7. Classing Systems

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Learning objectives

On completion of this topic you should have an understanding of:

- Different classing systems, the traditional (current) system, how it evolved and the reasons behind it
- The underlying basis of the current system along with the principles of blending different lots to meet specific requirements
- Other classing systems operating in other parts of the world

Key terms and concepts

Woolclassing, Code of Practice, Topmaking (Topmaker), Blend Engineering, Quality Definitions, Combers, Mob Concept

Introduction to the topic

This topic looks at the development of the current woolclassing system in Australia and the philosophy of the code of practice that underpins the quality management aspects for such a system.

To prepare wool for sale and to both maximise the returns and provide a degree of quality management requires a system that can be translated and embraced by the 37,000 or so wool growing enterprises in Australia.

The current main-stream system has evolved over time and is now well established. There are a number of other systems that are available under certain circumstances and new overseas developments that are discussed.

Specific details related to the practical aspects of woolclassing and the code of practice are covered in an earlier lecture.

7.1 History

The basis for classing systems is lost in history however history does relate that the system of skirting the fleece and having an “expert” or wool classer divide the clip up as we know it today was well established in Australia by the late 20th century. Initially the wool was sorted or classed on the basis of short and long wool and bright versus coloured wool. Some time later skirting and removal of belly wool and obvious faults such as dark patches etc. soon followed to improve the look of the wool being offered to buyers. In time, this developed further to match buyers requirements based on processing or mill requirements.

In essence, the woolclasser of that time had a main line and a number of smaller inferior or cast lines. The number of lines was dependant on the diversity of fleece types in the clip and the degree of “marketing” that the classer or owner employed in a bid to maximise the price obtained for the top line of wool.

Originally the lines or brands were based on worsted spinning counts or Bradford counts, such as 64's, 70, 74's etc. These reflected the visual appraised diameter based on crimp frequency and hence the estimated spinning ability of the wool or the amount of yarn that could be spun from a pound of wool. For example a 64's meant that 64 hanks each measuring 560 yards or 512metres in length could be spun from 1 pound (454 g) when spun to the limit. A 64's count is equivalent to 21um in today's terms. The finer the wool the higher the count number. In this traditional system, fleece lines were branded as AAASFM, AAAM, AAM etc. to indicate the fineness of the wool to the buyer. The BBB brand was used to indicate different qualities.

Despite the time that has elapsed since that seminar much of the work reported in these seminar proceedings are still very relevant today. They in fact form the basis of our modern classing systems and what is known as the "mob concept" which is described in more detail below.

7.2 Australian wool selling regulations / AWEX rules

One of the early functions of the Australian Wool Corporation (AWC), the statutory marketing board prior to its break-up and re-allocation of functions in 1994, was the organisation of wool sales and the rostering of the amount of wool being offered for sale at any one time in a bid to flatten out the peaks and troughs in supply. This system developed and was fine tuned over many years. To achieve these outcomes, a set of rules was drawn up to enable this to occur in an orderly manner. These rules were known as the Australian Wool Selling Regulations and have now been supplanted today by the AWEX Rules, operating in a similar manner.

These regulations, developed by a group known as the Joint Wool Selling Organisation (JWSO), defined such things as procedures for displaying wool for valuation, certification requirements, sale catalogue requirements and layout, and many other points that made for orderly conduct of the selling system. These rules were developed by industry consultation within JWSO by all the interested parties in the preparation and marketing system.

They also included details of objective matching of wool, bulk classing requirements along with rules for acceptable classing standards. These were covered by a code of practice and these have evolved over time and were transferred and developed further by AWEX when that body assumed the role from the Australian Wool Corporation in 1992. The details of the AWEX code are presented in a separate section below.

These rules described the acceptable degree of variation in clips and within sale lot lines. This was checked by AWC staff known as clip inspectors and in practice their attention was drawn to "poorly" classed clips by the wool buyers whilst they were valuing the wool in the display boxes on the brokers show floors. Each sale centre has a local rules committee and they arbitrated on any disputes. In cases of extreme "poor classing" the lot could be "ordered off the show floor" and withdrawn from sale. It was then up to the broker to re-sort and re-class the wool on behalf of and at the cost of the grower before re-offering it for sale. The clip inspector's role was also to inform the classer of the decision and where appropriate take remedial action. In severe cases, the woolclasser's stencil (his licence to class) could be withdrawn. The favoured option however was to attempt to institute some re-education.

7.3 Development of the current system

With the advent of the "mob concept" and objective pre-sale measurement, particularly for diameter, the branding system changed to one that reflected the best wool from any particular farm being designated as AAAM the next best as AAM etc.

