OFDA 100 versus OFDA2000 – Testing the testing

Paul Vallely, Art of Fibre.

One of the most memorable comments I have heard at Alpaca events was being told by one of our clients, that another breeder had suggested they test their fleece samples at one of the other testing laboratories because "… your samples will come back with lower microns"

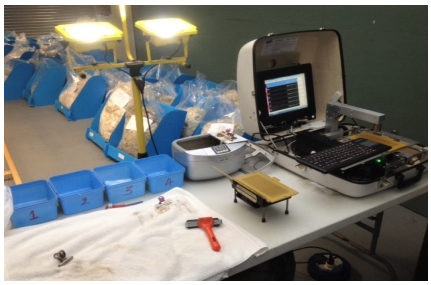
This comment concerned me on a number of levels. Firstly, I didn't like to hear recommendations being passed to our clients they should take their samples to another laboratory. Secondly, I didn't like the idea that breeders were 'shopping around' to see which laboratory gave the 'lowest microns' (a point I hope does not need to be elaborated upon). Finally, the idea there existed significant differences in the objective measurements being reported by the various fibre testing laboratories was too much for me to ignore. If there was any validity to this, then fibre testing was little more than a malleable marketing tool ready to artificially inflate selling prices or egos (or both).

Very soon after hearing this comment, AAFT proceeded with a small comparative trial to compare fibre test results for identical samples tested on AAFT's OFDA2000 fibre testing device based in the UK with our other device based in Finland. We would then have the same samples split into two, with one sub-sample tested on an OFDA100 device operated by Yocom McColl Testing Laboratories Inc (YM) in the USA and on an OFDA2000 operated by BSC Electronics (BSC) in Perth, Australia. BSC Electronics is the company that invented and manufactures all OFDA technology.

Let me confess at this point, the trial had two obvious weaknesses. Firstly, we used only ten samples. I was prepared to accept this given any significant systemic variation in results would be evident with even just this number of samples.

The other weakness was that the trial was not conducted by an independent researcher. While AAFT largely carried out the trial, we clearly have a commercial interest in the results. In saying that, let me invite others to replicate this trial as I have little doubt the outcome would be most similar.

MEET THE OFDA'S As a quick introduction, I will briefly describe the two relevant devices.



OFDA2000 (laptop is now stand-alone)

OFDA100 (now discontinued)

The main difference between the two is that the 2000 takes a series of measurements along the whole length of the fibre sample and then provides a series of averages pertaining to the whole sample or pertaining to each measurement interval (such as 'across fibre' variation). The 100 requires the sample to be 'cored' or 'guillotined' (sliced) to provide short snippets of about 2mm long that are then immersed in a solution and measured to provide overall averages of the snippet measurements. The other main difference is that while the 2000's are currently being manufactured, the 100 went out of production many years ago after being replaced by the 2000.

TRIAL METHOD The method for carrying out the trial was that AAFT randomly identified 10 different alpaca fibre samples that did not display any extraordinary traits such as low tensile strength. The samples were each placed in separate paper sample bags, and identified with numbering 1 to 10. Each of the 10 samples were tested according to standard operating procedures for testing alpaca fibre on the OFDA2000 based at our laboratory in Dorset, UK. Once tested, the samples were mailed to our laboratory located in Finland. Again, all were tested using standard operating procedures.

Once tested by AAFT devices, all samples were mailed to Ms Betty Stikkers, a recognised expert in the identification and characteristics of natural fibre located in The Netherlands. Ms Stikkers then separated each of the 10 samples into 2 sub samples, although sample numbered 10 was found to have insufficient fibres to create a complete second sub-sample. Consequently, one set contained 10 sub-samples while the other contained 9 sub-samples.

The set of 10 sub-samples were sent to YM with instructions to test the samples as midside alpaca samples on the OFDA100, while the other set of 9 sub-samples were sent to BSC with instructions to test on one of their OFDA2000 devices under standard operating procedures for testing alpaca. The results of the testing are contained in Table One below. A summary of the differences for AFD and SD when comparing the average for the two AAFT devices with the YM results and the differences when comparing the average of AAFT results with BSC results are contained in Table Two.

