



USING FLEECE TEST RESULTS

Fleece Test Results are used in a variety of ways to improve farm income such as:

- to select sheep for ongoing breeding programs to improve the economic value of the flock;
- to cull the sheep in a mob considered to have the lowest economic value;
- to class the individual fleeces during shearing into sale packages that maximise the return at the point of sale.

CRITICAL FACTORS THAT WILL IMPACT ON ECONOMIC RETURN

The critical factors that will impact on the economic return are:

- **Variation Over the Fleece**

Most wool characteristics vary in a systematic way over the sheep. It is commonly accepted that diameter increases from head to rear over a sheep. The range in Mean Fibre Diameter over an individual sheep can vary from 0.5 μ m for a uniform sheep to 5.5 μ m for a variable sheep.

- **Variation Between Sheep Within a Mob**

The variation between sheep within a mob is the single factor that is exploited to generate an increase in farm income. There would be no opportunities available to improve farm income through testing if there were no variation (i.e. all the sheep were identical). The more uniform the mob the more difficult and more costly it will be to generate a return.

- **Accuracy of the Test Result**

Accuracy of the test result simply relates to how close the test result reflects the value for the fleece if every fibre in the fleece were tested. This is controlled by the “variation over the fleece” and the “specific sampling procedures” used to ensure that the sample to be tested is representative of the entire fleece.

- **Repeatability of the Test Result**

Repeatability of the test result simply relates to the variation that can be observed if the sampling and measurement procedures are repeated over and over again. Ideally one would like the repeat measurements all to be exactly the same but the reality is there is always some degree of variation.

- **Price Sensitivity to the Parameter (eg Mean Fibre Diameter) being exploited**

The relationship between price achieved at auction and Mean Fibre Diameter is well publicised. The price generally increases with reducing Mean Fibre Diameter. The exact nature of the relationship will determine whether or not there are opportunities for generating any economic return from using fleece test results to class individual fleeces at shearing. For example, if the relationship is a straight line what economic gain is achieved by producing a fine line is offset by an equal amount in the economic loss generated by the remaining line going coarse.

LATEST RESEARCH FINDINGS

A recent research trial has established the repeatability of Test Results for the different fleece testing commercial services being offered to wool producers. Although based on only one mob of sheep, it provides the only comparisons so far published that relate to the entire fleece. The results are summarised in the table below.

	FLEECESCAN (Whole Fleece Minicored Samples)	LAB TEST (Midside Samples Laboratory Tested)	OFDA2000 (Microstaples from Pin-Bone Samples)
Mean Fibre Diameter	± 1.0 µm	± 1.2 µm	± 1.4 µm
Standard Deviation of Fibre Diameter	± 0.8 µm	± 0.7 µm	± 0.6 µm
Coefficient of Variation of Fibre Diameter	± 3.5 %	± 3.0 %	± 2.2 %
Comfort Factor	± 1.6 %	± 1.8 %	± 2.9 %
Mean Fibre Curvature	± 7 °/mm	± 12 °/mm	± 11 °/mm

IMPLICATIONS TO SHEEP SELECTION

When it comes to sheep selection accuracy is not a major factor as one is simply comparing the relative merits of one sheep to another. In contrast the repeatability defines the degree that one can differentiate the merits of one sheep compared to another.

The repeatability table above can be converted into a table that provides the difference between any two sheep that must be achieved before one could conclude one is better or worse than another.

	FLEECESCAN (Whole Fleece Minicored Samples)	LAB TEST (Midside Samples Laboratory Tested)	OFDA2000 (Microstaples from Pin-Bone Samples)
Mean Fibre Diameter	± 1.4 µm	± 1.7 µm	± 2.0 µm
Standard Deviation of Fibre Diameter	± 1.1 µm	± 1.0 µm	± 0.8 µm
Coefficient of Variation of Fibre Diameter	± 4.9 %	± 4.2 %	± 3.1 %
Comfort Factor	± 2.3 %	± 2.5 %	± 4.1 %
Mean Fibre Curvature	± 10 °/mm	± 17 °/mm	± 16 °/mm

The figures for Standard Deviation of Fibre Diameter, Coefficient of Variation of Fibre Diameter, Comfort Factor and Mean Fibre Curvature are all high when compared to the variation within a mob of sheep. This will make it difficult to select sheep for future breeding programs on the basis of these characteristics without an improvement in the repeatability of these measures.

In addition, the repeatability in conjunction with the “variation between sheep within a mob” sets the limit in economic return that can be achieved in sheep selection/culling by limiting the number of errors that are made. The table below gives an indication of the error rates for different situations for Mean Fibre Diameter. Wool producers need to be aware of the error rates for their own particular situation.

Variation Between Sheep Within a Mob	95% Confidence Limit of the Test Result	Percentage Error in Selection for Different Cull Rates		
		20% Cull Rate	35% Cull Rate	95% Cull Rate
Lower Variation (for an SD of 1.0)	±1.0	6%	9%	32%
	±1.2	7%	11%	38%
	±1.4	8%	12%	44%
	±1.6	9%	14%	50%
Normal Variation (for an SD of 1.5)	±1.0	4%	7%	23%
	±1.2	5%	8%	28%
	±1.4	6%	9%	32%
	±1.6	7%	11%	37%
Higher Variation (for an SD of 2.0)	±1.0	3%	6%	20%
	±1.2	4%	7%	23%
	±1.4	5%	8%	27%
	±1.6	5%	9%	30%

For any mob of sheep, the error rates are lower for the lower Confidence Limit. For high culling rates (that is when selecting the best animals) there is clearly a case for improving the repeatability of the measurement to be sure the best animals are retained.

IMPLICATIONS TO FLEECE CLASSING

The Accuracy of the Fleece Test Result plays a significant role when one is aiming to match the Certified result of the bales produced by the fleece classing process. It must be remembered that due to the normal diameter trends over a fleece that it will be highly unlikely that sampling at only one site will produce results that agree with the Certified result. The sampling strategy that aims to sample the entire fleece in a random manner will give the best chance of achieving a match.

The Repeatability of the Fleece Test Result will influence the ability to correctly class an individual fleece into the nominated diameter grouping. The better the repeatability (i.e. the lower the confidence limit) the lower the number of fleeces that will be incorrectly classed into the wrong grouping. It is also generally accepted that the repeatability is also the reason for the line created from the finest fleeces measuring coarser when Certified and the line created from the coarsest fleeces measuring finer when Certified.

CONCLUSION

In order to maximise their economic return Wool Producers need to have knowledge of the variation that exists within their flock and the limitations of the measurement system used to collect the test results so that they can take advantage of opportunities and respond to advantageous market signals when they occur.

FURTHER INFORMATION

Peter Sommerville
Corporate Development Manager
AWTA Ltd
Ph: 03 9371 4105
Fax: 03 9371 4191
Email: peter.sommerville@awta.com.au