The first four were visually classed, the last two came from 75 lots of that were grouped into fine (25) and medium (44) lots (with 6 lots rejected as too coarse) according to the values of mini-cored 100g sub-samples measured on Sirolan Laserscan.

Table 2: Selected Lots

1	AAAWM (white, medium) expected to be c.27μm	11kg
2	AAAWF (white, fine) expected to be c.23μm	14kg
3	AAWM (short, white, medium) c.27μm, SL=60mm	12kg
4	SAAWM (suri, medium) c.27μm	7kg
5	Fine (21.2μm) Objectively measured	6.7kg
6	Medium (c.25.4μm) Objectively measured	10.5kg

4.2 Measured Results

The first four lots were measured at CSIRO using the Fleecescan equipment, on the whole sample, and the results presented below are the average of 4 measurements. The values for the last two lots are the weighted average of the measurements for the selected components. Random subsamples were selected by hand and sent to AWTA for measurement and these results are also given in Table 3 below. (Curv. = Curvature in deg./mm, VM = % Vegetable Matter content.)

The first two lots are meant to be representative of good length medium and fine lines, the third lot represents a medium line where the staple length is classed as short, the fourth line is representative of Suri with no rejection of very long staples. The final lines indicate what could be achieved by measurement rather than classing.

Table 3: Measured Results of Classed and Objectively Matched Lots

Lot	Description		CSIRO			AWTA			
		D	CV(D)	Curv.	D	CV(D)	Curv.	Yield	VM
1	AAAWM	26.0	25.7	61.2	24.3	25.2	51	87.2	0.7
2	AAAWF	23.1	27.4	63.2	23.6	29.3	51	86.0	1.9
3	AAWM	24.4	26.1	64.6	25.9	26.9	52	87.2	1.6
4	SAAAWM	24.6	25.2	53.1	23.9	26.3	46	86.1	2.4
5	Fine	21.2	25.8	65.4	22.3	27.9	54	86.0	1.9
6	Medium	25.4	24.8	62.4	25.9	26.9	50	89.2	0.6

Measurements of staple length (SL) and strength (SS) were made on approx. 65 randomly selected staples from each of the 6 lots using the ATLAS machine at CSIRO and are shown in Table 4. It should be noted that this machine rejects staples longer than about 125 mm for strength measurement as well as very short staples, and occasionally staples get rejected for other reasons. The Suri lot had many over-long staples and so only about a quarter of all staples were measured for strength.

Table 4. Measurements of Staple Length and Strength

Lot	Wool Base %	Veg. Matter %	SL mm	CV(SL) %	SS (N/ktex)	Tip	Middle	Base	POB (%)	No. of Staples Measured for Length	No. of Staples Measured for Strength
1	73.0	0.7	108.8	29.4	54.7	46	34	20	39	55	30
2	70.8	1.9	114.0	18.5	47.3	59	31	10	30	65	44
3	72.1	1.6	82.2	20.9	63.2	71	14	15	28	53	34
4	70.3	2.4	142.5	18.7	54.3	32	50	18	46	57	16
5	70.8	1.9	116.6	22.0	43.0	38	49	13	40	63	50
6	74.8	0.6	113.2	24.8	59.5	49	42	9	37	63	55

For comparison, the typical average staple length and staple strength of Merino wools of similar diameter are 85 to 100mm and 35 to 40 N/ktex, and the co-efficent of variation of SL is typically less than 15% (Lamb, P.R. 1998b).

4.3 Topmaking

Scouring

Standard conditions for wool were used. It is likely that more gentle conditions would still be suitable because of the low grease content of alpaca. Such conditions would probably give rise to less entanglement and therefore less breakage in processing and longer top length. However, the small quantities of alpaca available have not allowed experiments in which sub-lots of one well-blended large lot are scoured under different conditions and the top properties compared.

Carding

The regain of the six alpaca lots was measured and a lubricant/water mixture added to bring the lots to 18% regain and 1% lubricant/antistat [Selbana 4554V (0.75%) plus ALNWS (0.25%)] before carding. Normally wool has only 0.5% lubricant Selbana 4554V added, the higher level and the stronger antistat (ANLWS) were added because alpaca is known to more easily suffer from electrostatic charging than wool. Standard settings for wool of a similar micron were used.
The lots were processed on 25th-27th July 2000 with Mr Avtar Singh of Elite Fibres observing one lot being processed on the 26th. He was impressed with the clarity (lack of nep) of the output card web. All lots, including the Suri, ran satisfactorily. The main problem encountered was lack of cohesion of the card web and the difficulty of feeding it in to the coiler of the can delivery.

To some extent this was expected because this card does not have a false twist delivery tube to increase the cohesion of the sliver. As a consequence the first two lots had many breakages in the sliver and would not be expected to feed satisfactorily to the first gilling stage. However, the slivers were reconstructed by feeding them through the crimping box of a NSC PB30 comb. For the third lot a portable can delivery system was brought in adjacent to the existing delivery. This enabled the card web to be delivered into a can satisfactorily and the feed (squeeze) rollers of the can delivery appeared to give the sliver sufficient cohesion for drawing. Half this lot was then fed through the crimping box and the sub-lots was taken separately to top to check for any detrimental effects from the crimping box treatment, but none was found. No problems with static charging were encountered.

Because of the losses in handling and the small size of the lots it was not possible to get sensible estimates of total losses. The burr beater wastes were examined. The first burr beater was throwing out some clumps of fibre and not much VM and could probably have been opened out. The second burr beater was performing effectively. The third beater was knocking out mostly lumps of rolled fibre and some VM. This is understood to be due to the rolling of the more slippery fibre between the burr beater and morel. In future trials this setting should also be opened out.

Combing

Combing was carried out on a NSC PB27 comb after three passages of gilling on GN5 machines. All lots were combed under the same settings with a loading of approx. 260 ktex, a nip distance of 32 mm, top comb of 30 pins/cm, and at a speed of 190 cycles/min. It was noted that the Suri lot tended to flare a bit on the apron. In hindsight, the comb draw off length (4) might have been increased, particularly for the Suri lot, this would probably have led to decreased noil (less long fibre) but possibly at the expense of web quality. Longer fibres require a longer draw-off length or they will be broken or will appear in the noil. However, the longer draw-off length means higher accelerations which disrupt the web or that the machine has to be slowed.

The lots were then given two more gillings to top. The diameter properties of the top were measured (3 samples x 2000 snippets) on Laserscan. The mean fibre length and distribution were measured on an Almeter. The results are shown in Table 5. The diameter values are in fair agreement with the earlier greasy measurements, the discrepancy is assumed to arise primarily from sampling errors in the greasy. The mean fibre length (Hauteur) values are well above the typical 70 mm of wool tops, except for the lot that was classed as short. For all but the lot classed as short the length of the longest 1% of fibres (L1%) is also well above the range of most wools and approaching a length that might be expected to give some problems in spinning when fibres can span the full ratch from front to back rollers. The objectively classed lot (5) has continued to measure more than one micron finer than the subjectively classed lot (2) as well as having a lower diameter distribution.

Table 5: Top Properties

Lot	D	CV(D)	Curv.	Hauteur	CV(H)	kg	%<20mm	%<30mm	L1%
1	24.7	26.4	54.4	86.0	45.9	5.5	3.1	7.3	196.6
2	22.6	27.0	55.7	84.9	45.7	6.7	3.0	8.9	179.3
3	25.6	26.8	53.5	66.8	40.0	6.4	4.0	9.2	132.8
4	24.6	25.8	53.1	83.1	54.1	3.0	4.2	13.2	207.5
5	21.5	25.9	53.9	77.4	50.3	4.5	5.6	13.1	186.4
6	25.6	25.4	55.8	86.0	46.4	8.2	4.6	10.4	193.8

The measured and predicted values of Hauteur, co-efficient of variation of Hauteur, and noil (percentage waste in combing) are shown in Table 6. In general, the agreement appears poor with the average length and amount of breakage (indicated by shorter H and higher CV(H)) being much higher than predicted.

However, the predictions tend to broadly rank the results correctly, with the major discrepancies being the Suri lot (which had SL well out of the normal range) and the short lot (which had SS furthest out of the normal range). The TEAM formulae (AWC, 1988) and TOPSPEC formula (Hansford et al, 1996) were developed for wool using regression fits to a large number of processing lots. All lots, except lot 3, have a staple length outside the normal range for wool, and all lots, particularly lot 3, have above average staple strength. Both cases for wool are known to lead to underestimates of the amount of fibre breakage.

