NSW DEPARTMENT OF **PRIMARY INDUSTRIES**

Designing and conducting

Merino Wether Comparisons and

On-farm Genetic Evaluations

Second Edition 2005

australian wool
another innovation
limited

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SECTION ONE – MERINO WETHER COMPARISONS

1.1 INTRODUCTION

Wether comparisons have been an important focal point for the wool industry. The design and value of these comparisons is important when woolgrowers compare their flock's performance with others, or when bloodlines are compared.

For those wishing to conduct a comparison, this publication provides a set of guidelines that will allow meaningful information on team differences to be gathered. This information can then be added to a larger pool of data which includes data from many other comparisons for further analysis to obtain bloodline and strain differences (the Merino Bloodline Performance package. In this analysis the variation in environment between comparisons and years is removed, leaving only the genetic variation between the described bloodlines.

Wether comparisons bring together teams of wethers from different flocks to a common site where they are managed and fed under the same conditions for a minimum of 2 years.

1.2 AIM OF MERINO WETHER COMPARISONS

The basic aims of a wether comparison should be carefully considered when deciding how to design and operate the comparison. These aims usually include a combination of all or some of the following:

- compare traits of commercial importance
- encourage increased productivity in commercial flocks
- assist breeders in determining how their flock compares with other flocks in the comparison
- assist producers to identify superior bloodlines by across comparison analysis
- provide a forum for an exchange of ideas amongst wool growers and others involved in the wool industry.

Local groups can add additional aims decided on by participants.

1.3 BACKGROUND - CONSTRAINTS TO COMPARISONS

Most of the aims can be achieved with ten wethers per team. It should be realised that each team is only a small sample of the bloodline it represents. There are major limitations when attempting to clearly identify superior bloodlines. A valid comparison of bloodlines requires at least 60 wethers per team, which is an impractical requirement for on-farm application. More accurate comparisons can be made by combining data on bloodlines, or strains from a number of comparisons (refer to section 1.3.5)

1.3.1 Environmental differences

The performance of sheep can change dramatically from season to season, district to district and even from paddock to paddock, on the one property. For this reason, the only way to compare the relative genetic merit of sheep is to run them together in the same paddock (i.e. under identical conditions) and this is what is done in a wether comparison.

1.3.2 Widely varying population

A strain or bloodline is made up of a large number of individual flocks with widely varying levels of production. Research suggests that there are bigger differences between individual sheep within a strain or bloodline than there is between the strains or bloodlines. These findings are supported by wether comparison results which show that there are top performing sheep within teams as well as poor performers, but the differences between bloodlines is much less.

1.3.3 Relating the team performance to the bloodline

Relating the performance of an individual team of wethers in a comparison to the genetic potential of the bloodline it is drawn from is difficult. Each particular team of wethers is a sample from just one of the many and varied individual flocks. These flocks, run on different properties under different conditions, are subject to different ram and ewe selection policies giving differences in their relative genetic merit that is then confused with environmental effects.

Therefore the estimate of genetic standard of a team of wethers of a particular bloodline is low. It is hardly a fair comparison of bloodlines if the teams representing one bloodline are from amongst its lower performers, and teams representing another bloodline are from its higher performers.

Superiority of bloodlines or strains can only be estimated when results from individual comparisons are combined to reduce the effects of low numbers and ram selection bias. This is the advantage of the Merino Bloodline Performance package where performance data from many wether comparisons is combined for analysis.

1.3.4 Link teams

Links between wether comparison sites allow merino breeders to benchmark the productivity of their flock on a state or national basis through the combined analysis of the Merino Bloodline Performance package.

Link teams are entered in a number of wether comparison sites. For example Farmer A enters a team in Comparison 1 (NSW) and Comparison 2 (QLD) from the same genetic base (Comparison 1 was 2001 drop wethers; Comparison 2 was 2002 drop wethers; all bred from the same ewe and ram base).

Table 1.3.4 – An example of linked wether comparisons

Comparison 1		Comparison 2
Team 1	⟷	*Team 1*
Team 2		Team 5
Team 3		Team 6
Team 4		Team 7

1.3.5 National Merino Bloodline Performance Package (combined analysis)

What information is taken from individual wether comparisons to generate the Merino Bloodline Performance Package (combine analysis)?

The raw data collected from individual wethers including fibre diameter, greasy fleece weight, yield, body weight, staple length and strength (based on AWEX ID or measured result) and some other wool quality traits are used in the combined analysis. Wool prices used at individual sites are not included in the Merino Bloodline Performance package.

If wether comparison sites do not meet certain criteria their data is not included. For example if teams are not randomly selected or the comparison is run for less than 2 years, data from the comparison would not be used in the Merino Bloodline Performance package.

The Merino Bloodline Performance package can be sourced from your local sheep and wool officer with your state department of primary industries.

1.4 NUMBER OF WETHERS PER TEAM

A minimum of 10 wethers per team is recommended and is sufficient to fulfil the aims outlined in section 1, but is insufficient to allow estimates of bloodline or strain differences. As already described, there are serious limitations when attempting to identify superior strains or bloodlines using small numbers.

The larger the team, the more accurately it represents the individual flock. However, each team of wethers still only represents one of the many and varied individual flocks within the strain or bloodline. The table below shows what percentage differences for particular traits are required between teams before differences are statistically significant. This table, in conjunction with the aims of the comparison will be useful when deciding the number of wethers per team.

Table 1.4 Relationship between team size and minimum detectable production differences in production comparisons.