In this way, it was possible for 2 lots of wool from different farms each to be branded AAAM but to have significantly different diameters e.g. 19.5 from 1 farm and 23.6 from another. Similarly, the length, strength and yields of these 2 AAAM lines could be significantly different. The concept of having the same descriptive brand on the bale is still today somewhat confusing to some overseas mills who believe that the brand is a quality mark rather than a distinguishing classing mark. The

brand therefore has almost no benefit to a mill with the exception of assisting it to identify bales from the same sale lot within a delivery. This can be essential in the preparation and delivery of a blend into a wool scour to ensure an even distribution of attributes throughout the processing and thus even combing outcomes.

Despite the change from the traditional Bradford count based branding to this mob concept, which should have simplified the brands used on bales, there are today something like 15,000 combinations of brand descriptions in use. They are now used to some degree as a marketing tool by growers and classers.

Table 7.1 provides a translation of the Worsted (Bradford) counts into microns. The table provides translations for the majority of the wool produced in Australia. Counts as low as 90's are related to superfine merino sheep. Despite the advent of objective measurement, counts are still used as a convenient way to describe greasy wool.

Table 7.1 Bradford Count to Micron Conversion Table Count. Note: 1um = 1,000,000 of a meter. Source: Capronex Services Pty Ltd (2006).

Count	Diameter (um)	Breed
74's	18	Merino
70's	19	Merino
64/70's	20	Merino
64's	21	Merino
64/60's	22	Merino
60's	23	Merino/ Comeback (Polwarth)
60/58's	24	Merino/ Comeback (Polwarth)
58's	25	Merino/ Comeback (Polwarth) / Corriedale
58/56's	26	Comeback – Corriedale
56's	27	Comeback – Corriedale
56/50's	28	Comeback – Corriedale
50's	30	Comeback – Corriedale
46's	32	Crossbred
44's	33	Crossbred
40's	35	Crossbred
36/32's	38	Crossbred

7.4 Aims of classing

The aim of any classing system is to some degree multi-faceted, however the main objectives are two-fold:

- to sort and combine wool of similar visual appearance to obtain marketable quantities, and
- to enable the buyer to select different farm lots that when combined into a mill consignment (also referred to as a batch or mill lot) will meet the technical specification for a top.

In seeking the former, the classer is also seeking to maximise the financial value of the clip by removing the inferior wool and placing it in a separate line.

This in turn allows the buyer to purchase such lines to:

- fine tune his selection to meet the top specifications and
- to cheapen his blend.

These latter activities are often referred to as topmaking or blend engineering.

7.5 Topmaking or blend engineering

Many woolgrowers believe that such activity is down-grading their wool but the reality is that it is possible to have a blend that is too good for its requirement.
The skill and art of a topmaker is the ability to mix and match farm lots to meet specifications at specific price points. This is sometimes called “blend engineering” and has, with the advent of objective measurement, developed into a fine skill and art. Today much of this can and is undertaken with the aid of computers.

It is also important to define the term *topmaker.* It is often loosely applied to a company or mill that converts raw wool into top. That is in fact a “*comber*”. A *topmaker* is the person that undertakes the blend engineering. Most exporters carry out the topmaking function and all combing mills will have a topmaker on their staff.

The topmaker can in fact be regarded as the “cook” in the wool combing industry. He takes different farm lots and blends them together to meet the specifications and price restraints placed on him by the combing mill, much the same way as a cook takes flour, butter, sugar, eggs etc. to bake a cake. If the chef wants a chocolate cake he must add chocolate in the same way as the topmaker can and probably will add pieces or skirtings to a blend if the end product is to be used for dark suiting fabric. In another example, the topmaker will only use low diameter fleece wool if the top is to be used in pastel shade ladies next-to-skin knitwear. The analogy between cook and topmaker is a very apt one.

It is at this point that it is worth introducing the concept of quality and perhaps defining it.

7.6 Quality

What is quality and how should it be defined?
Many woolgrowers believe quality is defined as “the best” wool. However, a more industrial focus would be to define it as providing a product that meets specifications for a given price. Note that we have introduced 2 separate criteria here, goodness of fit and price. They are intrinsically linked. You can not have one without the other when talking about quality.

For example, from a processing point of view, it is better to have a regular line of stained pieces at the correct price that fits an order for a specific top specification and end use, (dark dyed suiting fabrics where dark fibres are not an issue), than an uneven lot of fleece wool which is over priced and perhaps too good for its intended use. The former is qood quality whereas the latter could be deemed poor quality, when using the above industrial definition.

