SAMPLING GREASY ALPACA FLEECES FOR FLEECE JUDGING

By Cameron Holt DEC 2015

AIM
The aims of Alpaca Fleece Judging are to provide a competition which recognises those characteristics of Alpaca which are desired by manufacturers / processors, producers and enlightens those persons interested in the Alpaca industry.

The introduction of micron measurement to fleece judging at major shows is to recognise the part the manufacturers / processors play in the industry and the way alpaca is being sold at that level, as well as adding to alpaca grower’s knowledge.

In developing the Huacaya and Suri sampling protocols it was and is most important that a method for obtaining a representative sample from an Alpaca fleece is reliable, economic (not only in time) and is not destructive to the fleece.

Before we decided on what type of sampling procedure we ask - What do I want to know, and what testing process do you prefer, (grid & mini core or grid and single site 6x1)

The intent or aim is based upon what you want the procedure for in the overall process of alpaca fleece judging.

This is the first decision which takes place and is to establish which boundaries you can use in sub sampling the greasy alpaca fleece.

I will now discuss the various protocols that have been written to date.

INTRODUCTION
Judging decisions are based on breed standards that have evolved over time. Most appraisals are still on what the judge sees. Australia is using measured data in some main shows. Australia has been using fleece tested data in some of their major fleece shows since 1995.

The Alpaca fleece does vary for fibre diameter from neck to the britch: Within each breed of Alpacas there is a variation between sites on the individual breed, but there was no significant variability between the Suri and Huacaya in variability between sites. (Holt/Scott 1998)
This would suggest that the most accurate form of fibre measurement would be by gridding the fleece area. Research (Holt/Stapleton 1993) done on variation of Alpaca Huacaya fleece has shown that animals vary in evenness, that is, some display a more even fleece (fineness) to that of others. Studies on Suri fleece (Holt/Scott 1998) have shown similar results. This variation may cause problems when comparing one animal with another. Some alpaca Flanks (sides) do not mirror each other. This was more common in the Suri.

Whenever any testing is carried out, whether for fibre fineness, yield, or perhaps vegetable matter content, the item requiring measuring (e.g.: bale or fleece) cannot be tested completely. Complete testing of all fibre cannot be carried out because the test is destructive, and no fibre would be left for processing. A sample is therefore taken from the population and this representative sample is tested.

Before looking at sampling, it is important to understand 3 basic concepts which could have a large affect on the outcome of your test results.

1. **PRECISION**
The ability to provide a test result that is repeatable (using the same sampling technique and testing machine would help achieve this).

2. **ACCURACY**
   (a) The ability of the sample to correctly represent the true (correct) value of the fibre to be measured. A grid sample of the fleece or a coring of the whole fleece would enable the correct value to be assessed from the “Breeders” sample point of view. An in shed sampling, scouring and laser machine is currently being used in Australia. It cores the whole fleece, washes and calculates micron etc.

   (b) The ability of the testing machines to correctly interpret and calculate the true values of fibre being measures. (This would include controlled **standard laboratory conditions**, 20degrees C [+ -2 degrees] and 65% humidity [+ - 2%], as well as correctly controlled sub-sampling of the “Breeders sample” according to IWTO testing procedures).

3. **BIAS**
Most samples taken for alpaca (animal / fleece) evaluation are by definition, biased

**TESTING MACHINE / METHOD ....... SAMPLE REQUIRMENTS.**

Any sample that is going to be mini-cored by the testing lab will require an amount of fibre approximately equal to a 50mm X 50mm sample taken from the alpaca directly. The 12 staples composite sample mentioned in this document has been found to be satisfactory for mini-coring.
TESTING MACHINES IN USE TODAY FOR TESTING ALPACA FLEECE

Laser Scan Method

The Laser Scan is an instrument used for the rapid measurement of fibre diameter that also gives a full diameter distribution. This is the main testing machine used to test the Australian wool (sheep) clip.

Prepared snippets of fibre (less than 2mm) in length are dropped into either an isopreneol / water mixture or water based (AWTA), where they are dispersed. The dispersed snippets, still in the solution, are then carried past a laser/light beam, and as the fibres intercept the beam, the amount of light scattered is measured. This light scatter is directly related to the diameter of the fibre, and so the machine can calculate the fibre diameter in microns. Mean fibre diameter, standard deviation, coefficient of variation, fibre curvature etc are calculated and a histogram of the variation is printed.