Team Size	Minimum differences (%) between teams detectable for: G.F.W.	F.D.	B.W.T.
5	23	13	18
10	17	9	13
15	14	7	10
20	12	6	9
30	10	5	7
50	8	4	6
100	5	3	4

Source: I.M Rogan (1988)

From this table we can see for a team of 10 wethers with an average greasy fleece weight of 5 kg, an average fibre diameter of 21 micron and an average body weight of 50 kg, the differences would need to be greater than 0.9 kg greasy fleece weight, greater than 1.9 micron and greater than 6.5 kg body weight before we could say there is any meaningful difference between it and any other team.

More than 10 wethers per team is an advantage as it provides some flexibility when some losses occur in maintaining the minimum number of wethers per team.

1.5 AGE AND ENVIRONMENT EFFECTS

To provide a fair comparison of teams, the effects of previous management and the age differences between the teams should be minimised.

All teams should be run together for a minimum of three months before the comparison starts, to reduce the effects of previous management. An even up shearing to start the comparison should ideally occur at 12 months of age. By this stage the effects of differences in age between the teams would be minimal.

With wethers less than 2 years old there should be no more than 3 months difference between the age of the various teams in a comparison. Spring drop and autumn drop wethers should be handled as separate comparisons during the first year, but can be compared equally in subsequent years.

1.6 DURATION OF COMPETITIONS

Where teams have been run together and have met the requirements of sections 1.4 and 1.5, a comparison of 2 years duration is sufficient to gather reliable data and fulfil the aims of the competition. Where these minimum conditions have not been met, the comparison should be extended to 3 years and the first year's results excluded from the final calculations to evaluate differences between teams. Groups can decide to run a comparison for longer, for example up to 4 years, if that is required to meet the local group objectives.

1.7 SELECTION OF TEAMS FROM PARTICIPANTS' FLOCKS

Teams should be visually selected using the following method (no objective measurement should be used to cull any animals prior to team selection):

- Up to 30 per cent of wethers may be culled from the whole drop before random selection of a set number of wethers. The allowance for rejection by the entrant of a specified number of wethers (not to exceed 25% of the selection) is set out in **Table 1.7.** For example if 15 wethers per team are entered into the comparison the entrant can select their team of 15 from 20 randomly selected wethers.

Strictly random selections will give the most accurate genetic representation of the contributing flock. Random selection from the wether flock and allowance for a rejection by the competitor better reflects the practical commercial situation and avoids the possibility of the odd extremely bad sheep biasing the results.

The random selection should be done through a drafting race taking off wethers at regular intervals which will depend on flock and team size *(divide the total number of wethers in the mob by the number of wethers the team will be selected from e.g. mob size of 300 divided by 20 = every 15th wether is drafted off to obtain 20 wethers to select the team of 15 wethers)*. Where there are large numbers of wethers in a mob, (greater than 2000) a smaller group may be selected randomly from which the team can be obtained.

By setting the number of wethers selected and setting the number to be rejected, the same selection intensity is applied by each entrant regardless of flock size.

Wethers selected by any other procedure would not allow all the previously stated aims to be achieved.

Tag security - all wethers need to be double tagged with tags that cannot be taken out and put in another animal at the random drafting.

Table 1.7 – Maximum number of randomly selected wethers to visually select from.

Team Size	Number of wethers for random selection
10	13
12	16
15	20
20	26
50	65

1.8 OPTIONS TO IMPROVE BLOODLINE COMPARISON

1.8.1 More teams per strain or bloodline

The representation of a bloodline can be greatly increased by pooling the results of a number of teams of the same bloodline in a comparison. The more teams included per bloodline, the better the representation and the more realistic the results. Bloodlines should be compared by the across comparison analysis method.

1.8.2 Across comparison analysis

It has been demonstrated (Hygate & Atkins 1988) that the links provided by common bloodlines, in the many wether comparisons being conducted, allow the data to be statistically analysed to provide reasonably precise measures of any differences in production. This procedure will be expanded to include data from comparisons using these design suggestions. This will provide a relatively low cost, yet comprehensive, means of estimating bloodline and strain differences.

1.8.3 Breeding history of entrant's flock

To provide useful information for further analysis it is necessary to have the following details on breeding history of the entrant's flock.

- number of years of using the current ram source
- number of years of using the previous ram source
- number of years since ewes were purchased and bloodline of the ewes

For a team to be included in the Merino Bloodline Performance package a minimum of 5 years on the current bloodline with no ewe introductions in this period is required. Teams which do not meet this requirement can be classified as a 'mixed' bloodline or recorded under their property name.

1.9 LOCAL DECISIONS – The Organising Committee/Group

There are a number of issues which must be resolved by the local committee before beginning a comparison. It is best if these are written down and given to each participant.

- Number of wethers per team.

- Comparison duration.

- Valuation method to be used – bin line or individual fleece

- Wool price – what price period is to be used? It usually varies between 12 month and spot prices. Some comparisons have used 5 year average prices. (It is hard to get the discount data for 5 years.)

- What is the policy regarding deaths and averages? Some comparisons use the number of wethers present at shearing regardless of numbers. Others allow a 20% death rate, i.e. 8 in comparisons with 10 wethers per team. If the number of wethers drops below 8, then 8 is still used to calculate the average return/head.

- Management rules to be applied, for example what is the policy on fly control or pizzle rot – preventative action or just treat problem sheep?

- How are the results to be presented – general publication or results to participants only?

- Link teams – for data to be included in the national Merino Bloodline Performance package there must be link teams to other comparisons. The committee might

have to approach breeders from outside their area to put a team in to achieve the necessary linkages.

- Organise the random drafting and tagging. For local comparisons it is best if the participants draft each others sheep.

- Tagging – it is best if the wethers are uniquely numbered. Different tag colours can be used to identify individual teams to make drafting easier at shearing time.

- The committee needs to decide on who is valuing the wool – a single company per comparison or rotate each year.