7.7 Mob concept

As discussed above, the research work undertaken by CSIRO in the late 70’s and 80’s paved the way for our current system. It is based on what is known as the “mob concept”. This is best described in the following way.

Each mob of sheep is run as a management group and therefore should have a fairly high degree of similarity in the wool they grow in terms of raw wool attributes. Each mob will be normally made up of animals of similar age and sex and will be grazed together during the whole of the wool growing season. In this way, any management effects will apply to all the animals in the mob, with the exception of individual animals that may suffer illness or other stressors. This
being the case, with appropriate mob culling, the mob will be a fairly even group of sheep and thus the wool from them should be fairly similar, within the constraints of normal variation. This allows the wool classer to make his main line and separate out the off type fleeces in addition to the skirtings and oddments.

On some wool growing properties it is possible to have lines from different mobs, that are very similar and in fact the selling broker may advise the woolgrower to amalgamate some lines, at the time of auction, to improve the marketability of the wool. Such amalgamation will depend on market conditions at the time of sale. It is often better to combine small lots of 3-8 bales into a bigger line to improve its sale chances.

The mob concept is the corner stone of woolclassing and blend engineering.

With the acceptance of the mob concept there was also a move away from the reliance on an "expert" classer and more towards woolgrowers undertaking their own classing with a separate classer classification of "owner classer". This was possible because in each mob the majority of the wool was similar and the classer's role was simplified somewhat as he only had to remove the off types from the mob. The "expert" classer or professional classer classification remains today but tends to be part of a shearing contractor team. His skill base is higher as he is required to have knowledge of a wider range of wool types and faults. Many professional classers work over a wide geographical area through Australia. For the mob concept to work effectively it is important that the split up of wool within a mob is relatively consistent.

The original research was undertaken on from 18 clips over a 4-5 year period. Fourteen (14) were merino and four (4) were crossbreds from the major wool growing areas of the six (6) Australian states. The wool from each clip originated from a single mob, some were single ages others were mixed. The mix of wool for these mobs in respect to classing lines was as follows:-

Table 7.2 Proportion of Classed Lines in the Australian Wool Clip. Source: Capronex Services Pty Ltd (2006).

Line	Average %	Range %
Skirted Fleece	73	66-82
Pieces	15	5-22
Bellies	7	6-8
Locks	3	1-5
Stains	2	0-11

The classing of the skirted fleeces from the merino clips resulted in four (4) main lines being made and up to four (4) other oddment lines for cotts etc. The break-up of the fleece wool was as follows:

Table 7.3 Break-up of Fleece Wool Categories. Source: Capronex Services Pty Ltd (2006).

Line	Proportion %	Description
AAAM	73 (In 13 clips)	Main Line
BBB	11 (In 8 clips)	Broader line
TDR	10 (In 8 clips)	Tender Line
AM	8 (In 5 clips)	Short Line
COL	9	Discoloured

As discussed above, some processing mills still use bale brands such as AAAM to classify quality. Others such as some Chinese mills actually have teams of wool sorters who visually appraise the wool in each bale and attempt to breakup the wool into finer and coarse wool. Whilst this is sometimes possible with wool from mobs with a wide visual variation it has a distinct down-side as it reduces the mills ability to predict processing performance and manage any useful quality assurance/control program. The up-side is that if they get it correct and the wool being sorted is in the steep part of a price curve it may be profitable to do this and get relatively cheaper fine wool. This is explained in more detail later in the lecture.

Similarly, they use this sorting to remove coloured or stained wool and to separate out tender wool. Again, using such practices negates the mob concept and removes the benefits of processing prediction the subject of a separate lecture. Briefly, by removing any wool from a lot or blend negates the test results that apply to the whole lot or blend, thus it is not possible to obtain accurate predictions for processing outcomes such as top yield, top diameter, Hauteur (top length) CV of Hauteur or Romaine (the noil or combing waste). The essence of processing prediction is that there is a degree of additively in blend construction and therefore it is the average value of the blend that is the important feature rather than the results from the independent component parts. All the predictions are undertaken on a combination of each of the measured raw wool attributes for the various component lots and not as a weighted mean of the predictions from the individual lots.

7.8 Components of variation within a lot

It is also important to recognise the degree of variability in a lot as it will swamp any between lot variability in respect of blend construction.

Two examples can be given from the CSIRO research, diameter and staple length.

Table 7.4 Components of Variation for Diameter and Staple Length in Objectively Classed Clip Lines. Source: # Andrews et. al. (1979); * Rottenbury and Andrews (1975).

