Information sheet 12 - The finer points on 'Coarse Edge Micron'

Oct 2021

Fibre producers who have placed a priority on the quality of their fleeces are well aware of the benefits of measuring the amount of variation in fibre diameter on their animals.

Fibre producing animals that grow fleeces with low variation in fibre diameter have exhibited greater predictability of fleece traits in their progeny, produce fleeces with superior processing performance and often enjoy success in show competitions due to their relatively softer fleeces and staple uniformity.

The added bonus with breeding for low fibre diameter variation is that it is one of the more heritable traits, and therefore, more likely to pass to future generations. This in turn means relatively faster rate of genetic improvement compared to most other traits.

As many fibre producers would be aware, the statistic we look for when measuring variation of fibre diameter is Standard Deviation or SD. SD is derived from a complex statistical calculation that in the end, simply means how far either side of the average do we need to travel to capture two thirds of the total variation.

For instance, a midside fibre sample with an average of 20.5 microns with an SD of 4.0 microns generally means that two thirds of the fibres in that sample are between 16.5 microns and 24.5 microns.

Fibre producers with knowledge of objective fleece measurement would be aware the micron variation of fibres in a sample does not fall evenly away from the average. Most fibre producing animals have variation that tails off more towards the coarse edge than the fine edge of the overall variation. For instance, it is typical to see in one fibre sample or staple, fine fibres up to 10 microns finer than the average while the coarse fibres could be up to 15 microns coarser than the average.

Two examples of variation typically tailing off to the coarse edge are shown in diagrams 1 and 2. These fibre test histograms show some fibres up to about 10 microns finer than the average, but fibres up to about 15 microns coarser than the average.

It should be noted, the variation either side of the average does, however, fall off in a pattern that can be described as a 'normal distribution', thereby ensuring relative repeatability with objective measurements.

It is this issue of fibre diameter variation tailing off to the coarse edge that is one of the greatest problems for producers of natural fibre.

These excessively coarse fibres have the potential of creating a harsh feel to fleeces and subsequent yarn or fabric, even though they could be very few in number. The reason for this is that the higher the micron of the fibre, generally speaking, the greater the resistance to compression. This means they will exert far more of a prickle sensation against the skin compared to the finer fibres in the fleece or product made from that fleece. In other words, a very small number of very coarse fibres can ruin an otherwise valuable fleece.

Obviously, these coarser, harsher fibres will have consequences in the showring as well. Furthermore, the problem of excessively coarse fibres is likely to be passed on to progeny.

As we are witnessing improvements to fleece quality from fibre producers using SD as a selection criteria, it is the writer's view that we will now see producers looking for advanced fibre statistics that allow a more targeted focus on the extent of variation towards the coarse edge rather than overall variation for all fibres, both fine and coarse.

The objective fibre measurement we use to target how much of a problem a fleece has with coarse fibres is 'Coarse Edge Micron' or CEM. CEM tells us how far from the average micron are the coursest 5% of fibres in the fibre staple (sample). For example, if a fleece midside sample has an average of 20.0 microns and the CEM is measured at 8.5 microns, then the coarsest 5% of the samples in the sample start at 28.5 microns.

To put CEM into perspective, adult alpacas normally have CEM measurements of between 7.0 to 11.5 microns with the more superior alpacas being less than 8.0 microns. For sheep, the figures depend very much on the breed, however, merino sheep are normally between 5.5 microns and 7.5 microns with the more superior sheep being less than 5.0 microns.

While animals possessing an excessive degree of coarse fibres will typically have a high SD and probably a relatively high average fibre diameter, it is not uncommon to identify animals that have relatively low overall fibre variation (low SD), but still have issues with coarse fibres. CEM helps to avoid these fleeces passing under the radar given its focus on the coarse fibres.

To demonstrate how CEM might be utilised, one midside sample was taken from each of two alpacas. The samples were simply identified as sample 1 and sample 2. The samples were tested on Art Of Fibre's EU based OFDA2000 testing device. Diagram 1 and 2 show the respective sample's fibre test histogram while Image 1 shows the two samples.

The two samples recorded almost identical average diameter (19.4 microns and 19.3 microns) while they both had relatively similar SD figures (4.1 microns and 4.4 microns respectively). Initial fleece analysis based on these two figures would indicate very little difference in fibre diameter average and variation. There is, however, noticeably greater degree of coarse fibres in sample 2.

Observing the two histograms, it can be seen that sample 2 has about three times the proportion of its fibres above 30 microns compared to sample 1. It is generally regarded that fibres above 30 microns become uncomfortable and prickly against the skin.

The fact that sample 2 has three times the proportion of fibres above 30 microns is evident with the CEM figures. Sample one has CEM of 8.2 microns (the coarsest 5% of fibres in the sample commence at 27.6 microns) while sample 2 has a significantly higher CEM of 9.9 microns (the coarsest 5% of fibres in the sample commence at 29.2 microns). This conclusion is evidenced by observing the histogram bar graphs.