1.10 RECORDS TO COLLECT

Minimum records that must be collected on individual wethers and on a team basis are listed below in Tables 1.10.1 and 1.10.2 respectively. Additional traits that are of interest to the group can also be assessed and some are listed in the tables below (we have not included all possible traits that could be measured).

Wool data is to be collected each year and carcase data to be collected at the final shearing to comply with the minimum record requirements.

Table 1.10.1 Records to be collected on individual wethers in the comparison

	Pre-shearing	**At Shearing**	**Between Shearings**
Minimum Records			
Fibre Diameter (micron)	✓		
Wool Yield (%)	✓		
Greasy Fleece weight (kg)		✓	
*AWEX ID		✓	
*Bin Line		✓	
Body weight (kg)	✓	✓	
Estimated Fat Score		✓ Final shearing	
Additional traits Measurements			
Faecal Egg Counts			✓
Staple Strength	✓		
Staple Length	✓		
Carcase Traits			✓
Staple Profile	✓		

These records should be taken on individual wethers or their fleece because:

- the fleece characters are required to derive an AWEX ID for valuation
- many participants follow the individual performance of their wethers through the years and relate the measured performance to visual characteristics
- records are required for further statistical analysis using an across comparison analysis technique.

Table 1.10.2 Records to be collected on a team basis

	Pre-shearing	**At Shearing**	**Between Shearings**
Minimum Records			
Cast & oddment line greasy weight (kg)		✓	
Cast & oddment bin line		✓	
Cast & oddment AWEX ID		✓	
Historical wool price (c/kg clean)	✓		
Wool price (c/kg clean)		✓	
Estimated dressing percentage (%)		✓ Final shearing	
Carcase price (c/kg dressed)		✓ Final shearing	
Additional traits Measurements			
Wool processing (TEAM)		✓	

1.10.1 Additional trait measurement

There has been an increased interest in looking at some additional traits. We need to ensure that the information collected is useful and meaningful. Therefore some protocols have been developed to ensure that quality information is collected and the results are not misleading. The Additional Trait protocols appear in Appendix C.

Under the Merino Bloodline Performance project co-funded by Australian Wool Innovation and NSW Department of Primary Industries there is funding available to assist wether trial committees cover the costs of additional trait measurements. For more information you can contact Sally Martin, NSW DPI, Young on 02-63821077.

Additional traits – refer to Appendix C.

- Staple strength
- Staple length
- Staple profile
- Faecal egg count
- Meat characteristics
- Wool processing (TEAM)

1.11 METHOD FOR VALUING WOOL

There are two valuing methods that can be used:

1. Bin Line

2. Single/Individual Fleece

The Bin Line method aims to replicate what occurs in a commercial shearing shed. The Single Fleece method values each individual fleece independently and often gives an average dollar value per head greater than producers will achieve in reality.

1.11.1 Bin Line Valuation Method

The wool from each team should be viewed as an individual clip and classed into bin lines at the wool table without access to the information obtained from the mid side samples.

The fleeces should be skirted and classed according to the guidelines set down in the Code of Practice for the preparation of Australian Wool Clips. The identity of the fleeces placed in each bin line should be recorded to allow the calculation of a weighted average of the clean fleece weight, and fibre diameter for each bin to assist in allocating an AWEX ID and wool valuation.

1.11.2 Single/Individual Fleece Valuation Method

Each individual fleece is valued based on its own measured and visual traits (AWEX ID, length, strength, FD and yield). This method often results in a large range in dollars per head within and between teams. This is due to the variation in fibre diameter being reflected in the wool prices used.

1.11.3 Skirting Merino Clips

All fleeces should be skirted so that inferior wool is removed and all good fleece wool remains with the fleece. The degree of skirting should be consistent between each team, this can be achieved by having the same staff on the wool table for the whole shearing.

1.12 WETHER COMPARISON LOGISTICS

This section will discuss the data collected and the calculations required for both the Bin Line and Individual Fleece Valuation methods. A software program developed by NSW Agriculture removes the need to do the calculations by hand and provides flexibility in displaying results (see section 1.17).

1.12.1 WOOL - General procedure

The objectively measured characters of the fleece (yield and fibre diameter) are determined on mid-side samples taken before the shearing of the wethers. If a mid-side sample is being collected at shearing time it is essential to mark the site beforehand to ensure consistency and accuracy of sampling.

The yield provided from this test is only a washing yield and should be converted to a Schlumberger dry yield (See Appendix A). If you use the Wether Trial software this will be calculated for you.

On the day of shearing, wethers should be shorn in teams. Skirted and greasy fleece weights are recorded. The fleeces for each team should be classed according to the guidelines of the Code of Practice.

The cast fleeces and inferior wools are placed in their appropriate bin lines and weighed on a team basis. The remaining fleeces are put in bin lines which are typed (AWEX specifications) by accredited valuers and the price determined for the type.

The price applied for each type is usually the average price paid at auction over the last 6 to 12 months and adjusted for discounts due to faults, either measured or visually assessed. Spot prices can be used if that is the committee decision.

1.12.2 Fleece Wool

Bin Line Method

- The fleece wool is classed into the appropriate bine line (e.g. AAAM), the identity, bin line and greasy fleece weight are recorded to allow the calculation of a weighted average fibre diameter for use by the valuers in determining the AWEX type. This method brings the typing closest to the real life situation in wool selling.
- The weighted team average fibre diameter for a bin line is calculated by obtaining the sum of the product of the clean fleece weight and average fibre diameter of each fleece in the bin line divided by the total clean fleece weight of the bin line. An example is provided in table 1.12.1.