It is difficult to comment on the possibility of generating good topmaking predictions for alpaca on these few results, although many lessons from the wool industry will be applicable to alpaca (Lamb, P.R. 1998a). It is suspected that a major underlying problem will be that the raw material is much more variable than wool and an accurate estimate of the greasy parameters may require many more staples to be measured. Dehairing is being considered in Peru (Wool Record 2001). It could be expected to reduce the long tail of coarse fibres in the diameter distribution but is only effective at removing the really coarse guard hairs and cannot substitute for the elimination of coarse components at skirting and classing. Recent work with wool has also shown that differences in along-fibre diameter profile appears to be the major limitation on more accurate prediction and it is likely to similarly limit alpaca prediction. It should also be noted that the predictions for wool assume that the ratio of mean fibre length to staple length is 1.17, as far as is known, this has not been tested for alpaca.

Relative to wool, the noil levels are low and, except for the Suri lot, appear to broadly reflect the diameter of the fibre being processed.

Table 6: Comparison of Measured and Predicted Top Properties.

Lot	Hauteur			CV(H)			Noil		
	Meas.	TEAM	TOPSPEC	Meas.	TEAM	TOPSPEC	Meas.	TEAM	TOPSPEC
1	86.0	93.4	97.0	45.9	40.3	44.6	2.95	-0.37	3.46
2	84.9	89.9	98.6	45.7	44.7	44.5	3.97	2.71	4.92
3	66.8	84.0	84.1	40.0	33.3	27.7	3.97	2.77	3.06
4	83.1	108.9	126.5	54.1	45.5	48.3	5.17	-1.93	8.04
5	77.4	87.6	89.8	50.3	47.9	53.2	5.23	3.22	6.22
6	86.0	98.8	105.8	46.4	38.5	41.2	3.23	-1.41	3.51
Avg.	**80.7**	**93.8**	**100.3**	**47.1**	**41.7**	**43.2**	**4.1**	**0.8**	**4.9**

The fact that all lots, except the lot classed as short, gave as long a top length as would normally be desired (70 to 75mm for wool), and the fact that longer length is probably achievable by more gentle scouring conditions, suggests that the prediction of Hauteur is not critical. The only important criteria may be to limit the really short or really long staple components (and hence this is important in the classing criteria).

The bundle tenacity (BT) of each top was measured using Sirolan Tensor. The measured values are shown in Table 7 (after applying the correction factor for the instrument used).

Table 7: Bundle Tenacities

Lot	1	2	3	4	5	6
BT	13.53	13.81	13.73	10.04	13.76	13.97

The values are a little higher than those for wool of similar fibre diameter (approx. 11 cN/tex). However, the low value for the Suri lot is a surprise but follows a recent result (Ferguson, M 2000) that measured bundle tenacities of 12.99 and 11.18 on Huacaya and Suri, respectively, tops imported from Peru, and 12.37 and 11.29 on degreased staples from Australian alpacas.

4.4 Spinning

All six lots were taken through drawing, with the addition of a water/antistat freshener, to roving. Ratches were adjusted to those used for similar Hauteur wools. No significant problems were encountered. The bulk of the rovings were spun as shown in Table 8

(Tex is linear density in g/km, Nm is metric count in m/g, alpha is the metric twist factor.)

Table 8: Spinning

Lot	D	CV(D)	Hauteur	Roving tex	Tex	Nm	tpm Z	alpha
1	24.7	26.4	86.0	600	35.7	28	400	76
2	22.6	27.0	84.9	450	27.8	36	456	76
3	25.6	26.8	66.8	600	35.7	28	400	76
4	24.6	25.8	83.1	600	35.7	28	400	76
5	21.5	25.9	77.4	450	27.8	36	456	76
6	25.6	25.4	86.0	600	35.7	28	400	76

The yarn tex values were chosen as the finest for that diameter that would be likely to be spun commercially. In addition, 6 bobbins of 1.2 km of lots 2 and 5 were spun at Nm28 and labelled as 2A and 5A. The twist (tpm=turns/metre) was chosen to be that typically used for wool knitting yarns.

Spinning began with lots 1 and 3 as these were the coarsest and shortest lots. Initial values of ends-down per thousand spindle hours were approximately 450 and 1265, respectively. The effect of varying apron spacers and reducing back roller recess from 1.0mm to 0.5mm were tested. The latter was tried on the basis that wools with lower crimp and less cohesion are more difficult to grip, and proved remarkably effective, reducing ends-down by a factor of 6 to 8.

The yarn and spinning results are shown in Table 9. The values come from measurements on 6 bobbins – tex (1 test/bobbin), evenness CV%, thin (-50%), thick (+50%), nep (+200%) and hairiness (1 test/bobbin on an Uster Tester III), tenacity and elongation at break (100 tests/bobbin at 5m/min on an Uster Tensorapid). n = calculated mean number of fibres in the yarn cross-section. EDMSH = ends-down (breaks) per thousand spindle hours.

Table 9: Yarn and Spinning Results

Nm28 yarns, spun at 6600 revs./min, Traveller #23, 60 mm ring diameter.													
Lot	Tex	CV%	Thin	Thick	Neps	Hair.	Tenacity	Elong.	B-Work	n	Breaks	hours	EDMSH
			/km	/km	/km		cN/tex	%	cN.cm				
1	35.68	17.42	80	48	57	5.59	5.90	11.87	1104	53	4	71.5	56
2A	35.65	16.35	52	28	27	5.63	6.66	16.96	1809	63	0	11.4	0
3	34.99	18.86	186	115	35	5.54	4.73	5.16	327	49	28	135	208
4	34.09	18.42	137	82	49	5.97	4.68	6.54	402	51	3	52.1	58
5A	35.37	15.97	42	27	38	6.09	6.73	17.09	1816	70	0	14.8	0
6	35.78	17.58	99	53	32	5.28	6.30	13.13	1298	50	2	224	9
Nm36 yarns, spun at 6600 rpm, Trav.#25, 60 mm rings													
2	26.70	18.58	176	67	66	5.24	6.21	12.53	921	47	13	283	46
5	27.54	17.76	110	62	49	5.38	6.42	14.18	1097	54	9	143	63

It should be noted that the length of spinning is much, much less than a thousand hours and so the estimates of spinning performance are highly unreliable. The main points of note are that the ends-down for the shortest lot are higher than would normally be accepted commercially and the yarn strength values (tenacity, elongation and work-to-break) are unusually low for lot 3 (short) and lot 4 (Suri). The Fine lots are clearly superior to the Medium lots in evenness, strength and spinning performance. The objectively measured Fine lot gave marginally stronger and more even yarns than the subjectively classed lot.

A comparison of measured and predicted values using Sirolan-Yarnspec (vs.. 5.1) are shown in Figs. 6 to 13. This prediction software (Lamb &Yang 1997a) was developed for wool but is based on theoretical and experimental observations on the effect of fibre properties on yarn properties and spinning performance. It is important to stress than the relative importance of fibre properties is well understood and well-confirmed experimentally (Lamb & Yang 1997b). The key determinant is fibre diameter because, for a given yarn thickness, it determines the average number of fibres in the yarn cross-section. After diameter, come mean fibre length, diameter distribution and fibre strength.

The yarn evenness (CV%) is only slightly poorer than expected and the thin place predictions are good. There are more thick places and neps than expected. These may reflect the poorer web cohesion in combing or the need for additional lubricant antistat in drafting but may also indicate that fibre control in spinning could be further improved. For all but the shortest lot the small number of very long fibres may also have been interfering with drafting.

The yarn tenacity, elongation and ends-down predictions are poor for all yarns, but particularly the short wool. It is believed that the explanation lies in the apparent lower fibre cohesion of alpaca. It is suspected that the fibre needs more twist than wool of similar length to achieve sufficient locking of the fibres. The lower than expected strength will then go a long way towards explaining the higher than expected breaks in spinning.