Variation	Diameter (% Variation) #	Staple Length (% Variation) *
Between & Along Fibres	80	80
Between Staples	8	10
Between Fleece	8	5
Between Lines	4	5

Interpretation of this table clearly shows that the woolclasser can do very little to reduce the variation in either diameter or length of sale lots. In the case of diameter, 88% of the variation is found at the fibre and staple level and only 12% at the fleece and classing level. For staple length, the respective values are 90% and 10% at the same levels. In-mill sorting therefore will only address the latter class of variation i.e. at the fleece and sale lot level and therefore is likely to have only a marginal effect even if it is effective in being truly able to separate out the differences sought.

The added consideration in respect to in-mill sorting is the range of diameters or staple lengths that are acceptable in the mill specification. Remembering, that the mill has control of that degree of variation when it sets its buying specifications. Today, with a high dependence on objective measurement and a long period of use of prediction technology mills have reasonably tight specifications.

For example, it is common to see the specification for diameter to be a mean diameter ±0.5 – 0.7um for component parts or sale lots. For staple length, it is somewhat more liberal with the average range in commercial consignments to be ±12 mm. If a woolclasser prepared a sale lot of wool on-farm with this degree of length variation it would be unacceptable under the code of practice and would be withdrawn from sale for later re-classing. Classing within the code of practice therefore ensures lower levels of variation than that observed in a mill blend.

Similar values are available for the other raw wool components but that is the subject of another lecture and will be dealt with in more depth there.

7.9 Processing effects

Additivity

As briefly discussed above, additivity is an important concept in respect to the mob concept.

To test this, researchers calculated the carding and combing losses, as well as Hauteur (fibre length in the top) for six (6) clips and compared them against the actual results for the individual lots and then looked at the combined results (or additivity). These results are presented in Table 7.5.

Table 7.5 Additivity of Processing Performance. Source: Rottenbury (1983).

Clip	Total Losses %		Hauteur (mm)	
	Calculated	Actual	Calculated	Actual
B	25.0	24.7	56	57
C	18.3	18.5	71	74
D	30.2	33.9	62	59
E	19.3	18.6	62	60
F	14.3	13.9	62	63
K	12.1	13.4	67	69
Combined	**19.9**	**19.9**	**63**	**64**

These results clearly show that additivity works according to what is expected.

The mob concept

The research also studied the differences between classing methods i.e. the AAA line versus the mob unit. These are illustrated in table 7.6. The distribution histograms for both top diameter and Hauteur were very similar.

Table 7.6 Differences in Processing Attributes for Traditional Main Line and Mob Unit Attribute. Note: these differences are not practically or statistically different. Source: Capronex Services Pty Ltd (2006).

	Top Diameter		Top Length	
	Diameter (µm)	CVd (%)	Hauteur (mm)	CV Ha (%)
AAA Line	22.1	22.8	65	42
Mob Unit	22.0	23.2	64	43

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Again, these results clearly illustrate the similarity of the two systems and the easier classing method used with the mob concept saved growers money.

Reduced preparation research

A considerable body of work is reported on these principles in the Clip Preparation Research Seminar notes. The most important of these, however is that pertaining to dark fibre contamination.

Effect of classing system on dark fibre contamination

Another important difference that needed to be quantified was the effect of dark fibre contamination and how this might be affected by different classing systems. The researchers investigated the effects of a lower degree or nil skirting and the traditional objective clip preparation classing system in use today. The former system, referred to as *Minimal Skirting* (or the Fibre Direct) system only removes stained wool, bellies and points. The CSIRO research in the 1980's clearly shows the effects of the minimal skirting system and other variations on the theme. Studies took greasy wool through the whole processing chain to observe the effects in finished fabric. This is the most important area of detection of dark and stained fibres as the small numbers of dark or coloured

(and stained) fibres are difficult to detect in raw wool, top or yarn. Whilst not impossible in top it is a painstaking test and one many mill laboratory operators dislike intensely as it involves passing a very thin sliver of top over a back-lit screen and this is very tiring on the operator's eyes. The sampling procedures also tend to make it somewhat unreliable. The dark fibres really only become apparent in the finished fabric and then only in a grey or greige (undyed) form or in very pastel shades where they contrast against the rest of the fabric.

This work resulted in a dark fibre risk decision tree being developed. This relied on identifying the breed, sex and age of the animals in the mob unit and whether they were crutched or not and the time between crutching and shearing. This was important work but was never fully embraced by the industry because of difficulties in implementing the reporting system necessary for it to work successfully.