Individual Fleece Method

- The fleece is skirted and the skirted greasy fleece weight is recorded.
- AWEX ID is allocated to each fleece and recorded – type (e.g. MF5), length (80 mm), strength (Nil, W1, W2 or W3), colour (Nil, H1, H2 or H3).
- The individual measured (e.g. fibre diameter) and visual traits are used to value each individual fleece.
- Average price (determined by the committee prior to shearing) is used to calculate the individual fleece value for each wether in the team.

Table 1.12.1 – calculating weighted team average fibre diameter

Wether No.	FD (microns)		Clean Wool Weight (kg)	Product
1	23.0	x	7.0	= 161
2	20.0	x	5.0	= 100
3	23.0	x	6.0	= 138
4	23.0	x	6.0	= 138
5	23.0	x	6.0	= 138
BIN'S WEIGHTED AVERAGE FIBRE DIAMETER				= 675/30
				= 22.5 micron

A weighted average Schlumberger dry yield is arrived at in the same way or by using the Wether Trial software.

1.12.3 Cast lines and inferior wools (skirtings, bellies and locks)

Cast lines from individual fleeces should be pooled, weighed and valued as a single line using the mid-side average fibre diameter of the team, less one micron. Any reduction in yield should be estimated by the valuers.

The individual skirtings and bellies from a team are pooled as separate lines before typing. The fibre diameter of inferior wools should be reduced to one micron below the team's mid-side average which is the approximate difference seen in most Merino clips. A reduction in yield should also be applied and this difference is estimated by the valuers.

Locks may or may not be included in the valuation depending on the feeling of the comparison committee.

1.13 METHOD FOR DETERMINING CARCASE VALUE

A realistic and objective carcase valuation can be obtained if each team of wethers is considered as a sale lot and described using live weight, dressing percentage and fat score. The estimated dressed weight price, quoted by National Livestock Market Reporting Services, for the team description should be used to calculate carcase value.

Ideally, these market prices should be averaged out over the preceding 6 to 12 months. This compensates for the weekly fluctuations in the market and avoids exaggerated carcase values.

Table 1.13 Fat Score and Dressing Percentage

Fat Score	**1**	**2**	**3**	**4**	**5**
Dressing %					
Wether	39	41	43	45	47
Ewe	38	40	42	44	46

Source: Making the most of mutton – NSW Agriculture and Meat & Livestock Australia

1.14 CALCULATING AVERAGE TEAM PERFORMANCE

The average performance of each team is based on all wethers present to avoid giving advantage to teams with excessive deaths. An acceptable death rate should be established by the committee at the beginning of the comparison and if this is exceeded the total wool value is divided by the number that should be present.

For example: A comparison with 10 wethers per team decides that 20 per cent is an acceptable death rate (i.e. 8 wethers left). If the death rate is higher the total wool value for the team is divided by eight to arrive at an average value for ranking team performance.

This method only penalises the teams with excessively high death rates. Other methods advantage teams that have deaths, as the animals that died could be the worst performers.

1.15 TEAM RANKINGS

The annual ranking of the teams is based on the average wool value alone, while the final overall ranking in the comparison is based on average wool value over the duration of the comparison plus the carcase value calculated after the final shearing. This reflects the commercial situation in the merino industry..

1.16 PRESENTATION OF THE RESULTS

Performance can only be compared between teams of wethers that are run together in the same paddocks, under the same conditions. While the overall performance of the wethers will vary from season to season, the performance of individual teams relative to the average should remain relatively constant.

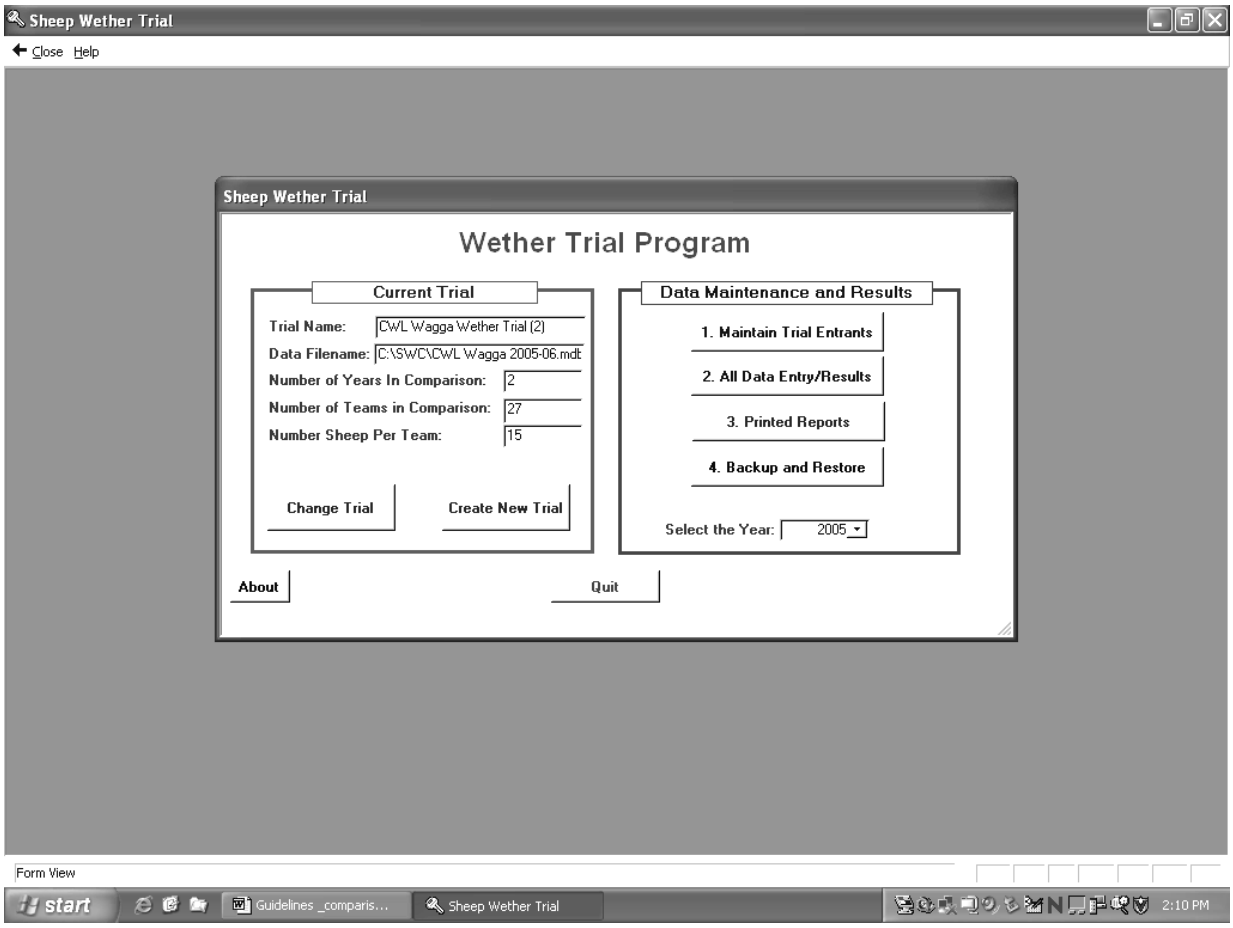
The simplest and most effective way to compare the performance of the various teams is to present the measurements relative to the average performance for the important traits and values. This can be done by presenting each team's average performance either as a percentage or as a deviation from the average of all wethers in the comparison. In this way, the one figure describes whether the performance is above or below average, and by how much.