OFDA

The OFDA 100 was invented in 1991 by Dr Mark Brims and became a recognised wool testing machine approved by the International Wool Textile Association. The OFDA 100 has been superseded by the OFDA 2000. The 2000 machine measures in two different modes:

1. The snippet mode which operates like the OFDA 100 measuring 2mm snippets obtained from a mini-core or similar, and

2. The staple mode which measures full length staples laid out on a fibre glass slide.

Optical Fibre Diameter Analyser 100 (OFDA) Method

The optical measuring OFDA 100 is an automatic microscope above a moving set of fibres.

The analyser captures the magnified images of the individual fibres with a video camera. The diameter of each fibre identified is measured and recorded by means of computer aided image analysis.
On completion of a pre-determined number of fibres, a histogram print out is produced similar to the Laser Scan.

The OFDA100 can identify medullated fibres (white only).

**OFDA 2000**
OFDA2000 gives a report based on the entire staple, sampling it along its entire length.

**GROWTH REPORT**
The OFDA 2000 produces a graph, which records the average fibre diameter of the staple, measured at different distances along the staple from the skin.

Variations in the fibre diameter along the staple may be interpreted as representing variations in the health, pregnancy, nutrition or climate enjoyed by the animal at the time the fleece was grown. The 2000 also prints the standard histogram.
For the 2000 to test “grid samples” (taken by the breeder), it needs to have an OFDA100 attachment to the machine.

This “100 snippet mode” would allow for measurements of the 2mm snippets which come from the mini-core that is used in laboratory sub-sampling.

Not all fibre Testers using the OFDA2000 have this attachment.

Conclusion

The Laser machine and both OFDA’s produce a histogram, indicating the number of fibre measurements recorded in a sample for every possible fibre diameter value in a range that can be set from zero to 60 (Wool) or zero to 150/180).

Currently (2012) the OFDA100 is IWTO approved along with the laser Scan as a certifying fibre testing device. When the OFDA 2000 is in the OFDA 100 snippet mode (special slide attachment fitted to the OFDA 2000) it has IWTO approval. (It is known as snippet mode.)

The OFDA2000 (staple mode) is shown to be very satisfactory for single site samples, and also for testing on site in the field.
POSSIBLE METHODS OF SAMPLING FOR FLEECE JUDGING
(In order of merit)

1
A reliable method for obtaining a representative sample from an Alpaca fleece is the Grid sampling technique.

or a coring of the whole fleece would enable a reliable sample to be obtained.

The negative to these obvious choices for sampling for a show are:

(a) Grid sample, too many staples would be removed from the fleece particularly if this show fleece was to be entered in a number of shows and therefore would take away the level of excellence which was first seen. The other problem for a fleece show is that to do a full grid sample as shown is very time consuming and one thing that a fleece show has is lack of time and quite often workers. For that reason I do not recommend this method for alpaca fleece shows but I would use it in my own private stud to obtain accurate details on a top stud animal.

(b) Mini coring of the whole fleece I mention this because there is a mini coring testing machine which is self contained and works on the laser measurement technique. This machine mini-cores the total fleece twice and gives a very good result in sampling but the problem is there is only one machine I am aware of. It is in NSW Australia and nowhere else.
2
12 SITE POSITIONS x 1
USING THE OFDA 100
LASER SCAN
OFDA 2000 - (100 - snippet mode)
(Collected staples need to be tested as a composite sample)

This protocol uses 12 staples to form a composite sample and when measured as a grid sample (mini cored) the result given is an average micron of the total fibre collected for this fleece. This 12 point method extends the sampling closer to the edge of the fleece and is more likely to pick up poor skirting or unskirted fibre.

On some occasions the judge still may have to modify the result, if in the judge's opinion the result looks well away from what they believe it to be. But this should not be often. This method only uses 12 staples (as in 6 SITE POSITIONS x2) and takes the same time to sample the fleece. *My recommend sampling method for mini-coring...*

3
6 SITE POSITIONS x2
USING THE OFDA 100
LASER SCAN
OFDA 2000 - (100 - snippet mode)
(Collected staples need to be tested as a composite sample)

This procedure uses 6 sites with 2 staples in each square. This procedure is similar to above but I have found that because the sample does not go near the edge of the fleece it is inclined to have more queries with the results.

I prefer the number 2 protocol of 12 sites by 1 staple.