The dark fibre decision tree has recently been re-visited and research and systems have been investigated by Aust. Wool Innovations to determine if it can't be modified to accommodate the added risks from exotic meat breeds, introduced into Australia in recent times. These animals and their crosses have high levels of pigmented and medullated fibres and are putting Australia's reputation as a major producer of white wool at risk. This added incentive to avoid such lots may make the adoption of the system more of a reality as wool buyers start to penalise lots that are found to have high levels of these exotic fibres present. There are moves to have a grower declaration incorporated into the woolclasser's specification to assist in the identification of such lots and thus allow buyers to apply appropriate penalties to high risk lots.

Mills generally seek dark fibre counts of ≤10/100 gms of top particularly for pastel knitwear. This is difficult to achieve unless well skirted, fleece wool from animals crutched <3months prior to shearing is used. Many mills do not know where their tops will end up and therefore seek to have their entire product sourced from such wools. It is purely a logistic problem for specialist topmakers. Vertically integrated mills have a higher degree of flexibility however, even then, the production schedules and "order" requirements make it difficult for them to be able to take advantage of using higher dark fibre types in the manufacture of dark suiting fabrics as an example.

The uptake of such low skirting classing systems therefore has not been strong. A grower entering into such a system is committing himself to sale under this regime. It reduces the option of diverting that wool into the regular auction system unless it is relatively clean for skirting type faults.

7.10 AWEX code of practice

Topic 5 provided the practical details of woolclassing, this section relates to the philosophy behind that and the code of practice that allows Australia to maintain its high reputation worldwide as a quality white wool supplier.

The initial approach to a code of practice was instigated by the Australian Wool Corporation. This was backed up by a considerable body of research into variation within mobs and flocks for a wide range of measured and appraised attributes. It was developed in conjunction with a wide consultation within the wool pipeline from growers to early stage processors and incorporated the requirements of the customers of Australian wool.

The central plank of the AWC code was what is referred to as the "Mob Concept'.

The philosophy behind a code of practice is to maintain a level of acceptable quality in the preparation of the Australian wool clip. In most manufacturing circumstances a quality manager has a fairly limited production system or unit with which to work. In the Australian wool industry there is something like 37,000 wool growing properties, or production units and a range of wool types. Maintaining a degree of quality is therefore a somewhat different proposition. Despite this the Australian wool clip has a high reputation for its preparation, packaging and description and most classing systems through out the world are modelled on it.

To overcome the problem of a large number of production units and a drift in quality through classing differences, there is a central theme or system in managing the classing of the clip and this is outlined very clearly in the Code of Practice for the Preparation of Australian Wool Clips. - The Woolclasser.

This code originated with The Australian Wool Corporation but has been modified over time and now is managed by the Australian Wool Exchange. The code sets out the aims for high quality preparation, packaging and description of wool for woolclassers to follow when preparing wool for market. It provides guidelines on the standards required by mill clients of Australian wool.

The code describes the 3 key principles in preparation of wool for sale:

- the need for even lines of wool suitable for processors
- the need to eliminate contamination, and
- the appropriate identification and documentation of the wool on-farm and at the point of sale.

Woolclassers have these responsibilities on behalf of the woolgrower. Maintenance of quality of clip preparation is backed up with classer registration and each classer is required to add their registered brand or stencil to each bale of wool classed by them to provide a quality control mechanism.

The code outlines:

- the conduct of efficient shearing sheds
- the responsibilities of the various workers within that shed
- the procedures necessary to ensure the mob concept of classing is obtained and
- the need to keep faults or inferior wool separate from the main fleece lines and classed into lower value lots.

Importantly, it also covers aspects of contamination control and the appropriate description of the wool on the bale and in the supporting documentation that travels with the wool to the brokers store for sampling and testing, display and ultimate sale.

The code contains a section on the AWEX-ID system of appraisal and description of appraised (non-measured) characteristics along with a large section detailing brand description and the corresponding codes used to brand the bale.

Whilst the majority of the clip is merino there are specific sections of the code devoted to the British breeds or what is commonly referred to as crossbreds. There is one section that deals specifically with the risk levels to white wool that arise from these British and *exotic* breeds. Having an understanding of the parts of these fleeces that can have heavy dark fibre proportions allows the classer to specifically remove those to inferior lines thus increasing the value of the clip.

The code also discusses the relationship between shearing contractors and woolclassers and where specific responsibility lies in relation to different roles within the contracting team.

The code however is not totally restricted to on-farm preparation in so far as it contains details for classing houses in preparation of bulk classed lots and OMLs (Objectively Matched Lots). These details relate to the ranges acceptable for yield, diameter and VM (vegetable matter) when combining component lots in order to make up commercially acceptable lines of uniform wool.