The higher proportion of coarse fibres in sample 2 can also be evidenced by observing the actual images of the samples (refer image 1). Close inspection of sample 2's image reveals a greater number of high micron, hair-like fibres than sample 1.

The animal that produced sample 2 therefore, likely presents problems in terms of genetic progress towards fleece quality.

As CEM figures are generally higher for high micron fleeces, the writer suggests reviewing fleece test results that have been sorted by micron, then looking down the list to observe any CEM figures that stand out, as evidenced in table 1.

Animal Eartag	Mic Ave	SD Mic	CEM	<15 %	CF %	SL mm
35	17.6	3.5	6.9	20.9	100	60
65	18.6	4	7.1	15.2	99.9	80
50	18.7	3.1	5.6	6.7	99.6	85
39	19.2	3.7	6.7	9.8	99.7	80
58	19.3	3.9	8.1	7.7	99.1	85
46	19.4	3.2	5.6	6.1	99.7	85
40	19.4	2.9	6	3.5	100	70
51	19.5	3.3	6.4	4.8	99.8	90
49	19.6	3.5	6.2	4	97.9	65
56	19.7	3.1	5.5	4.4	100	75
53	19.7	4.6	8.6	12.6	97.9	60
43	19.8	2.9	5.5	2	99.6	65
48	19.8	3.8	7.6	4.9	98.9	50

Table 1 – Excerpt of spreadsheet containing objective test results, with results sorted according to micron. Animals 58 and 53 have high CEM figures (compared to other animals with similar micron) and therefore deserve attention given their likelihood for breeding/producing coarser fleeces.

As with all objective data, the writer cautions against focussing towards any one single trait and that appraisal using objective data should ideally be made in conjunction with subjective evaluation.

For further advice on CEM or other objective data, contact can be made with the writer, Paul Vallely by email info@artoffibre.com

