

Fibre diameter variation as a measure of resilience in sheep

Erin Smith

Sam Walkom and Sam Clark

Overview

- Australia's extensive production systems
- How can fibre diameter describe resilience?
- What's next?



Australian production systems

- Large areas

Australian production systems

- Large areas
- Lots of sheep
 - ~80 million sheep



Australian production systems

- What are sheep used for?



Australian production systems

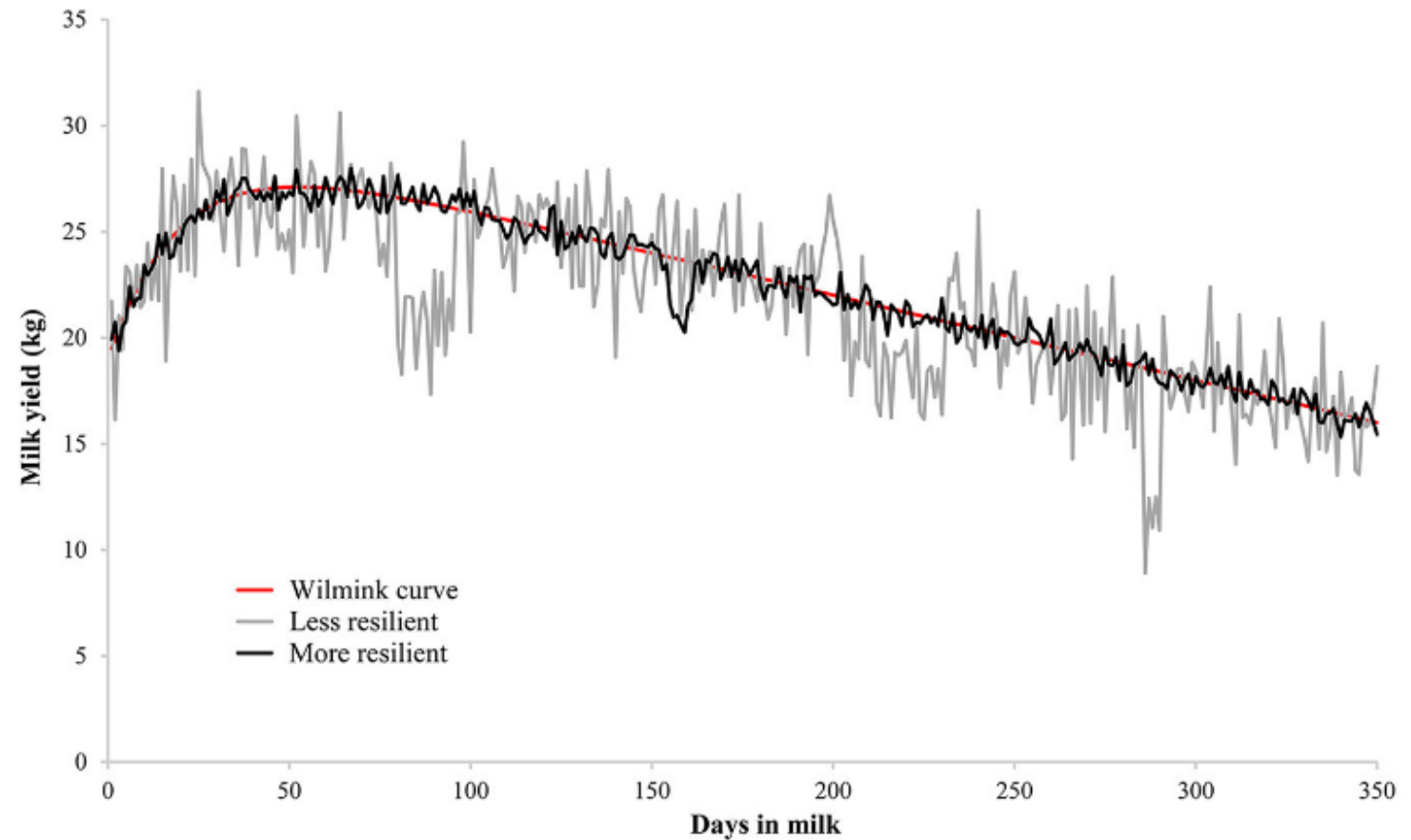
- Variable and diverse environments



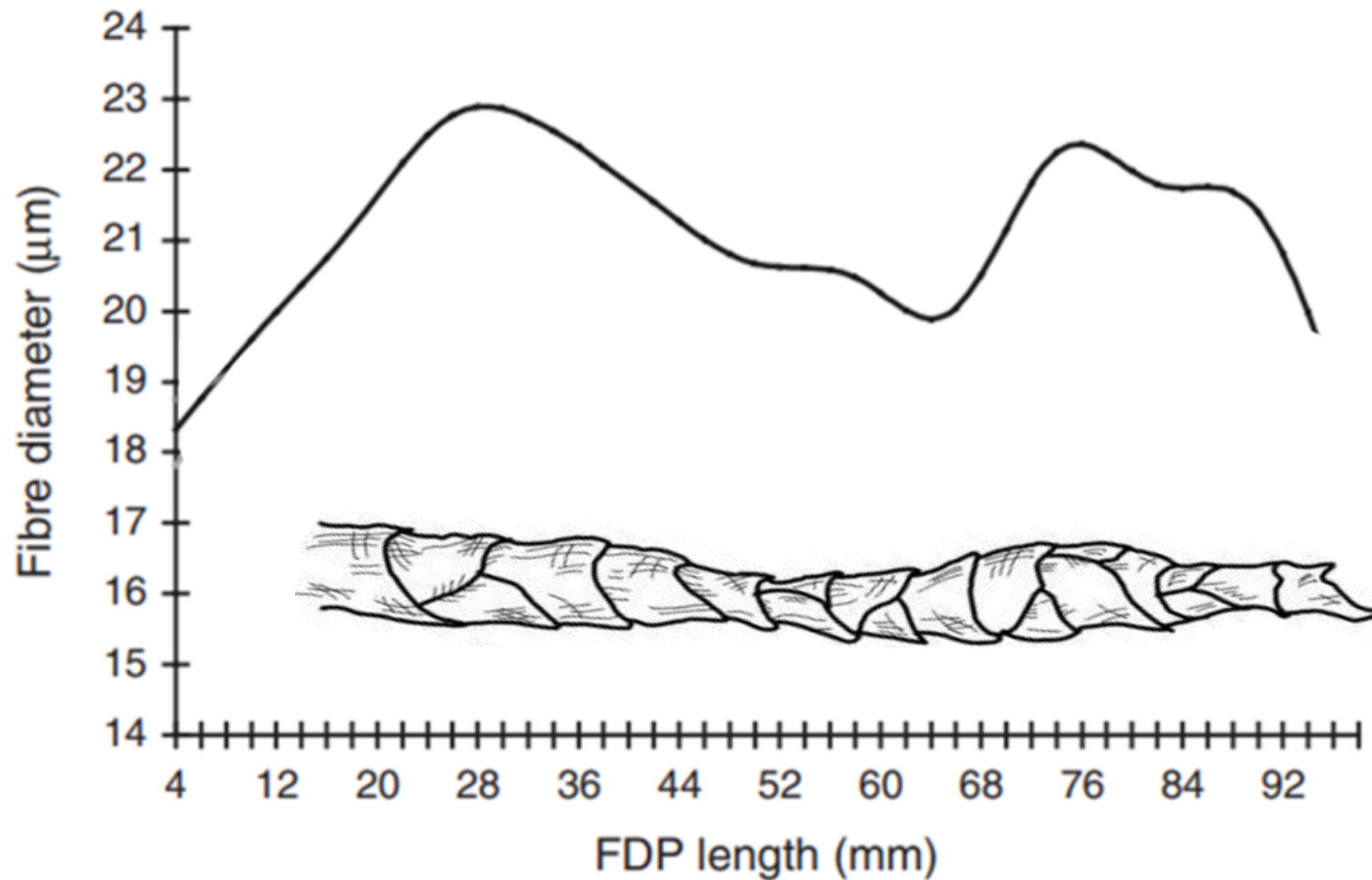
Resilience indicator traits

- How has resilience been measured previously?
 - Deviations from normal patterns of growth and production
 - Linked to better health, welfare and production

Fibre diameter profiles?