1.17 WETHER TRIAL SOFTWARE

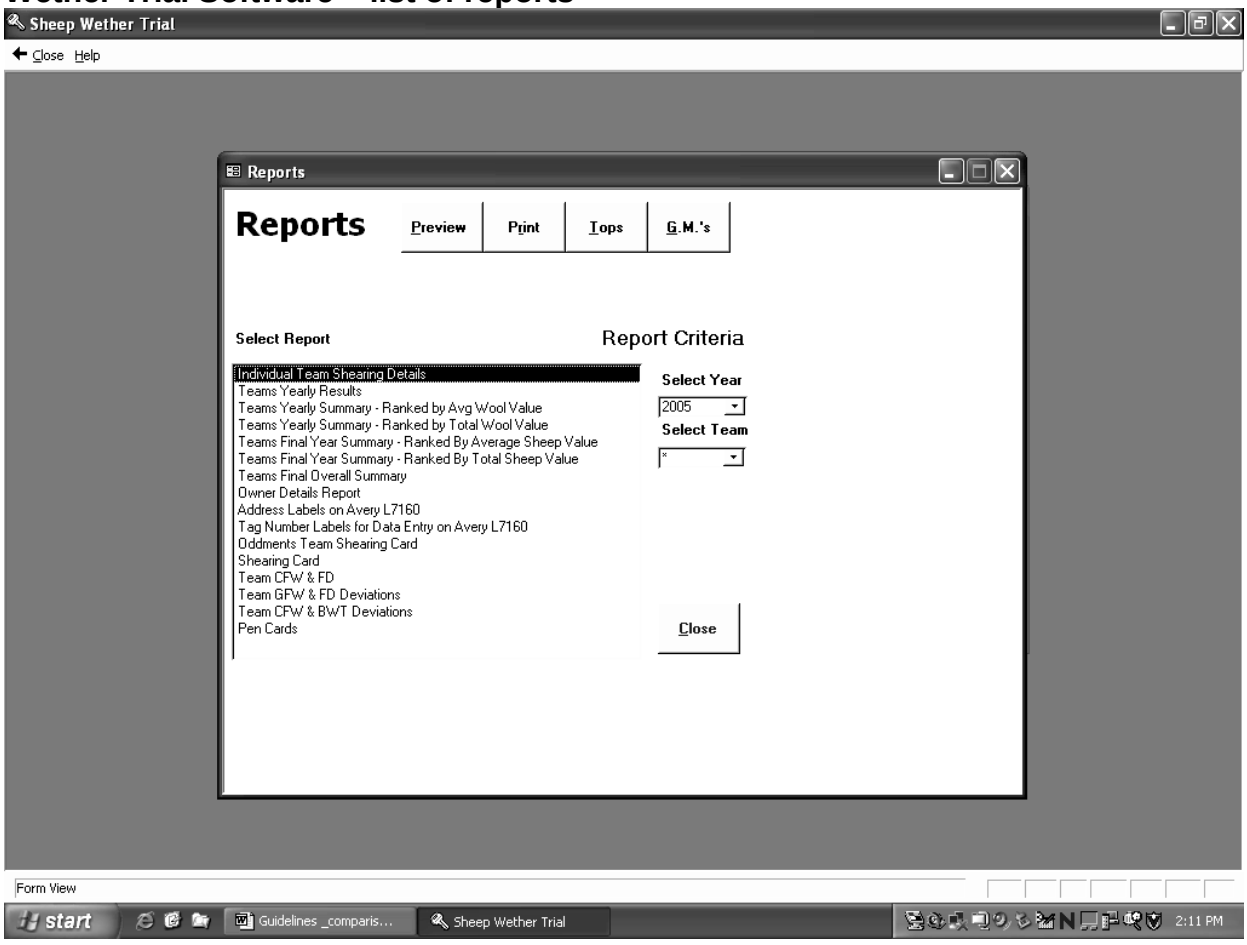
The Wether Trial software can be accessed from *Advanced Breeding Services* in Orange NSW by contacting 02-6391 3967.