The documentation of the clip, referred to as the Woolclasser's Specification has a variety of information and is used differently by the various segments of the pipeline from farm to sale room. These are listed below along with a short explanation of some of the uses made of the information:-

- **the classer** - this is the classers record and cross check of the clip. It is the classer's reference document that can be matched against the "wool book" that remains on the farm as the grower's reference.
- **the grower** – the woolclasser's specification provides the grower with information on the overall output from shearing but also describes details that will enable the identification of details to improve aspects of management that may require attention to. For example, if there are a large proportion of stains in the clip it signals the need for better nutritional management or even a pre-shearing crutching. A high proportion of high VM skirting lines may suggest the need for better weed control. etc.

  The specification has 2 additional sections that allow the grower to make declarations in respect to:

- Chemical use and
- Risk levels for pigmented or medullated fibres. This is becoming more important with the introduction of the so-called *exotic* breeds.

  These declarations allow a buyer to place a risk assessment on them and alter the bid limits on each lot. This is becoming increasingly more important, particularly in a time of shrinking supply and low demand for wool generally on a global market.

- **the broker** – The classers specification allows the broker to make up the sales catalogue, store the wool efficiently and perhaps even to suggest to the grower opportunity to amalgamate lines of similar wool from different mobs of the farm that have very similar attributes in order to maximise the selling opportunities for that wool.
- **AWEX** – The classers specification is part of the documentation trail necessary for quality management and trace-back procedures should there be any difficulties with a particular lot or clip. It is the clip history.

7.11 Classing systems

There are other classing systems in use, some of which are supplementary to the on-farm system.

Traditional – on-farm

This system has been extensively covered in the sections above. It has lead to the introduction of the Code of Practice to provide a measure of quality control and also an education component. It essentially relies on the preparation of the clip into lines of sufficient size and evenness to facilitate sale of that wool in the auction system. Despite this there are always small amounts of wool that do not make up sufficient quantity to be sold under the property or owner's brand. These bales or butts (parts of a bale) are generally sold to private wool merchants or are sent to the wool broker for amalgamation with other grower's small lots or amounts of wool. This is called lot building and bulk classing, respectively.

Lot building and bulk classing

This is the amalgamation of small amounts of loose wool or small number of bales into larger lots suitable for sale. In the former, each classing house, has its own classing stencil which is applied to the wool once the bulk class line is constructed. Wool from different farms is combined together in much the same way as it is done on farm but because there is a divergence from the mob concept there is a higher degree of variation likely to occur than in on-farm prepared wool. This results in lower prices, traditionally about 2% discount, being achieved at auction for such wool. The grower is paid on the amount of wool that goes into the bulk class lot at the average price of the lot. Many growers therefore attempt to juggle the size or quantity of wool in the bales of their lines to avoid having small amounts of wool left over that must go into a bulk class line. Instead of having all bales at 200Kg they will manipulate the weights accordingly.

Lot building is a higher order form of “bulk or off-farm classing” whereby individual bales from a number of growers are combined to form a sale lot. This is usually restricted to lots <4 bales in quantity. These can be combined either on a visual or traditional basis or they can be combined on the basis of objective matching on yield, Diameter and VM content. Interestingly, there are no combination rules for either staple length or strength in lot building. Details of the ranges allowable for yield, diameter and VM are contained within the AWEX Code of Practice. These ranges vary depending on the type of wool. They are less stringent for skirting and carding wool than they are for fleece wool for example.

Objective or measured bulk classing

With the advent of on-farm type fleece measuring systems (see section below) a new class of lot building has recently been introduced whereby bulk class lots can be measured for diameter at the time of classing in the broker’s or independent lot building facility. This improves (reduces) the degree of variation in that important attribute and as a consequence, these lots obtain better prices at auction than traditional bulk classed wool.

Reduced skirting systems

These are sometimes referred to as the “Fibre Direct system” (see Topic 11). This system was originally marketed by Australian Wool enhancers then the wool broking company Landmark (formally Wesfarmers Dalgety) to facilitate more direct selling options for growers who wished to market their clip in mill batches with other growers. A processing order was obtained by the Fibre Direct managers and participating clips meeting specific raw wool attribute ranges were amalgamated to meet that order.

A random sample of the animals in the mob were sampled and tested prior to shearing to ensure the mobs were acceptable to the order and at shearing only the bellies and stained wool was removed from the fleece before baling and shipment.

The major disadvantage of this system was that it locked the grower into such a system as the degree of preparation was different to that required by the code of practice and thus such lots could not be directed to the auction sales. This was the case if the grower failed to meet the required objective clip attributes for that lot to meet the specific order.

On the other hand, there was a financial incentive inherent in the system in respect to better prices being offered and because of lower preparation costs and direct marketing savings.