Figure 6

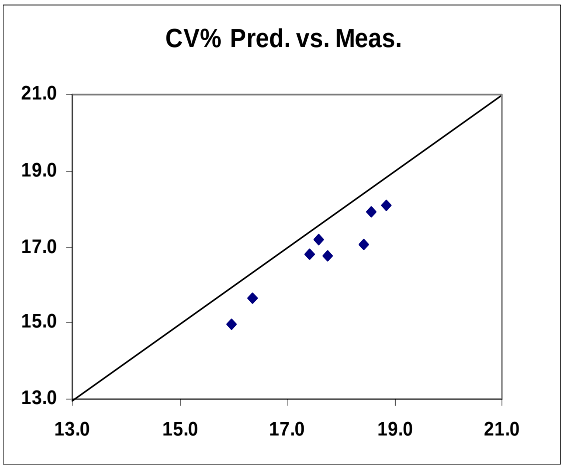


Figure 7

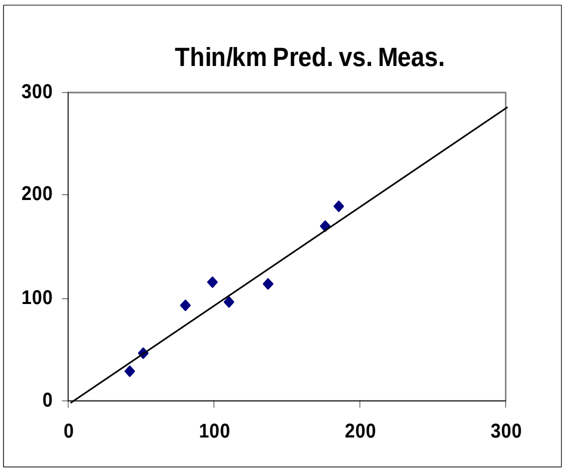


Figure 8

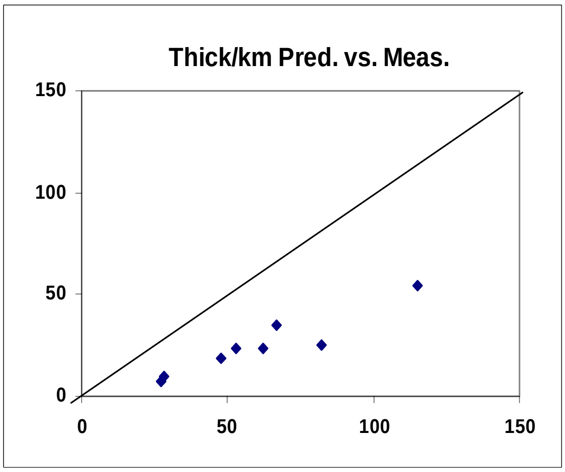


Figure 9

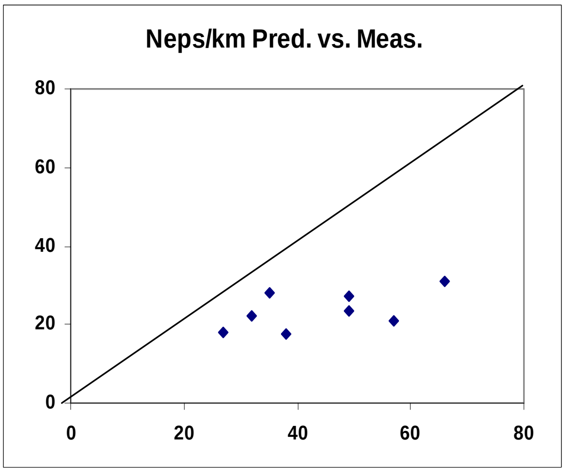


Figure 10

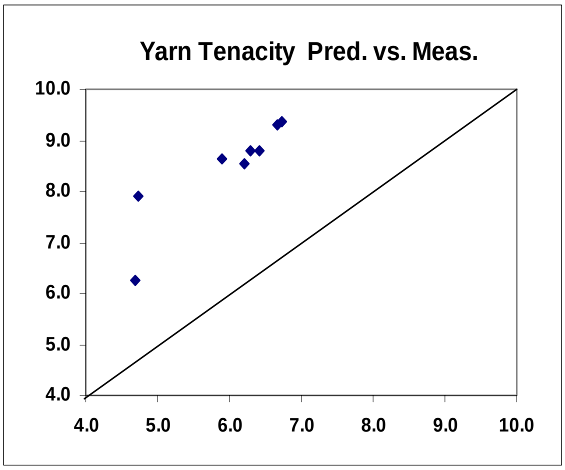


Figure 11

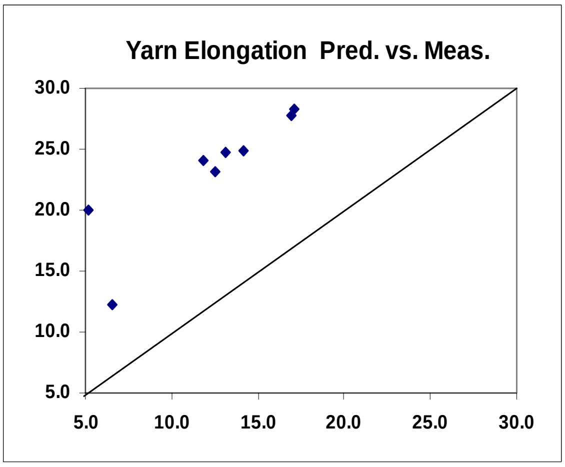


Figure 12

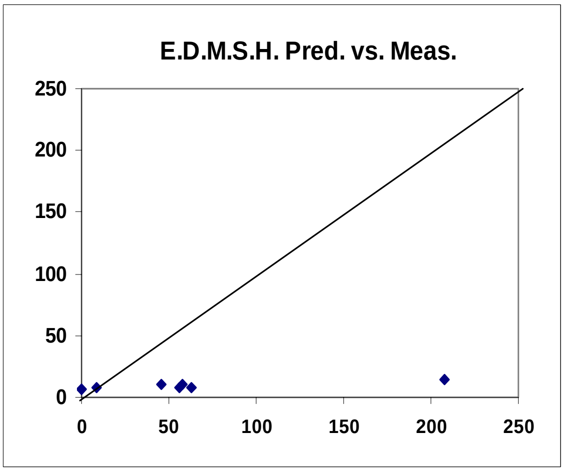
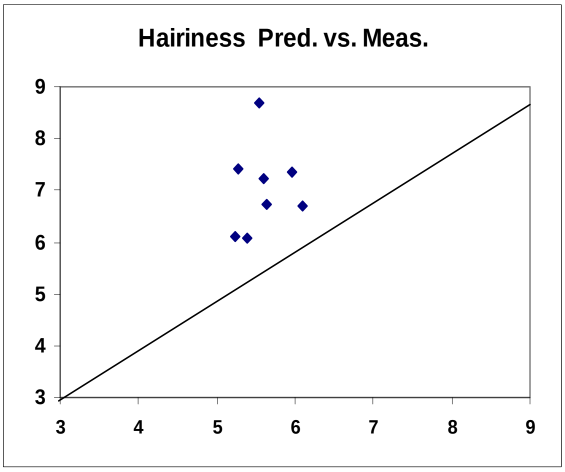


Figure 13



This hypothesis could be tested by up-twisting some of the remaining yarn and measuring the improvement in strength at higher twist levels.

It was intended that yarn, and the parent top, from Elite could be measured to compare spinning performance and yarn properties. The fibre diameter properties can be measured in the yarn but without the top, the mean fibre length and strength must be estimated. However, Elite spin very little pure alpaca yarn, particularly in fine counts and no yarns were supplied.

4.5 Conclusion

Classed alpaca lines were successfully processed to top and yarn. No major detrimental effects of staple length or the range of lengths was observed. However, the longest lot (Suri) showed the biggest shortfall in top length relative to predictions and the highest noil. The lot classed as short gave the shortest top and this led to unsatisfactory spinning performance and yarn strength at the low (knitting) twist levels used. Thick places were higher than expected in the yarn and may be, in part, an indication that there are too many really long fibres.

The ratches of wool processing machinery are set up to handle annually shorn wool. Hence, if alpaca is being classed for processing on the worsted system there should be limits placed on the allowed fibre lengths. The spinning results suggest that it is desirable to aim for a Hauteur of 80mm or more in the top in which case an average staple length of about 110mm appears satisfactory. The Suri at an average 142mm staple length led to a top with the 1% of longest fibres averaging 207mm, such fibres span the full ratch used in spinning and will be broken and are likely to disrupt the smooth flow of fibres. The suggested classing length range of 70 to 140mm for the primary line therefore seems prudent. Most spinners are likely to want to protect against overgrown fleeces by imposing such an upper limit and there is no reason to reject the shorter lengths provided the average length is satisfactory.

The classer-produced separation into Medium and Fine lines gave clear differences in performance while the objective sorting only provided a slight further difference. However, given the standard deviation of over 3μm in the ability of the three classers tested to estimate mean fibre diameter it is suggested that the present classing divisions are sensible.

It should be stressed that the results are entirely consistent with mean fibre diameter, followed by adequate fibre length, being the prime determinants of the fineness and quality of the yarns that can be spun, as is expected and observed for wool.

Both the lightness and softness of fabrics are therefore primarily dependent on mean fibre diameter, which is reflected in price premiums depending on fibre availability.

The limited number of lots and likely errors in the greasy measurements make it difficult to assess the usefulness of ATLAS measurements of alpaca staples. Predictions using either TEAM2 or Sirolan-Topspec were both poor. However, it is suggested that given all lots, except the lot classed as short, gave as long a top length as would normally be desired, and that longer length is probably achievable by more gentle scouring conditions, the prediction of Hauteur is not critical. It is probably sufficient to know that the staples have good average length and are not much weaker than has currently been encountered. Noil values for alpaca appear low, as is found with low crimp wools, and the prediction of noil appears to be likely to depend mostly on diameter and the amount of VM that gets through carding, provided there is not overgrown fibre present.