Table One – Comparative fibre test results

Sample number	AAFT UK AFD*	AAFT UK SD	AAFT Fin AFD	AAFT Fin SD	YM AFD	YM SD	BSC AFD	BSC SD
1	22.5	3.6	22.5	3.9	22.1	3.5	22.22	3.83
2	19.2	4.3	18.8	4.0	18.5	3.8	17.46	3.77
3	23.7	5.1	24.1	5.5	24.6	5.5	23.46	5.10
4	23.3	4.8	23.2	5.0	24.1	4.0	23.52	4.79
5	24.4	5.2	24.5	5.0	25.8	5.1	24.08	5.12
6	20.2	5.6	19.4	5.3	20.1	5.3	19.82	5.02
7	23.3	5.4	23.7	5.6	23.2	5.3	22.86	5.28
8	19.6	3.7	19.6	3.9	20.0	4.1	18.88	3.64
9	17.6	4.5	18.1	4.8	18.0	5.8	17.71	4.69
10	20.0	4.0	19.6	4.0	20.0	4.2	n/a	n/a

AFD = Average fibre diameter (microns)

Table Two – Variation of results

Sample number	AAFT*/YM variation AFD	AAFT/YM variation SD	AAFT/BSC variation AFD	AAFT/BSC Variation SD
1	+ 0.4	+ 0.25	+ 0.28	- 0.08
2	+ 0.5	+ 0.35	+ 1.54	+ 0.38
3	- 0.7	- 0.2	+ 0.44	+ 0.2
4	- 0.85	+ 0.9	- 0.27	+ 0.11
5	- 1.35	0	+ 0.37	- 0.02
6	- 0.3	+ 0.15	- 0.02	+ 0.43
7	+ 0.3	+ 0.2	+ 0.64	+ 0.22
8	- 0.4	- 0.3	+ 0.72	+ 0.16
9	- 0.15	- 1.15	+ 0.14	- 0.04
10	- 0.2	- 0.2	n/a	n/a
Avg	- 0.27	0	+ 0.43	+ 0.15

AAFT = average of UK and EU OFDA2000 results

DISCUSSION OF RESULTS. As previously mentioned, the trial was limited to a small number of samples, however, some assumptions are possible based on the trial.

Firstly, the results from the two AAFT OFDA2000 devices were remarkably similar. With the EU device undergoing a factory calibration check last year, it is reasonable to suggest these devices exhibit sufficient precision and accuracy to allow breeders to confidently rely on their objective measurements.

Secondly, and more crucial, is the lack of any evidence to support the theory that the OFDA100 is routinely generating finer fibre diameter results compared with AAFT OFDA2000 devices. Only one sample resulted in a difference of over a micron. Notably, the OFDA100 results averaged about half a micron higher than the OFDA2000 results.

The third thing to note is the average of the AAFT results is also very similar to the BSC results. The BSC results were accepted as being the reference point for considering accuracy given the testing was carried out at the birthplace and maintenance centre for all OFDA's. It should be noted that the AFD result for sample 2 from BSC was significantly higher than the sample 2 results from all AAFT devices and YM device. It is thought this was because the sample had a low number of fibres remaining after all the other testing and that the final sample contained a misrepresented number of coarse fibres.

The overall picture was that all 4 devices operated by the 3 selected laboratories provided very similar results and provides no evidence of any inter-laboratory or inter-device variation that might cause concern. The accepted 95% confidence limit for AFD on this equipment is plus or minus 0.6 microns (Baxter 1996), or in other words, a margin of 1.2 microns. Only one result was just outside that margin.

A POSSIBLE EXPLANATION The point of this matter is there exists no evidence of systemic differences in micron results between laboratories and testing devices. So what then is going on to cause the belief that it is evident.

One possible cause is that the snippets that are taken from fibre samples when testing on the 100 might be taken from the overall sample to give a sample average, as occurred with this trial, and therefore ensuring a repeatable testing regime with the OFDA2000. On the other hand, the snippets might be taken from slicing off one edge of the sample as occurs when using the 100 for 'across fibre' variation.

If the 100 is testing just the first few millimetres of fibre that is closest to the skin as often happens with 'across fibre' testing, the result will reflect the micron of the fibre at the point of sampling or shearing. This is often the finest point on the overall fibre sample (potentially due to the demands on the animal from carrying a full fleece over a winter period). The net result would be lower AFD compared to the AFD result for testing the overall length of the sample.

CONCLUDING COMMENTS This trial therefore discounts the argument that OFDA100 testing provides lower micron results that OFDA2000 testing. In saying that, the writer welcomes further work in order to include a larger data set and/or allow the work be carried out by an independent researcher. If this was the case, the writer suggests that Interwoollab tops be included in the trial samples.

Paul Vallely, Feb 2020. Contact: info@artoffibre.com

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REFERENCES Baxter, P, et al. (Jan 1996) 'Precision of OFDA Fibre Diameter Measurements of midside wool samples'. Wool Technology and Sheep Breeding, Vol 44, Issue 4