Fleece separation

In some cases, particularly in some superfine or ultrafine clips the shoulder region of the fleece may be separated out to form a finer diameter line. This is done to maximise returns.

Objective classing systems – on-farm testing

The subject of of-farm measurement is covered in a separate lecture (Topic 3).
As a consequence of the developments of FleeceScan – an on-farm derivative of the CSIRO Laserscan diameter measurement instrument and OFDA 2000, an image analysis system, it was possible to measure animals on farm for diameter and to class the clip according to diameter. Such a system has a number of benefits but the discussion here will be limited to the aspects of marketing and clip preparation/classing.

If one was to ignore all other benefits from on-farm testing, then classing the clip on diameter can only show benefits when the clip in question is sitting in the region of the price curve for wool that is rising rapidly (see Figure 7.1 below).

As a general point, over a long period of time the price curve flattens out around the 24 µm mark so to even contemplate classing on diameter the clip would have to average between 1-2 µm lower than that rule of thumb cut-off point. Anyone contemplating such a system would be well advised to study the price curve carefully before venturing into such a system.

Software is available to assist growers in making a judgement on likely splits for the clip or whether indeed it might be profitable to class in this manner.

Figure 7.1 illustrates the principles of diameter classing and how diameter classing can become a profitable proposition. It is noticeable that on the x axis the diameter range of the clip is between 19 and 21 µm. Making one line from this wool will provide a 20 µm line.

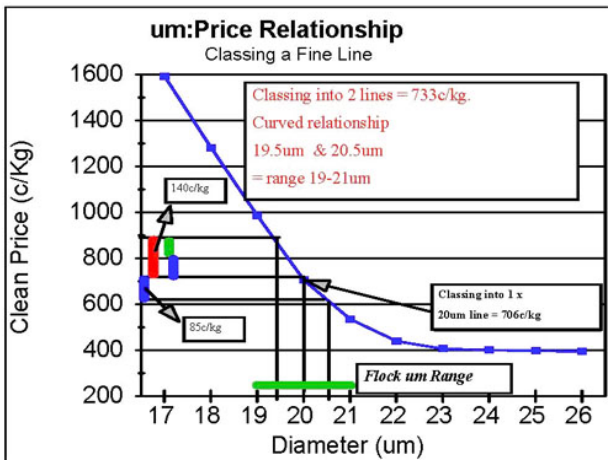
However if this wool was split into 2 lines, based on diameter, then the first line at 19.5 µm would receive +140c/kg more than the 20um single line (the red vertical bar). The second line, of 20.5 µm being coarser would receive in this example -85c/kg (the blue vertical bar). The nett gain is therefore +55c/kg. However, there is proportionally less finer wool and thus the overall outcome works out at 27c/kg benefit. Out of this the grower had to pay for the on-farm testing and this may not have been profitable.

However, many growers entering such schemes use these marketing gains to off-set their costs so that they can obtain data from individual animals for use on management and breeding decision making. This has been covered also in Topic 3. The OFFM calculator tool performs these calculations.

Inspection of this example price curve clearly illustrates that there is a distinct flattening of the curve around the 23 µm mark and thus it would not be possible to obtain any price differential between 2 separate lines as opposed to a single line. For such a system to operate profitably two criteria are required:

- the clip is in the appropriate region of the price curve i.e. where there is a rapidly changing structure to the curve, and
- the price differentials available at any one time in the market are high enough to cover the cost of testing.

Figure 7.1 Diameter Price Curve. Note: the prices quoted are not necessarily those operating in the current market they are used purely to illustrate the principles associated with on-farm measurement classing. Source: David, McKay and Charlton, (1973).



7.12 Overseas developments

NZ Pac Ltd. concept

A new development in New Zealand over the past 4-5 years is that of central classing facilities undertaking all the classing functions for the grower. This was developed for the New Zealand merino clip but has expanded to some degree to cover crossbred wools. At shearing, the grower removes the bellies and skirts the fleece. It is tagged (sometimes weighed with the bellies and skirtings) and these details are matched with the animal and both fleece and fleece tag are packed into a bale for shipment to the central classing house. At the same time, the details are entered into a computer for electronic transmission and later use in on-farm management and lot amalgamation and processing prediction.

On arrival at the classing house, the individual fleece is matched with the computer file, weighed and then passed through a scanner, much like an airport security scanner to detect any gross foreign matter contaminants and to obtain a yield estimate. The fleece is then sampled for diameter testing in a FleeceScan machine and is delivered to a conveyor belt that takes the fleece to a woolclasser who assesses the visual characteristics and appraises length and strength before allocating it to a classing bin.