Satisfactory spinning was achieved but needs further investigation. It is speculated that Sirolan-Yarnspec might be a reasonable tool for predicting yarn properties and spinning performance when the appropriate twist/strength curve for alpaca yarns is established.

5. Education

Most growers still send in their clips with fleeces, necks and legs individually bagged. This has been a satisfactory method, but it makes classing slow and expensive. The average clip size delivered to the Alpaca Cooperative is under 40kg. For handling to be streamlined and costs reduced more rigorous preparation at shearing time is needed. Being able to assess and prepare alpaca fibre will also become increasingly important, as animal values are tied more and more to the quality of their fleece. There is now both a demand and a need for specialised training in alpaca clip preparation. Many courses, information days, field days, workshops and seminars have been conducted on a variety of alpaca subjects throughout Australia. An alpaca production course curriculum was developed and conducted by NSW Tafe, but to date no formal training programs have been adopted nationally.

5.1 National Approach to Education

During the course of this project, efforts were made to start the process of introducing nationally accredited alpaca training programs. Feedback received from alpaca producers at fibre workshops conducted in each state indicated that there was a genuine need for alpaca specific training in all States. Response, initiated as a part of this research project included a number of activities. They included numerous meetings with the AAA education committee chairman, liaison with RTCA, and, adapting (from Wool Harvesting) a draft Alpaca Clip Preparation training package. This draft document was given to RTCA and was used as the basis of a scoping study commissioned by RTCA and completed by Kate Mountain (a NSW based consultant) in November 2001.

The Vocational Education and Training (VET) sector has undergone radical change in recent years and has moved from a curriculum based approach to a competency-based approach. Many agricultural sectors have had ‘Training Packages’ developed in a competency-based format under the direction of the Rural Training Council, Canberra. In June 2001 a review of the Agriculture and Horticulture training packages, funded by the Australian National Training Authority (ANTA) was completed and recommendations for changes submitted.

Progress towards implementation has been delayed due to the National Training Package Review (The Rumsey Review). The Agricultural Training Package review favoured the introduction of generic competencies whenever possible. Following the completion of the review, the RTCA commissioned alpaca scoping study also considered additional training needs of the industry. There are still many issues being debated concerning packaging of qualifications and the impact this will have on delivery by Rural Training Organizations. Some of the issues discussed at a Victorian Agricultural Network conference in December 2001 are included in Appendix 8. The potential loss of detailed skills definition in generic competencies is questioned in a letter from Primary Skills Victoria to other Primary Industry Executive officers in other states (Appendix 9). It is not clear for example if a qualification which included alpaca specific competencies would be granted as a Diploma or Certificate in Agriculture, or as a Diploma or Certificate in Agriculture (Alpaca) with alpaca being included in brackets as shown.

Whatever the format, it is anticipated that a range of nationally accredited alpaca specific training programs will be endorsed by RTC for delivery some time in 2002. While a speedier outcome would have been desirable, it is probable that no outcome would have been achieved without input from this research project, and the support of the AAA education committee. Besides being essential for meeting processing needs, clip preparation standards would also be an integral component of alpaca fibre training. To this end, priority was given to the development of a code of practice of minimum clip preparation standards.

5.2 Feedback from Alpaca Producers

The ‘hands on’ fibre workshops conducted in each state were enthusiastically attended. The opinion was expressed on many separate occasions that producers were keen to participate in ‘skills based’ training. Far less interest was expressed when people were asked to participate in, or be informed about the ‘process’ of training development and implementation. This was seen as a major issue as current education direction and policy in Australia dictates that training initiatives must be ‘industry driven’. It is no longer acceptable for educators to prepare a curriculum and present it to industry as a ‘course’; it is up to industry groups to develop their own training competencies, which will then be ‘packaged’ for delivery by a Rural Training Organisation (RTO). The education sub-committee of the AAA requested assistance when meeting with the Sydney consultant contracted to look at alpaca competencies, by the Rural Training Council of Australia. This assistance was willingly provided from the resources of this research project. It was also noted that assistance on technical training issues, is an ongoing need for industry education committees, which invariably are comprised of producer volunteers, and have minimal budgets.

5.3 Future Education Options

Tafe is just one avenue being explored to cater for the future training needs of alpaca producers. It is anticipated that as demand for training increases the AAA will continue to expand its training activities, as will other private and public training providers. Activities will range from informal demonstrations and workshops to undergraduate and postgraduate tertiary course opportunities. It would be beneficial if representatives of regional AAA branches liased with their local Tafe Colleges, other training providers and their state Primary Industry Training Board, to help establish the specific training needs their members need and want.

6. Conclusions and Recommendations

Since the commencement of this project, grower involvement and interest in clip preparation has increased noticeably. Although the alpaca industry is fundamentally still animal based, the value of animals has become directly related to their fibre diameter.

6.1 Discussion of Results

It is anticipated that the introduction of formalised fibre training will be welcomed and well supported. Subjective classification of alpaca fleeces into significantly different lines should be achievable, but tightly specified lines (with a small FD range) would be difficult to achieve without the assistance of objective measurement.

Processing presented few problems, and satisfactory spinning performance was achieved, but further investigation is needed, with larger lots. The variety of alpaca colours presents unique problems for the industry, as the majority of early stage wool processors will not process alpaca.

The Australian Alpaca fibre industry is currently little more than a cottage industry, and there is a desperate shortage of fine and medium fibre. Prices currently being offered by the Australian Alpaca Cooperative, namely $60/kg for fibre less than 20 microns and $1/kg for fibre 30 microns and over illustrate the magnitude of the shortage. As average (saddle) cuts per head are less than 2kg, an understanding of fibre, and a desire to breed finer animals will be essential for the long-term viability of a fibre industry. This urgency is compounded by the fact that the majority of animals are more than 26 microns. It is desirable that research currently being undertaken by the AAA to estimate the average fibre diameter range of the Australian herd should be supplemented by regular objective testing of bales classed for processing.

There is a need for further research in the areas of processing and genetics on an ongoing basis.

This project has played a major role in focusing the Australian Alpaca Industry on the importance of clip preparation. A focus on education and research should be emphasised in future strategic plans for the Australian industry.

6.2 Implications

There are very few marketing and/or processing options for alpaca fibre in Australia. The lack of options leaves producers particularly vulnerable. While fibre is still largely a by-product of a live animal market, the collapse of the fibre market would have a marked effect on industry confidence. Fibre producers need to heed market signals, and set breeding objectives accordingly. The major demand is currently for fine (and preferably white) fibre. By improving knowledge of alpaca fibre and its preparation, producers will be better able to make decisions concerning their future directions.

6.3 Recommendations

The Australian Alpaca Association should continue to support and nurture the introduction of comprehensive, nationally accredited training for the Australian Alpaca Industry through the Education Sub-Committee and its regional branches. Whilst other private organizations may play a role in training, it is noted that they may not represent all alpaca producers, and requirements will vary from one processor to the next. The Code of Practice should be updated annually by the AAA to reflect current industry practice. Because of the inherent difficulties with subjective classing it is recommended that for optimum performance all fleeces should be sent to a central location and then sorted and grouped based on Fleecescan measurements and according to customer orders. The results of current and future processing research should be heeded and incorporated into fibre production strategies.

7. Appendices

7.1 Interim Code of Practice - Clip Preparation Guidelines for Australian Alpaca Fibre

Introduction

Fleece preparation and classing at the time of shearing is a way Australian producers can enhance the value of their fibre. Husbandry and management of the animals in the previous 12 months prior to shearing will affect the quantity and quality of the fibre. Industry wide objectives will also influence the enduring quantity and quality of fibre. There is currently no nationally accredited course for alpaca fibre classing, but a training package will be developed by the Rural Training Council, Canberra.

These guidelines are designed ONLY for fleece preparation. They should be read in conjunction with guidelines concerning husbandry, management, quality assurance and marketing. In the absence of formal training for alpaca fibre classers, growers are encouraged to develop their knowledge of their fibre, and to familiarise themselves with these guidelines.

The object of fleece preparation

Alpaca fleece shows considerable variation between animals, between different parts of the fleece, even within a single staple of a fleece. Preparing a fleece during shearing accomplishes several goals:

- Processors can use Australian fibre with confidence, and with predictable outcomes.
- Australian fibre will develop a reputation as the world's best
- Producers will gain the maximum financial reward for their clip.

To achieve these goals -

- Fibre should be combined into industry approved lines
- All lines should be free of contamination while containing the appropriate colour fineness and length variation
- Producers should use suitable packaging material.

Alpaca Management

Processors use fibre primarily based on characteristics of fibre diameter, length, medullation and colour. Husbandry, management practices and breeding objectives may all influence fibre quality and how the clip can be prepared.