**REMEMBER:**
All fibre to be mini-cored needs the equivalent of a 50mm X 50mm sample (small handful) to successfully core the composite sample.
6 SITE POSITIONS x 1
FOR USE ON THE OFDA 2000 (staple mode) ONLY
(When NO 100 snippet mode available) (2 methods)

This procedure is specially designed only for the use of the OFDA 2000 that is not using the snippet mode. The OFDA 2000 can use 2 methods to measure.

Method 1 measures one staple at a time unlike the other machines mentioned previously that mini core the sample as a composite result. This method individually tests each staple and these individual results of the staples are then averaged for micron. (An average of the averages) Although some mathematicians will say that this is not an average of the total, I am happy for this process to be used (following discussions with the makers of the instrument).

Method 2; Test all 6 staples in selected bag as 1 test by laying all staples on the test slide together as per attached OFDA2000 instructions for a composite result.

As all these protocols are an abridged grid process specifically only for the fleece judging, and taking into considerations already mentioned, the slight variation that might be obtained in the scheme of things when all fleeces in the show are under the same method, is of no real concern to the intent of the outcome. Therefore when the OFDA 2000 is used under this protocol, micron results are satisfactorily achieved. See also procedure for fibre over 100mm.

A new protocol has been established by the AUTHOR Cameron Holt in consultation with Dr Mark Brims of BSC Electronics Pty Ltd.

SAMPLING NOT TO BE USED FOR ALPACA FLEECE JUDGING

Taking a sample directly from the bag. This method is very unreliable as we found out in Australia when an odd show did not follow the protocol and used this method.
Mid-side (1 or 2 positions)

This method would not be recommended by me as it only uses one / two positions of the fleece.

There is no guarantee that the actual midside has in fact been selected. Fleeces when they are rolled up after skirting are not always unrolled in a satisfactory manner for skirting particularly if the staples do not hold together. The other methods using the 6 or 12 SAMPLING SITES do counter this problem with the number of sites, but to guarantee this when you have used the midside that is not the case.

Do not attempt this particularly with Suri or Huacaya fleece that does not hang together.

The acceptance of midside samples is based around the sample being taken from a known position either on the animal or on the alpaca fleece when it first comes on the table in the shearing shed.

I reiterate again that once this fleece is rolled (at shearing) and becomes entangled. This is then hard to successfully open it up and find the right place to take the midside sample. In my opinion the result is not consistent.

My COMMENT for the above two methods is a very big NO! (Due to the errors obtained in the past use of this procedure).

Unskirted or poorly skirted fleece

As you look at this diagram the only protocol that has a chance of reaching the edges of a fleece is the 12 site mentioned earlier.

When any of the other procedures are used and the judge is aware of the poor or no skirting, the judge not only accounts for this through the various characteristics being assessed, but must reflect on the amount of unevenness around the edge and adjust the micron to a coarser result as the samples have obviously not been taken near the poorly skirted or unskirted area.
NOTE

Almost all alpaca fibre tests currently performed are called “Guidance Tests”, because the results are not certified. Only those tests performed by a certifying authority e.g. Australian Wool Testing Authority, can be called Certified Tests and ONLY when the certifying authority itself samples, measures and weighs the fleece or bale and bales are held in a register secure location. They guarantee the results, but where a third party, unknown to the test house does the sampling, there is no guarantee of the origin or correctness of the sample.

This type of test is used in the wool industry, as well as for the sale of other commercial fibres (including alpaca), when offering baled fibre for sale. The vast majority of alpaca fibre tests that are performed are done on samples taken by the breeder and then submitted for testing, and are hence uncertified “guidance tests.” The testing procedure is, however, essentially the same as that used for certified tests, and the standards by which those machines operate are also the same.

In Australia we have been using micron measurement in fleece shows since 1995.

These results are also used to calculate the "most valuable fleece" of the show.

I highly recommend the following procedure to replace the 6x2 site sampling procedure.

**SAMPLING ALPACA FLEECE FOR SHOWS**

12 x 1 SITE POSITION

USING THE OFDA 100

LASER SCAN

OFDA 2000 - (100 snippet mode)
**RATIONAL**

This procedure is developed to ensure consistency in sampling fleeces being tested for shows and to avoid, as near as possible, incorrect results due to biased samples. This procedure removes the random single sample from a bag of fleece (hit and miss) and removes the time consuming "grid sampling" (most accurate).

Note – this procedure is not to take the place of midside or grid sampling carried out by breeders. It is only for Alpaca fleece shows.

**PROCEDURE**

1. Fill in identification tag with –
   - Name of show
   - Class
   - Entry No

   This shall be completed each time a new fleece is sampled. Do not fill in before as a group or after sampling is completed. It must be done when each fleece is sampled.

