Impact of Locking Style on Desirable Characteristics of Suri Fibre, such as Lustre and Fineness

Summary of Preliminary Results to Date

Julie Wilkinson, Baarrooka Alpaca Stud, Strathbogie, Victoria. Ph: 03 5790 5288; j.wilkinson@baarrooka.com.au

INTRODUCTION

PRINCIPLE OBJECTIVE OR ISSUE ADDRESSED:
To determine the relationship between locking style of suri fleece and characteristics such as lustre and fineness.

OBJECTIVES AND OUTCOMES
a. To develop a descriptive definition for the different locking styles of suri fleece.

b. To determine if different locking styles relate to different internal structure of the individual fibre.

c. To determine if a. and/or b. above relate to other desirable fibre characteristics such as fineness or lustre.

The data collected in this project, while being valuable in its own right, will be used in two other proposed R&D projects relating to lustre identification and measurement and the impact of locking style on processing and end product.

CONTEXT AND BACKGROUND
As breeders, we need to know if we are focussing on the most important fleece characteristics in our breeding program and if different fleece styles have greater levels of lustre, are finer and have softer handle.

Many authors indicate there are a number of (more easily measured) characteristics that influence lustre.

These include:
- Fineness
- Density
- Colour
- Consistency of fibre
- Cross-sectional shape of fibre
- Flatness and consistency of scales structure

The identification of characteristics of suri fibre that contribute to lustre may enable suri breeders to tailor their breeding program toward always selecting for lustre, while still improving other characteristics.

While the above characteristics are said to impact lustre, there does not seem to be a consistent or direct correlation (i.e. fine and dense animals without lustre vs coarser and less dense animals with greater lustre).

There is some suggestion that the different locking styles relate to different internal structure of the individual fibre. Whether this structure then relates to other characteristics, such as lustre, fineness or handle is important to determine. There is some importance also in identifying if specific locking styles produce finer fleece. A secondary aspect of this, which is proposed to be undertaken in further research, is to determine if the different locking styles have different yields or other processing gains.

PROJECT DESIGN AND METHODS

The project is being undertaken in 5 stages:

1. Literature Review: Review previous published and unpublished data undertaken on alpaca fibre as well as mohair, wool or other fibres, where relevant. Identify styles of locking (eg. Cameron Holt). Document available research.
2. Develop Protocols: Develop and document protocols for taking and assessing samples of fibre, chain of custody and data collection and recording.
3. Collect and analyse Samples: Collect fleece samples from suri breeders Australia-wide in conjunction with the existing AAA fibre sampling project. Identify and record characteristics of the fibre in order to determine their influence on lustre and fineness. These include:
   - Lock style – record style type and consistency/quality over length of lock. Develop photographic documentation of different locking types
   - Length of sample
   - Cross section – take individual fibre cross section, fix and assess under microscope, describe fibre structure and photograph examples of types
   - Lustre – develop and document a subjective assessment of lustre (future project to develop objective measurement protocol)
   - Colour – describe colour and uniformity within sample
4. Collect and document fibre analysis: Receive histograms and record data, such as micron, CV, curvature, etc from histogram against data collected in 3. above. Undertake multivariate analysis to identify correlation between locking style, fibre structure and other fibre characteristics.
5. Report on findings. Prepare a detailed scientific paper which documents project objectives, methods and outcomes.

Samples

Suri breeders across Australia were asked to send in midside samples from suris shorn in Spring 2005. A total of 448 samples were obtained from 9 studs in Victoria, Queensland and NSW. The animals sampled included full suris and cross bred animals - no distinction or identification of these animals was made on samples. Animals ranged in age from 6 months to 13 years and included first shorn and previously shorn animals. Entire males, wethers, maidens and pregnant females were included and were distinguished male, female or wether. Animals of all colours were included, with 54% of samples being white and 45% coloured.

Breeders were requested to provide the following data with their midside samples:

- IAR (optional)
- date of birth
- date of shearing
- date of previous shearing
- sex
- stud name and address

Sample Preparation and Analyses

Each group of samples from a breeder was allocated a batch number and each individual sample given a alpha-numerical identifier. If provided, IAR numbers were included.