- Genetics chiefly determines fibre diameter, and it will usually increase considerably as animals get older. The time of shearing and nutrition may also influence fibre diameter.

- Fibre length is an important component of fleece weight. It is desirable for ease of processing that fibre is neither too long or too short. The main influence on length therefore is the duration between shearings, but nutrition and the reproductive state of entire males and females may also influence it.

- Visible guard hair is undesirable, and is genetic in origin. Fine fleeced animals should be kept separate from course fleeced animals at shearing time to prevent possible contamination (if practical or considered warranted).

- Colour is also breeding related, but management may help prevent loose fibre contamination between colour groups. Preparation before shearing can be a major aid to good clip preparation. This should involve drafting for colour, and may also include drafting for age, sex and fleece type.

Preparing animals for shearing

Preparation before shearing can be a major aid to good clip preparation. This should involve drafting for colour, and may also include drafting for age, sex and fleece type.

- Colour drafting should always be done. This will prevent cross contamination during penning, shearing and classing. White animals should be shorn first, followed by fawn and then darker animals.
- Age drafting may be desirable particularly for cria and first shear animals (not shorn as cria). They will tend to be finer than the adult herd.
- Sex drafting is useful for the benefit of the shearer and to prevent injury to teats or pizzles.

Alpaca should be yarded a few hours prior to shearing to settle and empty out. They should also be removed from direct sunlight to cool before shearing.

Shed Preparation

The shed and yards should be clean and free from contaminants. A firm clean surface should be available for shearing, preferably wooden. Gravel, grass or dirt are not suitable because fleece contamination may result.

Other animal fibres such as wool, mohair or cashmere should be removed from the area to prevent possible contamination.

Good lighting should be provided both for shearing and classing. While some fleece separation may occur on the shearing board, a separate slatted classing table should be provided for fleece inspection.

Sufficient wool packs and/or plastic bags should be provided and strategically placed prior to the commencement of shearing. Markers should be provided to identify the contents of each pack.

Shearing

Shearing preparation should consider the comfort of the shearer, the animals and the easy flow of animals to the shearer and fleece to the classer. A good working environment will help prevent injury to workers and animals, and fleece will be able to be prepared to maximise its value.

Contamination

Losses caused to processors by contamination is a major problem with all animal fibres. Contamination may be derived from either fibre or non-fibre sources and in turn may be classified as hard or soft. Hard contaminants (such as metal objects) may damage processing machinery, while soft contaminants (such as hayband, urine stain) may contaminate fibre at all stages of the processing chain and could ultimately destroy a finished garment if it was undetected in fabric. Preventing contamination is possible by careful planning and preparation for shearing.

Clip preparation

Alpaca fleece quality varies between animals, within fleeces and within parts of fleeces. The aim of fleece preparation is to prepare fibre to maximise grower returns and to allow for optimum processing performance. It is desirable to make as few lines as possible while keeping any significantly different fleece separated. The main criteria for classing are average fibre diameter, length, and colour. Because of the variation in fleece characteristics across a fleece the legs, neck and blanket should be prepared individually according to the characteristics of each section.
Shearing technique will vary from shearer to shearer. The legs, neck and blanket should be picked up and graded separately and placed in lines according to their length, colour and fibre diameter.

Line Descriptions

The following descriptions should be used to describe lines.

Breed
Unless otherwise stated any description will refer to Huacaya. Suri will be denoted by the prefix S.

Length

The actual length parameters placed in each line will vary according to the industry requirements. Generally it would be expected that the majority of a clip shorn at a 12 month interval would go into a AAA line. Consult where the clip is being dispatched to prior to shearing for specific requirements.

AAA – Good average length, suited to worsted processing.

AA – Short line. Significantly shorter than AAA

A – Very short carding length line.

OG – Overgrown fleece – too long too go into AAA line.

Colour

The AAA breed colour chart should be used. It is likely that some colours may be combined to make larger lots. Consult where the clip is being dispatched to prior to shearing for specific requirements.

W – White
LF – Light Fawn
MF – Medium Fawn
DF – Dark Fawn

LBR – Light Brown
MBR – Medium Brown
DBR – Dark Brown
BLK – Black
DG – Dark Grey
MG – Medium Grey
LG – Light Grey
RG – Rose Grey/Roan
O - Combination of colours for predetermined bulk lines

Because of the need to make lines as large as possible colours may often be combined eg WLF (white light fawn combination). BGR (black silver grey combination). O (may include any predetmined combination). As always consult where the clip is being dispatched to, prior to shearing, for specific requirements.

Fibre Diameter

The following fibre diameter grades are recognised and should be used.

SF - Superfine

F - Fine

M - Medium

S - Strong

XS - Extra Strong

The allowable fibre diameter range of fibre placed in each grade will vary. Each line should have a "bulk average" fibre diameter with fleeces both stronger and finer than the average. For all lines there will be some finer and stronger fibre within an individual fleece and between fleeces but the average fleece micron range should fall within the correct fibre diameter class. Fleece preparation can influence the fleece fibre diameter class. To create large enough lines to process it may be necessary to place fibre in the next strongest line to achieve useable lot sizes.

An example of fibre diameter classes (these classes will vary according to the requirments of the organisation the fibre is being dispatched to).

Superfine (SF) - 20 micron or finer

Fine (F) - 20.1 - 23 micron

Medium (M) - 23.1 - 27 micron

Strong (S) - 27.1 - 32 micron

Extra Strong (XS) - greater than 32 micron

Alpaca is an extremely variable fibre. Midside sample test results provide a guidence result only, and a whole saddle may often be considerably stronger, on average, than the test result.

Cast Lines

Fleeces which have a fault in them should be described accordingly. Small quantities of cast fleeces should be "Bulk classed" or packaged together and described in documentation for rehandling. Some organisation may request that cast lines are not delivered at all.
Descriptions

All tender fleece - TDR

All cotted fleece - COT

Skirtings - PCS (only extra strong legs, bellies and aprons).

Overgrown - OG (excessively long fleece. May be NCV)

No commercial value NCV (do not dispatch if not wanted)

Heavy vegetable matter - VM (may be NCV)

Some Examples of Fleece Descriptions

(Using the colour white)

Huacaya

AAAWSF - Good length, white superfine fleece.
AAAWF - Good length white fine fleece.
AAAWM - Good length white medium fleece.
AAAWS - Good length white coarse fleece.
AAAWXS - Good length white extra coarse fleece.

Suri

SAAAWSF - Good length, white superfine fleece.
SAAAWF - Good length white fine fleece.
SAAAWM - Good length white medium fleece
SAAAWC - Good length white coarse fleece
SAAAWXC - Good length white extra coarse fleece

It is unlikely that all of these descriptions would be used in one clip. Consult where the clip is being dispatched to prior to shearing for specific requirements.

Producer responsibilities

To provide suitable work area for shearing and clip preparation.
To ensure shed is cleaned before shearing and enough containers are provided
Provide enough woolpacks, plastic bags and marker pens
Provide brooms for shearing and fibre areas.
To provide anchor points for shearing ropes
To provide adequate labour during shearing so clip preparation can be carried out effectively.
To provide the classer with information on –

- Order of mobs to be shorn, with details of age, sex, colour and other relevant information that may effect classing.
- Previous test results or classing house feedback
- Provide feedback to the classer if available post sale of the fibre

Complete documentation in consultation with the classer for despatch to classing house, broker or other destination.

Classer responsibilities

The Classer's duties should be carried out in accordance with these guidelines as endorsed by the Australian Alpaca Association. Additional requirements may be requested by the grower or purchaser of the fibre. The main role of the classer is to supervise all shed (including the shearer) staff in clip preparation matters. This includes the removal of fleece from the shearing board; preparing the fleece into colour, average fibre diameter and length lines; packaging and documenting lines; prevent contamination. The classer should maximise the returns to the grower, by preventing contamination (either fibre or non-fibre) and avoiding small lines if possible. If different preparation methods are requested which fall outside of these guidelines, the classer should document them and note the differences.

Review: - These guidelines will be reviewed by the AAA in consultation with members, processors and industry representatives a minimum of every three years, more often if deemed necessary.

A glossary of terms

Apron: highly medullated extra strong fibre from the brisket of the animal.

Bale: a woolpack which contains between 110 and 204kg of fibre. Should always be a new woolpack, to withstand the strain of pressing, and to prevent contamination from loose or perished fibres. Only non-contaminating nylon packs were allowed in the wool industry from July 2000.

Bale fasteners: metal clips used to fasten woolpacks.

Belly: fibre from the underline of the animal. If similar may blend with the upper leg but if stronger in appearance it should go in the XS line.

Bin: partitions (usually made of wood), which are set up to keep lines separate during classing of fibre.

Blanket: all of the fibre from an alpaca with the legs and neck removed. Previously called saddle.

Board: area where shearing operation is carried out. Often called shearing board.

