

# Alpaca fleece measurement

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October 13, 2009

## Abstract

Cashmere Connections have been purchasing Alpaca Fleece based on subjective measurement. Some growers have objected to the fibre assessments given because they have test results for mid side fleece samples which differ to Cashmere Connections fibre assessment. This paper attempts to answer two questions.

1. How useful is a mid side sample test in ascertaining the value of a fleece?
2. How good is Avtar at estimating the production value of a fleece?

**Key words:** Alpaca fleece, OFDA100, OFDA2000

## 1 Introduction

When spinning, a course fibre in the top causes yarn weakness, and in the extreme, yarn breakage. Cashmere Connections aims to supply tops that are easy to spin, with an average micron equal to the spinner's specification. To meet this goal we dehair the fibre to remove the obviously course fibres and we attempt to build consistent lots.

Cashmere Connections has asked for Alpaca fleeces to be consigned in two bags; one containing the the saddle the other the neck and pieces. All fleece is placed in a line for a particular market and Cashmere Connections pays accordingly. That is, if the fleece goes into a spinning yarn line, the grower is payed the set price for spinning yarn fibre. A fleece can be rejected from a finer line because the classer feels the average micron is too coarse or because the classer feels too much of the fleece is too coarse.

Problems have arisen because growers have mid-side samples that do not match the classer's assessment. This leads to two questions:

1. How useful is a mid side sample test in assessing the commercial value of a fleece?
2. How good is Avtar at estimating the production value of a fleece?

The second question can be looked at from two angles:

1. Are we delivering to spinners a product that has an average micron range that is within commercially acceptable limits?
2. Are Avtar's average fleece diameter assessments similar to the tested values?

Looking at Cashmere Connections quality control system answers the first of the last two questions. The answer is yes. The methodology aims to answer the second question.

## 2 Methodology

A mid side sample only offers for testing a small portion of the fleece. If there is a large micron variation across the fleece then its use as a full fleece micron test is limited. Processors are interested in the whole fleece. To get a feel for the typical micron spread, we extensively tested sixteen saddles from the Creswick fleece competition. Each fleece was divided into eight. A sample was taken from each unit and an OFDA 2000 test was performed on each sample. These tests were performed by Dr Bruce McGregor, a research fellow at Deakin University, at the Deakin University testing laboratories with the author present.

Also of interest is the full fleece tests variation. Four different full fleece tests were obtained.

1. Cashdown Goats are involved in cashmere goat breeding and test several hundred fleeces a year. To reduce the labor and improve the sample quality, a mini-core machine has been developed. This machine was used to sample the Alpaca fleeces. The resultant sample was sent to Performance Wool Testing Services for testing on an OFDA 100.
2. A 48 way grid sample was taken from each of the 16 fleeces and the resultant sample sent to the Micron Man for testing. using his OFDA 100 and OFDA 2000.
3. The results from the 8 tests performed on each fleece were averaged to give an effective 8 way grid sample tested using the Deakin university OFDA 2000.

To get a feel for Avtar’s accuracy, we asked him to estimate the diameter of the 16 fleeces without informing him that it was part of an experiment.

In summary:

- Eight samples were taken from different fleece sites and each sample was tested using the Deakin University OFDA 2000.
- A 48 way grid sample was taken. The sample was sent to the Micron Man for testing using the OFDA 2000 and the OFDA 100.
- Using the micro-core machine developed for the Cashmere Industry a standard micro-core was taken and sent to Performance Wool Testing Services for testing using a OFDA 100.
- Avtar was asked to assess the fleeces.

### 3 Results

The results are given in the following table:

sample	Deakin			Micron Man		PWTS	Avtar
	min	max	average	OFDA 100	OFDA 2000	OFDA 100	Subjective
1	16.15	22.35	20.9	19.7	21.7	19.94	25
2	21.9	27.8	24.8	25.4	27.9	?	26
3	22.6	27.6	25.1	22.4	23.5	23.83	26
4	17.28	21.45	19.6	20.5	20.5	21.23	24
5	21.9	31.1	26.4	26.5	25.9	26.77	26
6	22.11	27.9	24.3	24.5	25.3	25.74	22
7	20.5	24.5	22.4	23	23.8	23.46	23
8	20.9	25.3	22.7	23.1	23.5	23.56	23
9	22.5	26.9	24.4	24.8	23.8	25.88	26
10	21.17	24.93	22.7	24.7	26.1	22.94	24
11	22.53	33.07	26.9	28.6	31.3	25.46	30
12	27.9	35.5	29.7	29.3	35.6	30.84	29
13	17.8	24.7	19.8	21	19.5	21.21	21
14	16	17.6	16.7	19.9	15.9	19.45	20
15	19.26	24.37	21.2	23.1	22.5	22.73	24
16	18.01	19.55	18.6	19.6	20.3	22.51	19
average			23.06	23.65	23.95	23.97	24.13

The following table gives the correlation coefficients between the OFDA 2000’s the OFDA 100 and between the machines and Avtar.