2. Remove fleece from bag and spread evenly on table.

3. Imagine the fleece in 6 sections. Then halve each section as shown. Take 1 similar sized staple from each of the positions as marked (12 positions).
4. Place all 12 staples collected into a plastic bag and insert the identification tag in the bag, filled out as mentioned in Step 1.

5. When all fleeces have been sampled place all individual bags into a larger container and send to an approved testing laboratory that is able to test gridded samples.

6. Advise testing house that these are 12 point (site) grid samples that have to be minicored in the laboratory.

NOTE:
A “gridded” sample requires the laboratory to mini-core all the individual fleece samples as one to obtain the most accurate result. When laboratories select one staple as a representative sample of the total fibre collected, it becomes a very “biased” sample and results are unreliable.

Author Cameron Holt 2007/ Dec 2015

SAMPLING ALPACA FLEECE FOR SHOWS - 6 x 1 SITE POSITION
 USING THE OFDA 2000 (staple mode) ONLY
(NO "100 snippet mode" available)

Method 1 & 2

NOTE ; ONLY RECOMMENDED FOR ALPACA FLEECE SHOWS

RATIONAL
This procedure is specially designed only for the use of the OFDA 2000 that is not using the 100 snippet mode. The procedure is developed to ensure consistency in sampling fleeces being tested for shows and to avoid, as near as possible, incorrect results due to biased samples. This procedure removes the random single sample from a bag of fleece (hit and miss) and removes the time consuming "grid sampling" (most accurate).

Note – this procedure is not to take the place of midside or grid sampling carried out by breeders on their farm. It is only for Alpaca fleece shows.
PROCEDURE

1. Fill in identification tag with –
   Name of show
   Class
   Entry No

This shall be completed each time a new fleece is sampled. Do not fill in before as a group or after sampling is completed. It must be done when each fleece is sampled.

2. Remove fleece from bag and spread evenly on table.

3. Imagine the fleece in 6 sections. Take 1 similar sized staple from each of the positions as marked.

4. Place all 6 staples collected into a plastic bag and insert the identification tag in the bag, filled out as mentioned in Step 1.
5. When all fleeces have been sampled place all sample bags into a larger container and send to an approved testing laboratory.

6. Remove bags from main container for individual testing.

7. Advise testing house that these are 6 point (site) grid samples for alpaca fleece showing (See method 1 or 2).

**Method 1**

Using an OFDA2000, test all 6 staples in selected bag separately, and combine the individual data into a composite result that will represent the entire staples taken from this fleece.

**Method 2**

Using an OFDA2000, test all 6 staples in selected bag as 1 test by laying all staples on the test slide together as per attached OFDA2000 (staple mode) instructions for a composite result.

**Also see instructions for over 100mm in length.**

**Refer to OFDA2000 alpaca fleece single slide testing guidelines**

AUTHOR   Cameron Holt (c) 2013 & Nov 2015
(In consultation with Mark Brims BSC Electronics Pty Ltd)
(Letter of instruction for testing laboratory)

OFDA 2000  method 2
For measuring alpaca fleece judging site staples (6)

The best way to maximise the accuracy of an OFDA2000 fibreglass slide measurement is to cover the slide area with as many fibres as possible.

With staples less than 100mm long, it should be possible to fit 6 staples (or part staples), 3 across the top and 3 across the bottom. If the staples are too large then peel them down the middle and use half the staple. It is important to tease them apart so that there are gaps between the fibres.

It is also important to overlap the staples in the long direction or else the scan will stop when it gets to a lower density part of the slide since it thinks the end of the staple has been reached.

If the staples are longer than 100mm then, 3 staples could be placed side by side. It is important to place the tip of the staples as close to the top of the slide as possible.

If multiple staples are placed along the slide then the"along staple" profile will not be correct. But if multiple staples are placed side by side then the"along staple" profile will be correct.

Mark Brims
BSC Electronics Pty Ltd
A
Normal Staple Placement on OFDA2000 Fibreglass slide

2 or 3 staples split into micro staples and all placed with staple tip near top of the slide so that the diameter profile along the staples is correct. To maximise the number of fibres measured, it is important that the staples be spread wide and not too dense.

X for 6 site x 1 staple
(6 staples), fleece judging sampling procedure

2 rows of 3 staples under 100mm split into micro staples placed so that the staple tip of the bottom row just overlaps the bottom of the top row of staples.