Butt: a woolpack which has less than 110kg of fibre in it. May be new or second hand.

Butt frame: woolpack holder, which suspends pack for easy filling.

Comb: a shearing handpiece attachment, which helps guide the handpiece and provides a cutting surface.

Cotted: fleece which is matted together. Causes processing problems, so it must be opened.

Crimp: pronounced corrugations in the staples. Good crimp should be even and well defined.

Cutter: sharpened tool which reciprocates back and forth on a comb to cut fibre during the shearing operation.

Empty: non pregnant female.
Empty out: alpaca which has been yarded prior to shearing for more than four hours to

minimise urine and dung contamination on the shearing board.

Fleece: all of the fibre from an alpaca.

Full: alpaca which has not been emptied out.

Handle: degree of softness of a fleece. Generally the softer the finer, but not always.

Hayband: polypropylene twine used to hold hay bales together. A major contaminant of natural animal fibres because it takes up dye differently and causes blemishes in finished fabrics. Called baler twine in some states.

Lines: different categories that the fibre is classed into after shearing.

Medullated: true hair fibres which contain a hollow core or medulla. Generally applied to the coarse guard hair in alpaca, but alpaca also contains varying degrees of finer medullated fibre or part medullated fibre which is not undesirable.

Objective measurement: the testing of traits which can be measured objectively. Measurements will typically increase with age so they should be measured at 12 months, 24 months and so on.

Performance records: the collection and recording of objective and subjective measurements throughout an animals lifetime.

Pieces: inferior very strong parts of the fleece removed to leave the rest as even and fine as possible. May includes legs, belly and apron.

Progeny testing: collection of performance records from an individual's progeny. Common method of comparing the progeny of several sires.

Repeatability: the ability of a superior trait to repeat itself during an individual's lifetime. If a trait is not highly repeatable, little genetic gain can be achieved. To be useful objective measurements must be taken when a trait is repeatable. For example, in sheep repeatability of FD is low at six months, moderate at 12 months and high by 24 months. This means that if sheep were selected for low fibre diameters at six months, they may not be the finest in their group by 12 months old. If the same sheep were selected on an older test result, the repeatability of their superiority would be much higher.

Show Floor Bags: Plastic bags good for packaging and dispatch of small lines of alpaca. Multiple show floor bags should be placed in a woolpack, so a butt is dispatched.

Specification: documentation dispatched with the fibre. Should include the owners name, address, property name, description of lines, weights (if weighed), and any test results if available.

Stain: urine, dung or mud stain on a fleece. Must be kept separate from other fleece.

Tender: fibre which has a distinct break in it. Usually the result of health or nutritional stress. Not common in alpaca but it does occur.

Tramping: treading down the contents of a butt to get more fibre in it.

V.M.: vegetable matter. Major natural contaminant of alpaca. Three main types - burr, seed hardheads. If heavy VM can render alpaca of no commercial value as there have been problems carbonising alpaca fibre. More research is needed.

7.2 Email From AAA Education & Training Committee Chairman

Mr. Ian Knox
Gordon Institute of Tafe
Private bag 1
Mail Centre Geelong
Victoria 3221

28/04/01

Dear Ian

After a recent discussion with the Executive it has been decided to give acceptance to the provisional Code of Practice for Alpaca Fibre Harvesting as presented by you to NATCOM.

Whilst you have been instrumental in putting the Code of Practice together, and we sincerely thank you for it, it must be recognised that this code is to be owned by the "alpaca industry".

It is also felt that the Code needs to be a "fluid" document and as such it will be reviewed and updated as industry needs and trends dictate.

We see this as an essential early step in getting as many owner-classers trained to a level whereby they can make a genuine impact on the value-added side of their alpaca enterprises.

On behalf of NATCOM I thank you for your work so far and look forward to the next stage of your training programme.

Yours Sincerely

Geoff Fysh
Chairperson
Education & Training Subcommittee
Australian Alpaca Association

7.3 Australian Alpaca Cooperative Ltd Classing Lines for 2001 (Pre. Nov 2001)

(Source – produced by Australian Alpaca Cooperative Ltd in conjunction with I. Knox)

For processing to be cost effective, it is necessary to make mill lots as large as possible. Lots as small as 100kg have been processed by the Co-op. but this is very inefficient. A typical batch of wool that is scoured in Australia would be between 50,000 and 100,000kg!! Obviously quantities of this size would be processed for a fraction of the cost of processing small lots of alpaca. To increase the average lot size, it has become necessary to combine some lines for processing. The following lines will be used by the Co-op during 2001.

For further information on general clip preparation please also refer to the Code of Practice of Minimum Clip Preparation Guidelines. This is available online on Ian Knox's web page at http://www.ozrural.com/rirdcalpaca.htm

LINES

Most people still individually bag fleeces, and you may still do so if you wish. In the longer term however, there are many advantages to be had from combining lines at shearing time. These include cost savings from less rehandling, much easier fibre handling at shearing time, and increased personal fibre knowledge.

If you feel confident to combine fleeces into lines, you are encouraged to try. Recent test results to guide you would be a major advantage. Any mistakes will be corrected at the Coop classing centre, and you will also be given feedback.

Example: if you have 5 fleeces that are all between 23 and 27 microns, AAA length and White they could be combined together and marked AAAWM. *You must ensure that you remove any fibre of another colour, including light fawn; otherwise the entire lot will be reclassed as the other colour.*

The prefixes to be used during 2001 are as follows:

HUACAYA

Length

AAA	70-140mm
AA	40-70mm

Fibre Diameter

Super Fine (SF) 20 microns or finer

Fine (F) 20.1 – 23

Medium (M) 23.1- 27

Strong (S) 27.1 - 32

Extra Strong (XS) >32 (Please don't include heavily guard haired pieces)

Cast Lines

Heavy Vegetable Matter (VM)
Cott (COT)
Overgrown (OG)
Tender (TDR).

It is currently not possible to process economically these lines so they have no commercial value. Therefore please **do not** send them.

Colour

To increase lot sizes for processing, some colours are currently combined. For 2001 the colour prefixes to be used are: -
W (White)
LF (Light Fawn)
BLK (Black).
GR (All shades of Silver Grey)
WLF (White/Light Fawn)
BLKGR (Black/Silver Grey)
O (All Other Colours including-Brown, Mid and Dark Fawn, Rose Grey)

AAASF (S/fine)	White/Light Fawn, Black/Silver Grey, Other (3)
AAAF (Fine)	White, Light Fawn, Silver Grey, Black, Other (5)
AAAM (Medium)	White, Light Fawn, Silver Grey, Black, Other (5)
AAAS (Strong)	White/Light Fawn, Black/Silver Grey, Other (3)
AAAXS (X/strong)	White/Light Fawn, Black/Silver Grey, Other (3)
AAF	White, Light Fawn, Silver Grey, Black, Other (5)
AAM	White, Light Fawn, Silver Grey, Black, Other (5)
AAS	White/Light Fawn, Black/Silver Grey, Other (3)

Reason some lines must be combined.

If all colours were made into separate lines, there would be over 100 different lines. Because of the small quantities that would be in many of these lines it is not viable to process them. As the production of Australian alpaca fibre increases, it may become desirable to separate more lines, and Co-op members will be advised of any changes.

Suri

The quantity of Suri received by the Co-op has been low, and much of it has been overgrown. Some recent product trials have been very promising and it appears there could be a niche demand for Suri fibre.

Producers are strongly urged to shear their Suri’s before the fibre exceeds 175mm, or the fleece will be overgrown, and of no commercial Value.

Descriptions for Suri should have an S prefix i.e. SAAAWM – means Suri, AAA length, White, Medium. If a description does not have an S prefix, it will be assumed the line is Huacaya.

Length

AAA	100 – 175 cm
AA	70 – 100 cm

Diameter

Fine	Less than 23 micron
Medium	23.1 –27 Micron
Strong	27.1 – 32 Micron

Colours

SAAAF	White/Light Fawn, Grey/Black, Other (3)
SAAAM	White/Light Fawn, Grey/Black, Other (3)
SAAAS	White /Light Fawn, Grey / Black, Other (3)

Despatch, Documentation and Packaging

Despatch

All fibre should be delivered in a woolpack unless it is a very small quantity when bags are acceptable. As freight is generally volume dependent, try to make woolpacks as heavy as possible. Fibre is generally well packaged.
It should be delivered to: -
Attn. Ian Knox
Gordon Tafe,
International Fibre Centre,
Pigdeons Rd, Waurn Ponds.
Ph: 03 52272358

Documentation

Each woolpack should have the grower's number on it, and a description of contents if lines have been made. The specification should include name, address, grower number and a description of any lines made. The specification should either be hand delivered or placed under the flap of the bale. If there are multiple bales it is handy if the specification location is marked with a large X on the outside flap of the bale it is in, so it is easily found. If the consignment is from a syndicate, the clip details will be posted to the lead syndicate member. It is YOUR responsibility to know who sent the fibre in. This is best accomplished by staggering despatch, and also cross checking the into-store receivable number, which will appear on the clip details.