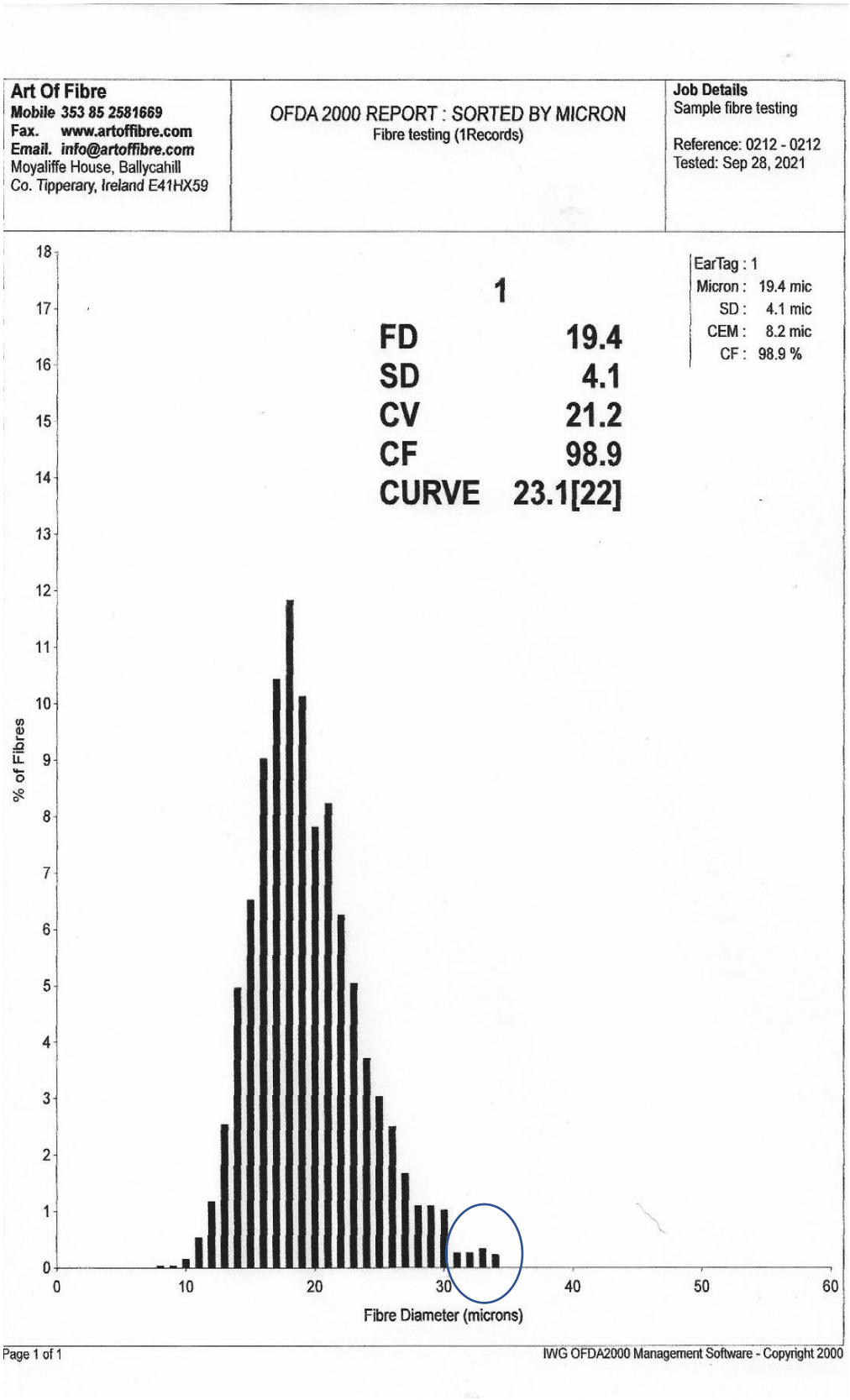

Diagram 1 – Histogram of midside sample 1 showing average micron of 19.4 microns, SD of 4.1 microns and CEM of 8.2 microns. Histogram indicates about 1% of fibres are above 30 microns

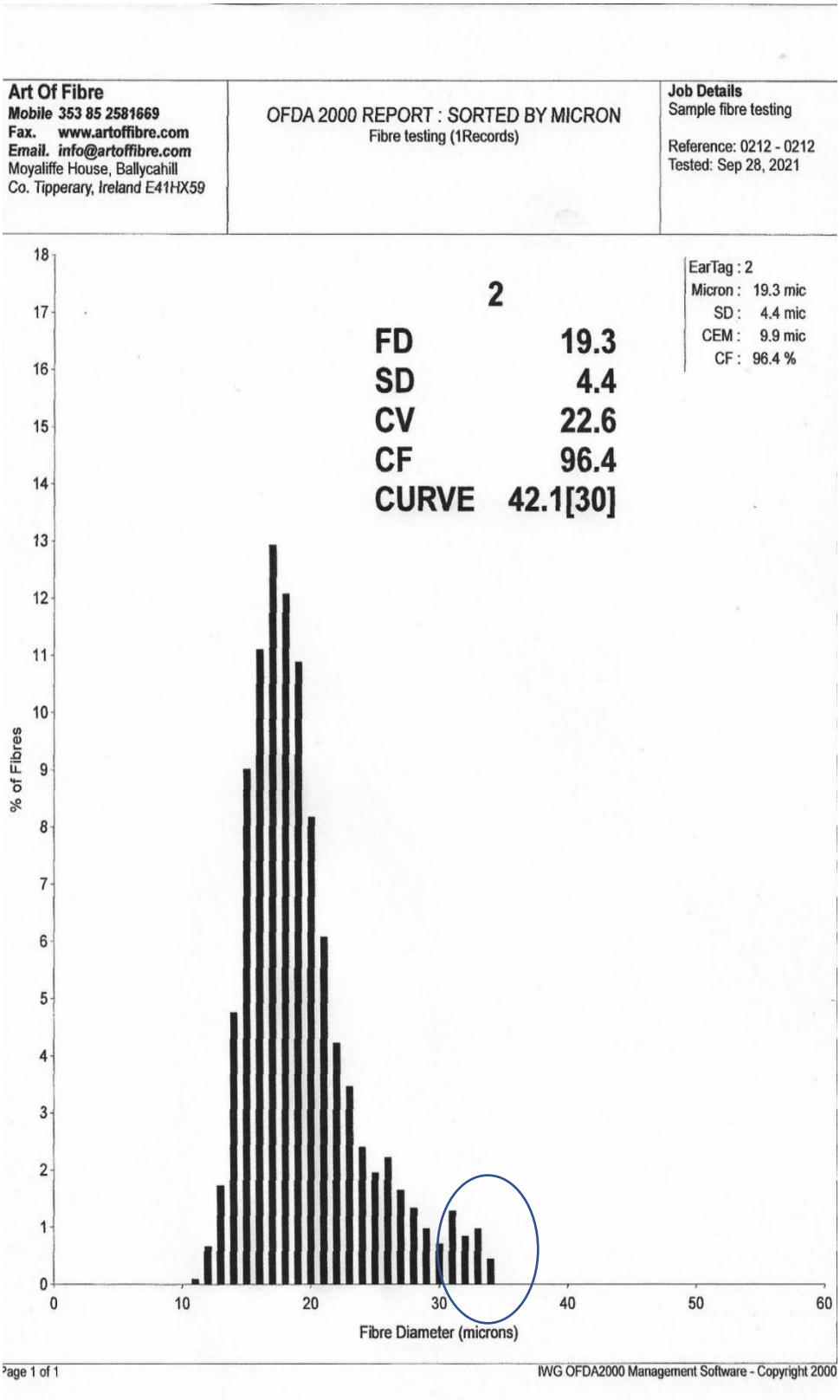

Diagram 2 – Histogram of midside sample 2 showing average micron of 19.3 microns, SD of 4.4 microns and CEM of 9.9 microns. Histogram indicates about 3% of fibres above 30 microns

Image 1 – photo of sample 1 and 2, showing a higher proportion of coarse, hair-like fibres in sample 2.