This will maximise the number of diameter measurements, but the "along staple" diameter profile will not be correct. So do not supply.

NOTE:
If fibre length is over 100mm then make 2 single slides and average the result.
RECOMMENDATIONS

Let me now comment on some recommendations.

1. Any procedure developed should be in the ownership of BREED SOCIETY and copyrighted accordingly.

   There can be more than one testing laboratory in a given country and the procedures should be inclusive of all.

   The Breed society must control how sampling is to be carried out, as well, has an input into how they want the testing laboratory to carry out the testing relevant to the greasy sampling method that society has employed for that particular alpaca fleece judging show.

2. As mentioned, there should be two basic procedures that are needed;
   a. A procedure (I suggest the 12X1 site test) for use by testing machines which can mini-core the entire fleece sample as one composite result. They are:
      - Laser scan
      - OFDA 100
      - OFDA 2000 (WITH 100 SNIPPET MODE)
   b. A procedure for the OFDA 2000 (staple mode) only (with 6x1 sites). The new procedure is in this document.

   The makers of the OFDA2000 have approved 2 methods for the testing laboratory to calculate results;
   (i) Average the 6 individual sites for a combined micron, sd & cv.
   (ii) Measure all 6 sites on slide together as a composite result. only micron, sd & cv need to be calculated. See instructions for fibre over 100mm.

   The "along staple" diameter profile will not be correct. So do not supply.

   Normally a micron result is what judges applies points from when using a 6 or 12 point sites. This has been the method of allocating points in Australia since 1995 and the judge uses the tested result for this allocation of points.
**Overrider**

*If in the opinion of the judge the test does not match the fleece, the judge will request a new test and the judge will take a fresh sub sample to be measured.*

**The old sample cannot be used.**

*There could be an incorrect sample label or a crossover of samples.*

*If the sample cannot be re tested then the judge must alter the result to what is visible. Bad or no skirting may also be the problem and this would be easily recognisable.*

**SAMPLING METHOD**

Whichever sampling procedure is selected to use, the method and who does the sampling must be considered. Sometimes the testing house that is doing the measurement will carry out the sampling of the fleece, but it is normally the stewards who are unpacking the fleece, weighing it and getting it ready for judging that carry out this procedure.

It is not hard to train stewards to do this prior to the show and I believe it is more convenient and time saving on the judging to have all sampling and testing ready prior to the appearance of the judge on show day.

Care is required by the OFDA 2000 tester when putting 6 staples on the reading platform at one time. As advised by the OFDA maker, the machines are basically set to read the sample in a particular way owing to the format that is in its program. **The tester should follow instructions (In document) as given by the manufacture.**

**CONCLUSION**

For use on the machines that can minicore a grid sample, then I recommend changing to the 12 x 1 site procedure. They are the best short of "mini - coring the fleece" or using a full grid sample as shown earlier (But they had some draw backs for the fleece show).

*The first use of the 6 x 2 site sampling was used in 1995. The total sample was then mini - cored for testing for a composite result. Some anomalies occasionally appeared and these tended to be poorly skirted fleeces, and sometimes on very odd occasions a sampling error. These were picked up by the judges (gives them credit). Generally the procedure worked well.*

*Because of the skirting problem the 12 x 1 site procedure was developed in 2005/7 to try and overcome this issue. (Sampling errors are often just short cutting and not taking care of the paper trail.)*
For use on the OFDA 2000 (No 100 snippet mode) machine that cannot minicore a grid sample, then the new 6 x 1 site procedure should be used (method 1 or 2) as listed.

Good luck

Cameron Holt

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Author-
A Definitive Guide to Alpaca Fibre.

Cameron Holt, a leading international alpaca fibre expert has had some 50 years in the fibre industry with 25 of those later years dedicated to alpaca research and education.

In 1990, because of Cameron’s long involvement with wool, mohair and cashmere, he was asked by the founding fathers of the Australian Alpaca Association to develop an educational program and to help in the setting up of standards for both testing and judging of alpaca fleece.

His numerous research programs and publications over these years helped enable this book to be written.

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The author has made every effort to ensure that the information in this document was correct at time of printing. The information is meant to supplement, the readers own education and experience. The author advises readers to take full responsibility for their decisions related to alpaca fibre / animals contained within.

It is important to understand the large variance still in the alpaca gene pool, as research results quoted in this article with another research group of alpacas, the findings may vary slightly to those results indicated herein.

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