Packaging

The best packaging is a nylon woolpack. Fleeces can be placed in the woolpack in plastic bags, or classed lines may be separated by newspaper. Woolpacks should be closed with bale fasteners. Special care should be taken so White and Light Fawn fibre is not contaminated by dark fibre.

For very small lots, single bags are acceptable, but perished bags should be avoided because of a major contamination risk.

General Advice

Ian Knox is happy to answer questions at any time by phone or they can be posted on his web site at http://www.ozrural.com/rirdcalpaca.htm Commonly asked questions will also be posted on the web from time to time. Visits by Coop members to see classing are also welcome by appointment throughout the year.

7.4 Australian Alpaca Co-operative Classing Lines (Post Nov. 1 2001)

(Source:- Geoff Fysh, Chairman AAA Education & Training Sub-committee)

Skirtings

Need to be sorted into 3 colour ways (1) white / light fawn, (2) greys and black, (3) fawns and browns including rose grey - this line to consist of legs & bellies, skirtings from the blanket, but NO guard hair or second cuts.

Colour Descriptions

W	White
LF	Light Fawn
F	Fawns
BL	Black
LG	Light Grey
RG	Rose Grey
B	Browns

Combinations

W/LF	White / Light Fawn
BRS	Browns / Mid / Dark Fawns / Rose Grey
BL/G	Black / Light Grey

Lengths

"A"	120 to 150mm
"B"	80 to 120mm
"C"	60 to 80mm
"D"	less than 60mm
"O" (overgrown)	more than 150mm

Suri Classing Lines

Fine	< 23 Microns
Medium	23 – 27 Microns
Strong	> 27 Microns

Colour

White/Light Fawn
Fawns/Browns/Rose Grey
Grey/Black

Length

80 – 200mm

Classing Line Identification Examples:

C LF M	= C length, Light Fawn / Medium
A BLG SF	= A length, Black / Grey combined, Super Fine
SKT BRS	= Skirtings, Mid / Dark Fawns / rose grey
S A W F	= Suri, A length, White, Fine

7.5 New Zealand Classing Lines
(source: New Zealand Alpaca Fibre Manual March 2001)

Colour
1. White (W)
2. Fawn (F)
3. Brown (Br)
4. Grey (G)*
5. Black (B)

*White with black fibres and black with white fibres will be added to Grey.

Fineness
Huacaya

< 20 microns	HUF (Ultrafine)
20-22.9	HSF (Superfine)
23-26.9	HF (Fine)
27-30.9	HM (Medium)
31-35.9	HS (Strong)
36+	HC (Coarse)

Suri

< 21	SSF (Superfine)
21-25.9	SF (Fine)
26-30.9	SM (Medium)
31-35.9	SS (Strong)
36+	SC (Coarse

Length
Huacaya

Overlong	OL	Over 150mm
Long	L	101-150mm
Medium	M	75-100mm
Short	S	50-74mm
Very Short	VS.	under 50mm

Suri

Overlong	OL	Over 225mm
Long	L	151-225mm
Medium	M	85-150mm
Short	S	50-84mm

Crimp/Style

Style 1 – Fleece that shows a good wool style crimp along the length of the staple.
Style 2 - The crimp is not well defined along length of staple. There is crinkle in the individual fibres.
Style 3 – Fibre that has no wave formation in the staple or crinkle in individual fibres.

7.6 Communication with Chairman AAA Education Sub-Committee

Email received May 2001-12-30

Hi Ian

Have just received a call from RTC (Rural Training Council) to set up a meeting for putting the training in place for the whole alpaca package. Initially, I will take all the information that they want to discuss and then disseminate it out through the Reference Group before going back to them.

Others on the group will be George Jackson, Maril Stout, John Lawrie and Alan Jinks. As far as an interim Certificate 3 goes, my gut feeling would be to persuade prospective attendees to tread water for a while - unless you think this thing is going to take too long to put in place. I know I said they are about 18 months behind where they thought they'd be, but if it's only going to take two or three months to put the new regime in place maybe it's better encouraging people to wait. I don't know. In the past RTC definitely said they'd honour anything undertaken in the interim. You'd be in better position than me to judge how fast the cogs turn in such matters. I know how keen you are to wrap it up from your end and maybe it will make little difference in the long run.

Regards Geoff (Fysh)
Chairperson
Education & Training Subcommittee
Australian Alpaca Association

7.7 Subjective Fibre Assessment Answer Sheet

Name________________________________

Number 1 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 5 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 9 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 13 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5
Number 2 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 6 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 10 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 14 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5
Number 3 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 7 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 11 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 15 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5
Number 4 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 8 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 12 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5	Number 16 a – 20 b – 21.5 c - 23 d – 24.5 e – 26 f – 27.5 g – 29 h – 30.5

7.8 Training Package Discussion
(source – Victorian Agricultural Network email)

Joint Networks Conference – Dookie, 6th-7th December 2001

Day 2: Workshop: Horticulture, Agriculture and CLM Training Packages – Packaging Issues and the impact on RTOs

Time: 11.15 am –12.15pm

Facilitators: Tony Audley, Executive Director, RTCA

Gay Gallagher, Executive Officer, PICMM

Issues for discussion

1. Qualifications
The redeveloped packages reduce the number of qualifications from the first Training Packages. Some sectors wish to retain their own individuality by having the sector bracketed after the qualification eg Certificate ll in Agriculture (Dairy)

Question: will this impact on RTOs?

Responses so far:
- *Qualifications should continue to be bracketed*
- *Retain industry details in brackets eg Certificate IV in Agriculture (Sheep and Wool)*
- *Would be easier for RTOs to administer if number of qualifications are reduced, BUT*
  - *i) no ownership for sectors*
  - *ii) do need realistic names for qualifications*
  - *iii) clients will demand ID*
- *Undecided whether to retain or change. Opinion divided 50/50*
- *Yes it is important to retain bracketing as it will avoid confusion from prospective employers*

2. Use of standards from other sectors
ANTA strongly supports the use of using existing units where they exist elsewhere, for eg in Business, to support portability of qualifications . There is capacity to customise imported units (add to ROV) RTCA say they will customise units taken from other packages, will modify assessment guidelines to show how assessment should take place in a rural setting, and develop sector booklets to give details for delivery and assessment in a given sector

Question: what impact does the use of imported units have on RTOs?

Responses so far:
- *Different funding rates must be taken into consideration by RTO, as customisation to Rural takes the focus away from the initial owner of the unit, eg Business*
- *No problem*

3. Group A, Group B and Group C units[1]
The existing packages make use of core and sector specific units. RTCA believes that from the sector specific area, units could be selected to suit the needs of the client but could also be selected in such a way as to give an inappropriate collection which did not address the area of specialisation and thus RTCA has developed the concept of three groups of units

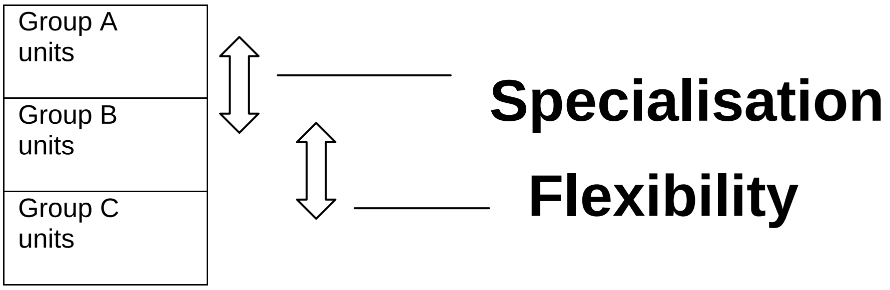
[1] Extract taken from RTCA Executive Director and Project Report – November 2001

Group A units: these are core units and give the specificity required by the area of specialisation (determines the specialisation of the package)

Group B units: these are units perceived to have second tier importance to the area of specialisation- highly relevant but not essential (further enhances the specialisation and builds flexibility

Group C units: These are units which can be chosen from other training packages (introduces endorsed flexibility)

The selection of units, with the rules envisaged, can allow for a specialist or a very flexible qualification



RTCA is supporting the creation of areas of specialisation, eg Certificate lll in Agriculture (specialising in Dairy) but will be guided by industry

Questions:
i. what advice has been given by industry to the review process?
ii. Can RTOs give examples of course structures that were inappropriately selected in the past?
iii. Does the new concept truly add anything better to the core/ sector specific structure?