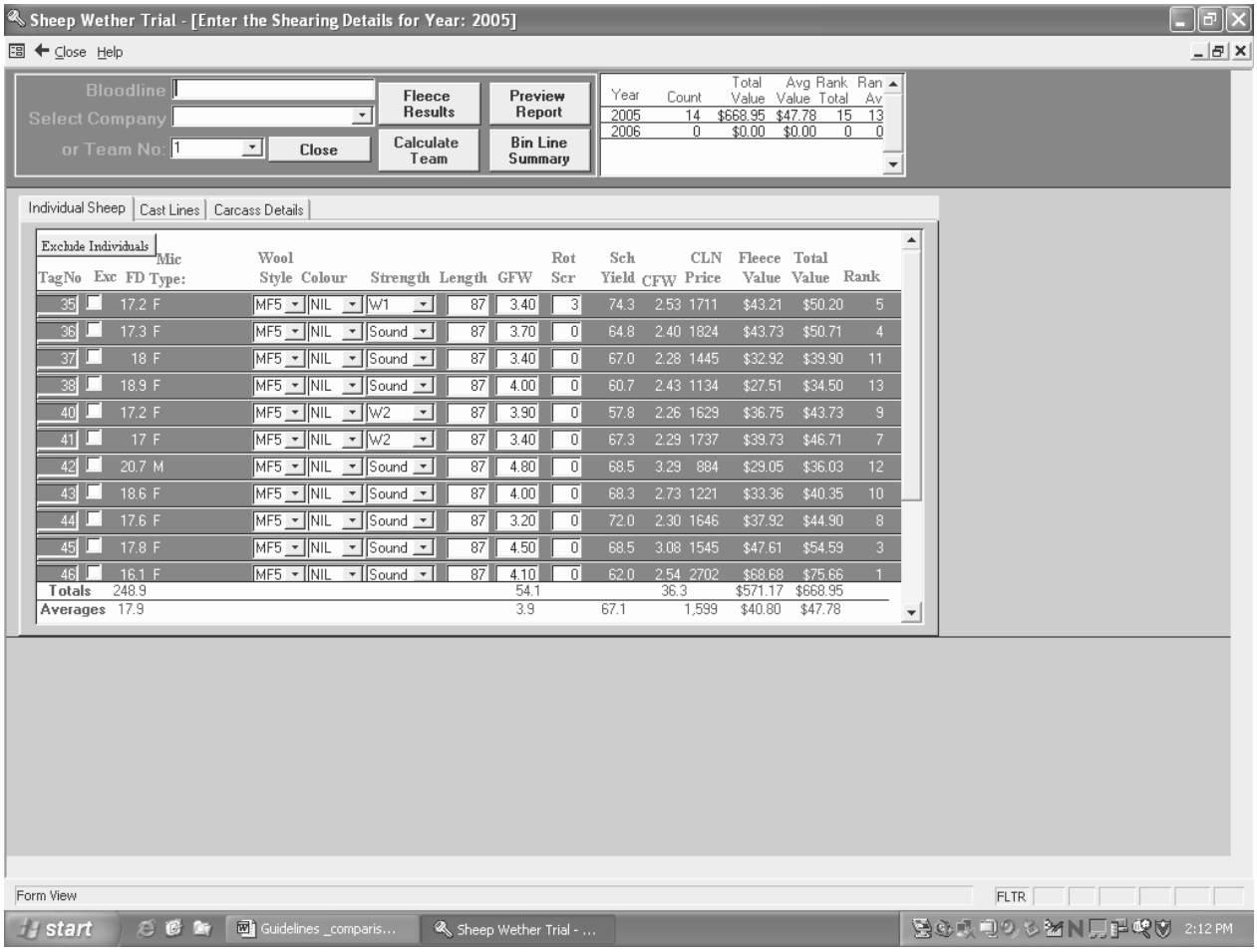
The Wether Trial software allows you to maintain and manage data from wether comparisons and has a number of reporting features. A summary of the capacity of the software is listed below.

- Import mid-side sample results to use at shearing time
- Converts washing yield to schlumberger yield
- Enter raw data (for example greasy fleece weight) at shearing time
- Provides access to wool prices for valuation purposes
- Enter body weights and carcase details
- Produces the bin line fibre diameter and yield
- Produces individual team results after shearing
- Produces a summary of shearing results after shearing.



Wether Trial Software – list of reports





Sample Report - Final Year Summary – Ranked by average sheep values

Rank	Entrant #	FD	Greasy Wt.	Sch Yield	Clean Wt.	Clean Price	Body Wt	Wool Value	Carcase Value	Sheep Value
1	8	17.8	5.53	73.18	3.98	1505	48.1	$59.62	$36.50	$150.68
2	10	19.1	6.52	72.95	4.68	939	50.6	$42.87	$39.28	$126.83
3	2	19.0	6.47	71.08	4.53	991	48.3	$43.90	$36.35	$124.70
4	7	18.7	5.79	72.72	4.16	1042	46.2	$42.66	$32.79	$122.56
5	1	19.4	6.43	75.12	4.77	894	49.7	$41.48	$37.90	$117.80
6	4	19.3	6.04	73.77	4.41	922	52.5	$39.40	$41.33	$116.95
7	3	19.2	5.94	73.28	4.28	984	46.3	$40.68	$33.26	$112.90
8	6	19.2	5.98	74.89	4.41	964	50.5	$41.23	$39.28	$110.94
9	5	19.5	5.72	72.56	4.10	924	54.9	$35.76	$44.29	$110.50
10	9	21.0	6.59	72.09	4.69	836	56.1	$37.59	$46.09	$109.99
	AVERAGE	**19.2**	**6.10**	**73.16**	**4.40**	**1000**	**50.3**	**$42.52**	**$38.71**	**$120.39**

SECTION TWO – EWE PRODUCTIVITY COMPARISONS

In some areas around Australia Ewe Productivity Comparisons are being run instead of Wether Comparisons. Guidelines for establishing a Ewe Productivity Comparison are available at the Western Australian Department of Agriculture web site.