The following assessments were recorded for each sample on the greasy fleece:

- length - measured in cm
- colour - assessed against the AAA colour chart
- consistency of colour - on a scale of 1 - significant variation, 2 - some variation, 3 - consistent
- locking type - assessed using the following descriptors:
  - Tight Ringlet TR
  - Wave & Twist RingletW&T
  - Corkscrew C
  - Broad wave BW
  - Straight lock/Offstyle SL/OS
- Examples of these locking styles were recorded using a flatbed scanner.
- Extent of locking - percentage of staple showing locking style

One staple from each sample was removed for further analysis and the remainder of the sample was sent to Southern Tablelands Fibre Testing Laboratory for fibre analysis using OFDA 2000. Protocols for sample handling are included in Appendix A. The following measurements were made on each sample:

- mean fibre diameter
- standard deviation
- coefficient of variation
- fibre curvature
- spinning fineness
- finest point from the tip
- staple length

The laboratory fibre analyses were recorded against the sample number on a spreadsheet.

The reserved staple from each sample was labelled and prepared for further analysis. Each sample was washed using the protocol described by Holt & Scott (1997) to remove grease and dirt content.

The following analysis was undertaken on the washed samples:

- lustre assessment;
- description of cross-sectional characteristics of the fibre (this was only undertaken for 10 samples from each of the lock types) (still to be undertaken).

Further description of these analyses are provided below.

Lustre
In the absence of a effective objective measure for lustre, a subjective panel-based assessment, as described by other researchers (Ref), was used to record the relative lustre of each staple.

Each staple was washed and dried as indicated above. A lustre assessment panel was compiled using 8 suri breeders. Each panel member was provided with a headlamp of the same wattage (LED) and the assessment room was curtained to mimimise outside light input.

The staple was wound around the assessor's finger and viewed with light from the headlamp on the curve of the staple. The sample was given a score from 5 (no lustre) to 1 (very high lustre). The results of each batch were collated and given an average score to one decimal place. Where the range of scores varied by more than 2 points, the samples were re-numbered and put through the assessment panel again. For quality assurance, 2 duplicate and 2 replicate samples were included in each batch.

Cross Section Analysis
Still to be undertaken.

Statistical Analysis
Still being finalised.

RESULTS

A summary of the suri fibre assessment undertaken to date is provided below.

<u>General:</u>

- 448 samples from 9 studs: Qld, Vic, NSW
- 54% white; 45% coloured
- Finest: 12.9 micron; sd 2.8
- Coarsest: 36 micron; sd 8.3
- Mean: 23.2 micron; sd 4.9
- Median: 22.7 micron; sd 5.1
- 13 samples had CF of 100%

Lock types identified and proportion of sample: (these were further subdivided)

Twist	59%
Wave & Twist	14.7%
Wave	8.9%
Ringlet	8%
Corkscrew	0.4%
Off style	8%

Lock Style of samples ≤20 µ (n=85)

	% of sample	% of style
Twist	44.7	14.3
Wave & Twist	27.1	34.8
Wave	17.6	37.5
Ringlet	0.8	19.4
Corkscrew	0	0
Off style	2.3	5.4

Lock Style of samples ≥30 µ (n=15)

	% of sample	% of style
Twist	60	3.4
Wave & Twist	0	0
Wave	0	0
Ringlet	20	8.3
Corkscrew	0	0
Off style	20	8.1

Lock Style of samples ≥25 µ (n=127)

	% of sample	% of style
Twist	59.8	28.6
Wave & Twist	10.2	19.7
Wave	5.5	17.5
Ringlet	9.5	33.3
Corkscrew	1.6	100
Off style	14.2	48.6

Average micron of Lock Styles

Twist	23.47
Wave & Twist	22.3
Wave	20.43
Ringlet	24.15
Corkscrew	26.45* only 2 samples
Off style	25.67

Top Lustre score (≤2) from a range of 5= no lustre, to 1=extreme lustre)
n=11
all white
year of birth: 1 x 2001
1 x 2002
3 x 2003
3 x 2004
3 x 2005

Lock style:

	% of sample	% of style
Wave	64	17.5
Twist	36	1.5

4 samples from 1 stud; 1 sample from 7 studs

Bottom Lustre score (≥4)
n=14
8 (57%) white; 6 (43%) coloured
Lock style:

	% of sample	% of style
Twist	57.1	3.0
Wave & Twist	14.3	3.0
Wave	0	0
Ringlet	14.3	8.3
Corkscrew	0	0
Off style	14.3	5.4

Other suggested relationships (subject to correlation analysis to confirm):

- Direct relationship between finer micron & higher fibre curvature
- Direct relationship between fineness and lower sd
- Inverse relationship between fineness and yield
- No apparent relationship between grease or softness and lustre or fineness or lock style