Responses so far:
- *We are happy to be governed by industry as to the competencies selected. The use of mandatory Group A competencies will ensure the important ones are done*
- *Will this give greater range of choice at various qualification levels?*
- *Keep it simple eg*
  - *i) Group A - compulsory (do all units)*
  - *ii) Group B – highly recommended (choice of eg, have to do six from group)*
  - *iii) Group C – balance can be made up from the remainder of Group B units or from other training packages*

4. Generic approach to units
RTCA indicate that the Rumsay report strongly supported the use of a generic approach, eg, “Feed pigs” and “Feed beef cattle” collapsed to “Feed livestock”.

Questions:
i. What impact does the creation of generic units to replace highly sector specific units have on RTOs?
ii. Is the concept of generic units useful across training packages, eg, can a unit “Plant areas” be useful across Horticulture and CLM?

Responses so far: ♦ *NO! – care must be taken when adapting generic units as it will impact on RTOs ability to run units for another sector, eg, beef then pigs. Only funded once for each unit.* ♦ *We want specialised units* ♦ *You can write very generic units and simply change the ROV. But you can end up with something as incongruous when you go across training packages as in this extreme example - hairdressing being listed under the ROV for a competency on shearing or vice versa*[2]

5. Coding of units

The new coding system introduced in this package is numerical, with a prefix "RTC" to show it applies to plant, animal and land management activities and under RTCA.

- The first number is the AQF number (as previously)
- The next three numbers are unique to the unit and indicate the function

000-099 Working with plants	500-599 resource management
100-199 Working with animals	600-699 Irrigation and drainage
200-299 Construction and maintenance	700-799 Health and safety
300-399 Machinery and equipment	800-899 Working with people
400-499 Pests and diseases	900-999 Administration and business

Question: do you have any comments or advice in terms of RTO responsibilities?

Responses so far: ♦ *Maybe you can put the alpha code at the end of the code , eg 903 S (sheep) 903 B (beef) or 903 D (dairy)* ♦ *Need to retain sector descriptions to maintain ownership of commodity* ♦ *Can use generic units but be able to add an industry descriptor to the qualification/ unit* ♦ *Need to have alpha descriptions that tie the competency to its training packages* ♦ *Agree. We feel it is an administrative issue that can be accommodated reasonably easily*

6. Entry and exit points

The 80/20 rules will apply in the new packages and each certificate is a discrete qualification, ie, the concept of nesting does not apply

Questions:

1. What impact does this have on exit year 12 students, at which level may they enter?
2. Is it in fact allowable for this cohort to enter at Certificate lV and Diploma? Should pre-requisites be specified for this group and what implications for VTAC?

Responses so far: ♦ The old 50/50 system gave better value for apprentices articulating into the diploma ♦ The apprenticeship system needs to be protected ♦ Agree in principle. 80/20? ♦ The 80/20 rule is very restrictive to Diploma, eg, may not be able to get FCU ♦ We need to allow for students who want to enter at level 5 without the job experience

7. Nested qualifications/ co-requisites and pre-requisites

The concept is not used in the primary industry packages. Many other training packages are nested, without damaging the concept of multiple entry points[3]*. Packages such as metals and Sport and Recreation make extensive use of the concepts of co and pre-requisites. There are mixed views as to whether the concept of co and prerequisites makes delivery more cumbersome for the RTO and less flexible for the individual*

Questions:

i. Would the notion of nested qualifications be beneficial from your viewpoint as an RTO?
ii. Would the notion of co and prerequisites be beneficial from your viewpoint as an RTO?

[2] this example was actually raised in another meeting but is a good example of an extreme so I have included it here– editors note

[3] ie, an individual may enter at any certificate level or may move from Certificate l through. Requirements apply in each case

Responses so far:

- We are in general agreement with this proposal
- This is a very complex issue which needs investigation

8. Towards a single rural training package

Question: would a combined training package that covers all the Primary training packages be beneficial from your viewpoint of an RTO?

Responses so far:

- Must retain the three sector qualifications of Hort, Ag, CLM. Divided opinion whether or not to move to a single training package
- Issues are
  - i) funding issues
  - ii) loss of identity
  - iii) danger of units that are too generic
- Need to ensure there is no loss of funding from ANTA for review/ maintenance of the package
- General feeling is negative
  - i) RTOs will find it hard to sell to its clients – too complicated
  - ii) Too many choices for trainees/ apprentices

C:gay:wpdocs/picmm/Tppackaging issues/13 December, 2001

7.9 Letter regarding Training Package Proposal

(Source – Victorian Agricultural Network email)

Wed, 5 Dec 2001 13:47:08 +1100

Dear all,

The following is a letter that has been sent to all Primary Industry Executive officers in the other states asking for their Industries response to the one Package proposal. I felt this may be of value when you have discussions on this matter over the next two days.
Regards Greg Hallihan (EO PSV)

Subject: Towards a Single Rural Training Package Proposal

At a meeting of the Board of Primary Skills Victoria on 28th November 2001, a discussion paper was placed before Board members for comment.

After discussions, I have been asked to write to other State ITABS to indicate the direction of the PSV Board's thinking with respect to the proposal.

Members believe that there are a number of concerns, which need to be responded to before the matter is proceeded with. These issues include:

- The question of future funding levels
- The loss of detailed skills definition in generic competencies for specific commodity groups

During the present round of reviews, separate funding has been provided by ANTA to undertake the Agriculture and Horticulture Review, the Animal Care Review and the development of the Conservation suite of competencies. If the packages are amalgamated will there be the inevitable temptation to reduce funding at the time of the next review only providing funding at around the level of that of the present Agriculture and Horticulture review? Will this in turn be exhibited in shrinkage in funding for the assessment guides, learning materials and the like for any future projects?

In the present review there has been a move towards the introduction of generic competencies, with a loss of detail in some units bringing the integrity of some of the competencies into question. Will not the introduction of a single Training Package accelerate this trend particularly if funding is reduced?
Members from specialist sectors such as Animal Technology, who have been very supportive of the Training Package concept, have particular concerns in this area.

Given the above, the Board would be interested in the views of industry in other states and look forward to hearing from them and you on the matter.

Yours sincerely

Greg Hallihan

Executive Officer

8. References

AWC (1988). TEAM - Report on Trials Evaluating Additional Measurements 1981-1988, Report to the Raw Wool Measurement Research Advisory Committee of the Australian Wool Corporation, Melbourne.

Ferguson, M. (2000). Follicle characteristics and fibre properties of Suri and Huacaya alpacas. Institute of Land and Food report, University of Melbourne, Parkville.

Hack, W., McGregor., Ponzoni R., Judson G., Carmichael I., Hubbard D., (1999). Australian Alpaca Fibre Improving Productivity and Marketing. RIRDC Publication No 99/140. Rural Industries Research and Development Corporation, Canberra.

Hansford, K.A., Humphries, W. and Charlton, D. (1996). Introducing Sirolan-TOPspec processing Prediction Technology: A Review of Sirolan-TOPSpec Development, Proceedings of Top-Tech '96 Symposium, CSIRO Division of Wool Technology, Geelong.

Knox I. (1999). Getting well fleeced. The Australian Alpaca Industry National Conference. July 1999. Adelaide.

Knox I. (2000). Getting a 'Handle' on Clip Preparation. Proceedings The Australian Alpaca Industry National Conference. August 2000. Canberra.

Knox I., and Lamb P. (2001). Alpaca Clip Preparation in Australia. Proceedings The Llama and Alpaca Association of New Zealand 2001 Conference. June 2001. Lincoln University Christchurch, New Zealand.

Lamb, P.R. (1998a). Wool Fibre Processing, Proceedings of Alpaca Conference, Fibre Science and Technology: Lessons from the Wool Industry, CSIRO Animal Production and Australian Alpaca Marketing Organisation, Prospect, NSW, November, p.6.

Lamb, P.R. (1998b). Fibre Metrology of Wool and its Applicability to Alpaca, Proceedings of Alpaca Conference, Fibre Science and Technology: Lessons from the Wool Industry, CSIRO Animal Production and Australian Alpaca Marketing Organisation, Prospect, NSW, November, p.13.

Lamb, P.R. and Yang, S. (1997a). An Introduction to Sirolan-Yarnspec for the Prediction of Worsted Yarn Properties and Spinning Performance. IWTO Technical Committee, Report No. 5, Boston.

Lamb, P.R. and Yang, S. (1997b), Wool Quality for Spinners. CSIRO Div. of Wool Technology, Report WT97-05, Geelong.

Michell D. (1998), 'The Alpaca Trace', Proceedings The Australian Alpaca Industry National Conference 'Crossing the boundaries, July 1998, Fremantle,

Whiteley, K.J., (1963). Unpublished information, Charlton and Whiteley. Lecture Notes. University of New South Wales.

Wool Record, (2001). Dehairing in Peru. Wool Record. pp. 67, April. World Textile Publications Ltd. Bradford, West Yorkshire