Between	Correlation Coefficient
Deakin OFDA 2000: Micron 2000	0.92
Micron OFDA 100: Micron 2000	0.92
Micron OFDA 100: PWTS OFDA100	0.89
Micron Man 2000: PWTS OFDA100	0.88
Deakin 2000: Avtar	0.84
Micron 2000: Avtar	0.82
Micron 100: Avtar	0.81

## 4 Discussion

The average of the eight OFDA 2000 tests can be looked upon as an 8 way grid sample using the Deakin OFDA 2000. This gives us, for each fleece ( bar fleece 2 where a sample was lost) two full fleece tests using the OFDA 2000, and two using the OFDA 100. The results from sample 14 ( a fine fleece) indicate that the OFDA 100 and OFDA 2000 give very different results under some conditions. This needs to be looked into further. Is it the type of fleece or the micron?

The 8 separate fleece measurements indicate there is considerable variation across the the fleece; the average variation is 5.38 micron. As the average fibre diameter increases, the variation within the fleece increases.

What is surprising is the variation between tests based on full fleece samples. The correlation between the two OFDA 2000's is quite good, as are the results between the Micron Man's 100 and 2000. Avtar's results correlate better with the OFDA 2000 results than the OFDA 100 results.

Avtar was within the test range for 14 of the 16 fleeces, and within the full fleece tests range offered by the machines for 8 of the 16 fleeces. The average of all full fleece test micron results ( machine and Avtare) across all fleeces were within 1.1 micron. Avtar and the Micronman's OFDA 2000 average micron were within 0.18 micron.

The average micron variation across the full fleece tests for the 16 samples was over 2 micron.

## 5 Sub Dividing Fleeces

This section considers a related topic. If the classer is capable of separating fleece into 2 micron sub groups, the value of the fleece could be increased by separating it, the downside however is the labor involved.

Separating a fleece into subgroups involves unrolling a fleece onto a classing table and picking through the fleece. Let's use one minute as a conserva-

tive estimate of the additional time taken to divide the fleece. If you doubt this figure, try it. From experience to date, in the 24 to 26 micron range, a one kg saddle is typical. Even though it is a bit low when on-costs are added, let's use an hourly labor rate of \$25.00. Let's assume 20% of the fleece is upgraded.

$$\begin{aligned}
 v1 &= \text{value micron range 1} \\
 v2 &= \text{value micron range 2} \\
 w &= \text{weight fleece} \\
 fu &= \text{fraction upgraded} \\
 hr &= \text{hourly rate} \\
 fh &= \text{fraction of hour} \\
 fv &= (v2 - v1) * fu * w - fh * hr \quad \text{increase in value}
 \end{aligned}
 \tag{1}$$

To give us a feel; some figures:

$$\begin{aligned}
 v1 &= \$4.00 \\
 v2 &= \$6.00 \\
 fu &= 0.2 \\
 w &= 1.0kg \quad \text{and} \\
 fh &= 1/60 \\
 fv &= (6 - 4) * 0.2 * 1 - 1/60 * 25 \\
 fv &= -0.02
 \end{aligned}
 \tag{2}$$

So the exercise resulted in reduction in the fleece value; that worked out well.

The situation is worse if the fleece has been poorly classed into packs and the individual fleece identities have been lost. There may be good fibre in the pack, but the time to pick through the mess makes the fibre valueless. Excessively fine fibre in a lot consigned to a market that needs coarse fibre is almost as bad as coarse in the fine.

Cashmere Connections is trying to generate commercial value for all fibre received and as a result is very careful not to over-class the fibre and have costs that leave the growers with no commercial return.

## 6 Conclusion

Keep in mind our pricing structure has 2 micron price breaks.

The average micron range found in a fleece across the 16 sample set was 5.38 micron. Claiming a mid side sample represents the micron of a fleece is a joke.

The average micron range of the full fleece test across the 16 sample test was 2.8 micron. You're not even on solid ground claiming a full fleece test gives a definitive answer.

As we pay on the line to which the fleece is consigned, Cashmere Connections makes neither a profit nor a loss on this. At the moment some growers win and some growers lose, it really is a case of, what you lose on the swing you win on the roundabout. Increased testing will improve the accuracy slightly, but it will also increase the costs. Costs that will come out of grower payments. Avtar's assessments are quick, involve no sampling of fleece, the results are immediate and reasonably accurate. An OFDA100 or OFDA2000 fleece test is more accurate but is not a definitive guide.

Full fleece testing for breeding selection is essential; however adding the additional costs to allocate payments is questionable.