There are 16 possible classing bins that can set up on the basis of clip variation or processing order specifications. The classing criteria are set in conjunction with the owner of the clip.

All the collected information of each fleece is then sent back to the grower for on-farm management and culling decisions.

Interest was shown in such systems by S. African, UK and US interests. The system was developed by the Merino NZ Company and taken over by NZWTA. However it was closed down in 2004, proving to be non-commercial.

Other countries

It is not surprising that classing systems in other wool growing countries have been modelled on the Australian system given that Australia produces something like 65% of the world's apparel wool. These have been modified in countries like New Zealand to suit the types and diameter of the wool produced in that country. Similarly, the classing system in the other major wool growing countries such as S. Africa, Uruguay and Argentina are modelled on the Australian system. These are summarised below.

South Africa and New Zealand
Very much the same in concept as Australia, but different classifications.

South American
Very much the same in concept as Aust./NZ/ S. Africa but not perhaps as advanced or refined as Australia or New Zealand.

USA
The USA is not regarded as a wool producing country; many of their sheep are raised for meat production therefore their wool preparation systems are not as developed as those in the wool producing countries. Private brokers purchase wool from growers and carry out what in Australia is regarded as traditional bulk classing activities based on subjective assessment.

UK/Europe
Central classing

Central Europe
Woolclassing as we know it in Australia is almost non existent. Sometimes wool is bulked together on a broad visual count basis but often it is just bulked together without any skirting or preparation. This results in its limited use for quality fabrics and its low cost base. Wool is often blended with wool from traditional growing countries to cheapen the blend in the manufacture of lower price point fabrics. Wool is traditionally used with pieces blends in the dark fabric trade because of it's high dark fibre content.

Readings

The following readings are available on CD

1. AWEX 2004, Code of Practice for the AWEX Quality System – Preparation of Australian Wool Clips – the Woolclasser 2001-2003, publ. 2004, Australian Wool Exchange.
2. Foulds, R.A. 1983, Dark fibre contamination in wool – its prediction and ramifications, CSIRO/AWC.

Activities

Available on WebCT

Multi-Choice Questions

Submit answers via WebCT

Useful Web Links

Available on WebCT

Assignment Questions

Choose ONE question from ONE of the topics as your assignment. Short answer questions appear on WebCT. Submit your answer via WebCt

Summary

Summary Slides are available on CD

This topic discusses the development of the Australian wool classing system and its move from the traditional appraisal of wool on the basis of its visual crimp characteristics that were related to the Bradford count system to the use of the mob concept and the objective clip preparation system.

The topic provides an insight into the development of a code of practice as a quality management tool for the Australian wool clip and provides a brief description of other classing systems within Australian and around the world.

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Andrews, M.W., Blankenburg, G., Bomass, R., McKay, B.H. and Walis, G. 1979, Processing Traits on Wool Classed by Objective Clip Preparation, *Journal of Textile Institute,* vol. 70, p 230.

AS 4175, Glossary of Wool Terms, Standards Australia, Sydney

Australian Wool Corporation/CSIRO Div. Textile Physics, 1983, *Proceedings of Clip Preparation Research Seminar,* CSIRO and Australian Wool Corporation.

AWC, 1992a, Australian Wool Classing – Second Edition, Australian Wool Corporation, Melbourne.

AWC, 1992b, Australian Wool Selling Regulations, Australian Wool Corporation, Melbourne.

AWEX 2004, Code of Practice for the AWEX Quality System – Preparation of Australian Wool Clips – the Woolclasser 2001-2003, publ. 2004, Australian Wool Exchange.

David, H.G., McKay, B.H. and Charlton, D., 1973. Objective measurement of wool in Australia, Technical Report. Australian Wool Corporation. Paper 9.

IWTO 26-98, IWTO Glossary of Terms, International Wool Textile Organisation.

Rottenbury, R.A. 1983, The influence of preparation procedures on processing performance, *Proceedings of Clip Preparation Research Seminar,* CSIRO and Australian Wool Corporation.

Rottenbury, R.A. and Andrews, M. W. 1975, Fibre length variation in wool, *Wool Technology and Sheep Breeding,* vol. 21, pp. 27.

Textile Terms and Definitions, 10th Edition, 1995, Textile Institute, Manchester, UK

Glossary of terms

There are a number of sources for a full glossary of terms. Students are directed to the following:

- IWTO 26-98, IWTO Glossary of Terms, International Wool Textile Organisation.
- AS 4175, Glossary of Wool Terms, Standards Australia, Sydney
- Textile Terms and Definitions, 10th Edition, 1995, Textile Institute, Manchester, UK.