2.1 How to start a linked ewe productivity trial

Lock Butler WADA Narrogin and Sandra Brown WADA Esperance

http://www.agric.wa.gov.au/pls/portal30/docs/FOLDER/IKMP/AAP/SL/BGH/ewe_trials.htm

Benchmarking your Sheep Genetics – Farm Note
Lock Butler, Development Officer, Narrogin
http://www.agric.wa.gov.au/pls/portal30/docs/FOLDER/IKMP/AAP/SL/BGH/FN047_2003.PDF

SECTION THREE – ON-FARM GENETIC EVALUATIONS

3.1 On Farm Genetic Evaluations

Producers can compare new bloodlines and/or ram sources against their existing sheep by following the guidelines listed below. A well run on-farm comparison will provide an accurate picture of relative performance.

Well run on-farm comparisons can provide an accurate picture of your bloodline and flock performance.

How do they work?

The key design features of on-farm bloodline comparisons are:

- animals need to be bred on farm before assessment;
- a minimum of five rams from each bloodline must be used for the comparison;
- the rams must be mated to an equal standard and age of ewes. The ewes must be split into the bloodline mating groups randomly by drafting the mob up a race and taking one for each group in turn. Counting the required number of ewes out of the gate is not a satisfactory method of random selection;
- 100 progeny of each sex are required for evaluation. The actual number of sheep joined will vary depending on predicted weaning rates. As a guide 250 ewes per bloodline should be regarded as a minimum for accuracy;
- the same standard of rams should be selected from each source in the comparison (it is best to use a similar standard of ram to what you would normally purchase to use in your flock);
- all the progeny from evaluation matings must be assessed. Culling some progeny before assessment may distort the results.

Assessing performance

When you compare the progeny from each bloodline, include the traits that are of importance in your breeding objective.

The minimum features you need to include for most breeding objectives are:

- lambs marked to ewes joined (reproduction),
- two tooth classing percentage (visually assessed traits), and
- measured production, e.g. average fleece weight and fibre diameter, for each bloodline group.

Important considerations

If you introduce ewes from the chosen bloodlines as well as rams, economic improvements will be much faster. At current values, introducing ewes pays off if the changeover is less than $10/head.

It is critical that the bloodlines you compare on-farm are identified by a process, such as described by the *Merino Bloodline Performance* package. This ensures the evaluation compares the best bloodline options.

Advantages

Well run on-farm comparison can provide the following benefits:

- you get an accurate evaluation of bloodline and flock performance
- performance is established in the farm environment where they will be run
- you can regularly evaluate the sheep involved
- on-farm bloodline comparisons will show in more detail traits affected by the environment such as fleece rot resistance
- it can be used to assess traits not evaluated by wether comparisons, such as reproductive performance
- on-farm assessments of bloodlines have a shorter time lag in relation to current bloodline performance than that of the *Merino Bloodline Performance* results but the lag is still typically two to three years.

Limitations

The limitations of on-farm comparisons are:

- limited on-farm resources restrict the number of bloodlines that can be accurately evaluated
- there is a disease risk from introducing sheep from several other flocks.

3.2 Comparative Analysis Groups

Commercial Merino breeders in a similar environment can use their on-farm performance records to compare their flocks. This can be a useful benchmarking exercise even though there will be some differences in management between properties.

Breeders in this situation often work together and form ‘on-farm comparative analysis groups’. These groups regularly compare their production and economic performance.

Many groups produce high quality results that extend to gross margin per hectare and costs of production. This to some extent allows for the differences in feed and management between farms.

If both fibre diameter and fleece weight are accurately assessed and presented, the increase in diameter that results when fleece weight is increased through better nutrition provides a corrective mechanism for the difference in management.

Limitations

Flock ewe comparisons evaluate maiden ewes bred and grown on different farms. However, they do not normally provide measured performance information.

This results in high input flocks obtaining a distinct advantage that is normally not recognised by those observing the competing flocks, and thus misinterpreted as being genetic performance/superiority.

APPENDIX A - Conversion of clean washing yield to Schlumberger dry yield.

Conversion of clean washing yield (mid-side samples) to Schlumberger dry yield.

1. Schlumberger dry washing yield is determined from wool base and vegetable matter base.

2. The standard formulae for wool base is:

   Wool base ={Corrected scoured yield (100-[A+E+T])}/100

   where A, E & T are the percentages of grease, mineral matter and vegetable matter in the scoured sample

3. Steps to convert clean washing yield 16% to IWTO SD

   Step 1: the washing yield is obtained from the fleece measurement printout, whilst the VM% is estimated on a flock basis by the valuers before shearing begins.

   e.g. Washing yield of 80% with 1% VM in grease.

   Step 2: calculate the corrected scoured yield to remove regain from the washing yield which is determined from the mid- side sample.

   e.g. Corrected Scoured Yield (CS) = 80/1.16%

   = 68.97%

   Step 3: convert greasy VM into VM in the scoured sample (T)

   e.g. T = VM% / (CS/100)

   = 1/.6897

   = 1.45

   Step 4: allow for constant values of grease and mineral content (A & E); for this purpose 1% each is acceptable. e.g.

   A = 1%

   E = 1%

   Step 5: calculate A + E + T.

   e.g. A + E + T = 1 + 1 +1.45

   = 3.45

Step 6: calculate wool base.

e.g. Woolbase (WB) = CS (100-[A + E +T])/100
= 68.97(100 -3.45)/100
= 66.591%

Step 7: determine the processing loss (VM is VM in the grease).

e.g. Processing allowance (PA) = 7.7 - (40.6)7(7.8 + VM)
= 7.7 - (40.6)/(7.8 = 1)
= 3.086

Step 8: calculate the Schlumberger dry yield.

e.g. IWTO SD = (WB1.207) - PA
= (66.591 x 1.207) - 3.086
= 77.3%

Steps 1 to 8 are undertaken for each individual wether in the comparison. This procedure is incorporated into the computer program.

APPENDIX B – AWEX IDENTIFICATION TABLES

Refer to the following web site for the most recent Australian Wool Exchange Ltd (AWEX) Identification tables.

http://www.awex.com.au/Corporate/Industry_Services/Files/AWEX-ID%20Chart.pdf

APPENDIX C – SAMPLING PROTOCOLS

FLEECE MEASUREMENT SAMPLING

Fibre Diameter; Yield; Staple Profile; Staple Strength and length

Fibre diameter, yield and staple profile

- should ideally occur 2-4 weeks prior to shearing if results are to be generated on the day of shearing.

- A mid-side sample will give you a result that is closest to the average for the animal. It is important to be consistent with the site the sample is collected from and the amount. If the sample is being collected at shearing over the board or while wool handling, it is recommended that a mark be placed on the side of the sheep prior to shearing to ensure consistency and accuracy.

- The ideal size is usually 10–20 g (a good hand or coffee cup full). If you are getting additional measurements conducted on the samples, it is advisable to contact the testing house prior to sampling to confirm the size of sample that they will require.

- Yield samples often need to be sent in plastic bags; check with your testing house for more detailed requirements.

Staple strength and length:

- Sampling can be done on an individual sheep basis, In this case follow the mid-side sampling protocols. A larger mid-side may be required for this additional test, so check with your testing house.

- Sampling can be done on a team basis. This can be achieved by taking a double sized mid-side sample and splitting into two portions. On portion goes into a sample bag for fibre diameter, etc. and the other goes into a bulk sample bag for the team. It is important that the sample is mixed well and that the testing house takes a number of random samples per team for testing.

- Staple length can also be measured at the mid-side. Use a small steel engineer's ruler to measure from the skin to the tip on a straight but relaxed staple. Record three staple lengths and average the three measurements. (More detail can be found in the 'Requirements for an Accredited Sire Evaluation Site').

FAECAL EGG COUNTS (FEC)

The purpose of carrying out FEC testing is to see if there is any difference in faecal egg counts between teams within a comparison.

Sample size

- Individual samples rather than bulk samples are required so there is a measure of variability between animals in each team.
- 10 samples per team are required, i.e. all animals in a comparison with 10/team or 10 out of 15/team. It should be the same 10 animals tested and the samples must be recorded to a tag number.

Frequency of sampling

- A minimum of 2 sample times per year when larval challenge is likely to be highest e.g. spring.
- The cost of testing is such that selected teams might have to be tested rather than all teams. Different teams could be tested in different years.

All FEC testing should be done at an approved laboratory and veterinary advice sought to interpret the results. If teams are identified which are substantially different from the trial average, a higher degree of testing may be required to confirm the difference.

Approved laboratories can be located at the WormBoss website http://www.wormboss.com.au/LivePage.aspx?pageId=604 and then type in 'laboratories' in the search box.

CARCASE TRAITS (fat depth, eye muscle depth or area)

- Carcase traits must be assessed by an accredited operator.
- Accredited operators are listed on http://www.mla.com.au/lambplan/
- Body weight and carcase traits are required post weaning 7.5+ months or 45–55 kg live weight.
- For more information regarding carcase traits go to http://www.mla.com.au/lambplan/

Source: Meat & Livestock Australia – The Breeder's Guide – Animal Genetics

WOOL PROCESSING

The TEAM 3 equations can be used to assess the wool processing performance of teams using the following information:

- Mid-side sample fibre diameter test result
- Staple strength and length (team sample and/or individual sample) – refer to staple strength and length sampling procedure above).
- VM% from the main fleece line sold at auction
- Point of break – from the staple length and strength test results
- Coefficient of variation of fibre diameter – from mid-side sample results
- Coefficient of variation of staple length – if a bulk team sample is used this information should be requested from the testing house or the information can be calculated from individual sheep test results.

It is recommended that an independent sheep and wool advisor with processing knowledge be contacted prior to publishing results to assist in checking and interpreting the information.

TEAM-3 formulae

Hauteur (mm) = 0.43L + 0.35S + 1.38D - 0.15M - 0.45V - 0.59CVD - 0.32CVL + 21.8
CV(H) (%) = 0.30L - 0.37S - 0.88D + 0.17M + 0.38 CVL + 35.6
Romaine (%) = -0.13L - 0.18S - 0.63D + 0.78V +38.6

Where

L	= Staple length (mm)
S	= Staple strength (N/ktex)
D	= Fibre diameter (μm)
V	= Vegetable matter base (%)
M	= unadjusted midbreaks
CVD	= coefficient of variation of fibre diameter
CVL	= coefficient of variation in staple length

	Description
Hauteur	the average fibre length of fibres contained in the wool top (there are no specific target or optimum hauteur level as they differ depending on the end use eg worsted or woollen).
Romaine	refers to the amount of card waste generated during carding and noil (short fibres removed during combing process) produced during combing. A low romaine indicates that the majority of the greasy wool is converted into wool top.
CV(H)	(Coefficient of variation Hauteur) is a statistical measure of the variability of fibre length contained in the top sliver (similar to the measure of coefficient of variation of fibre diameter CVFD). Generally high CVH is associated with short hauteur and high romaine.

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