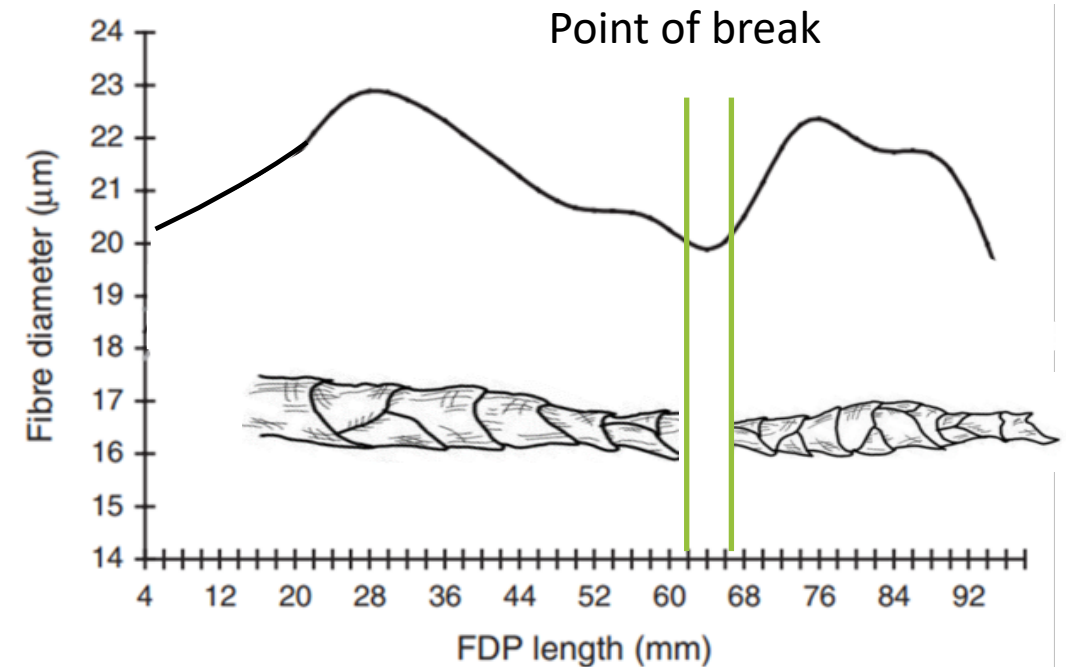


Measuring fibre diameter variation along a staple



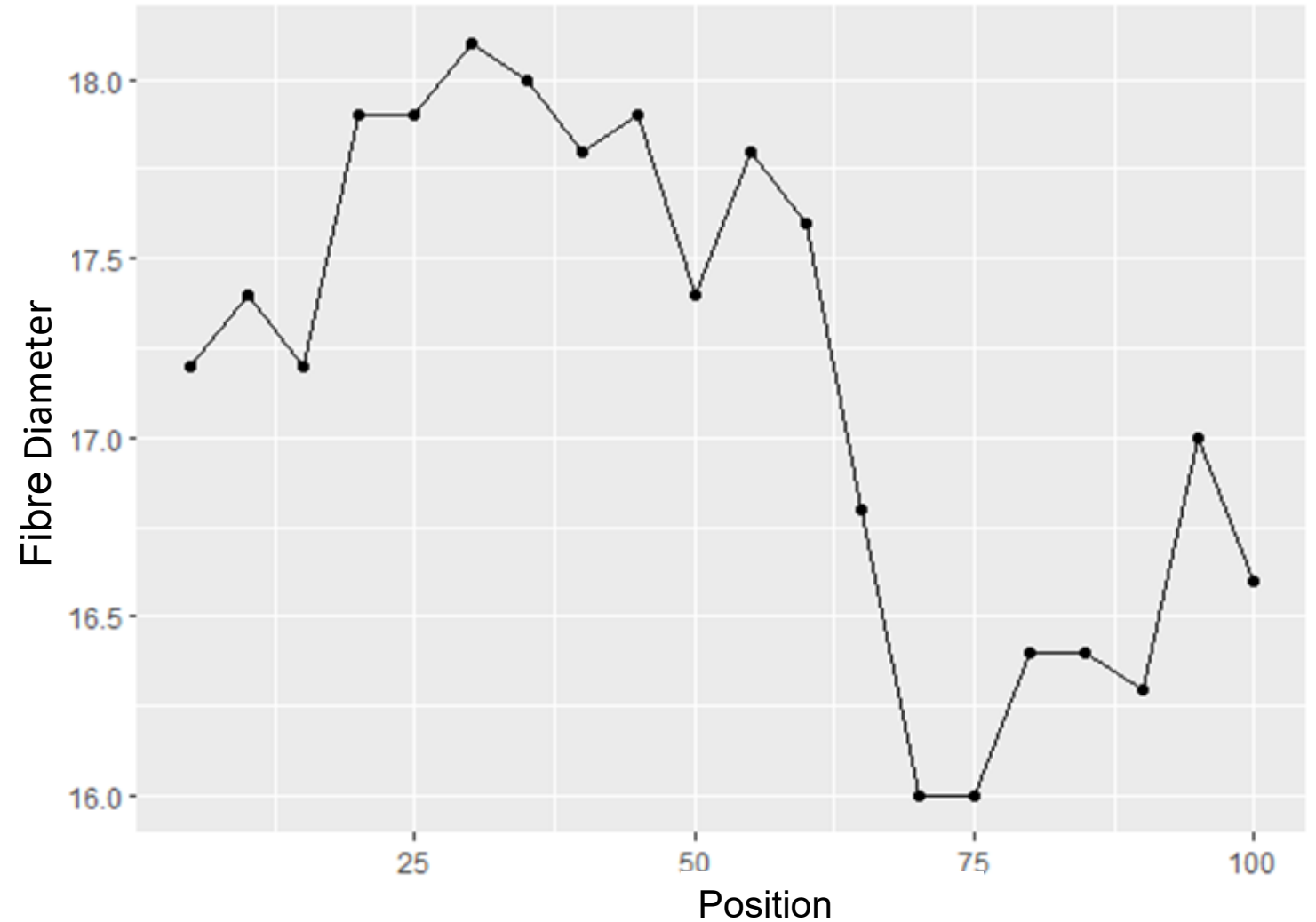
Describing fibre diameter variation?

- Previously investigated in relation to staple strength
 - Reducing the minimum fibre diameter
- Other measures?
 - Not just the point of maximum stress



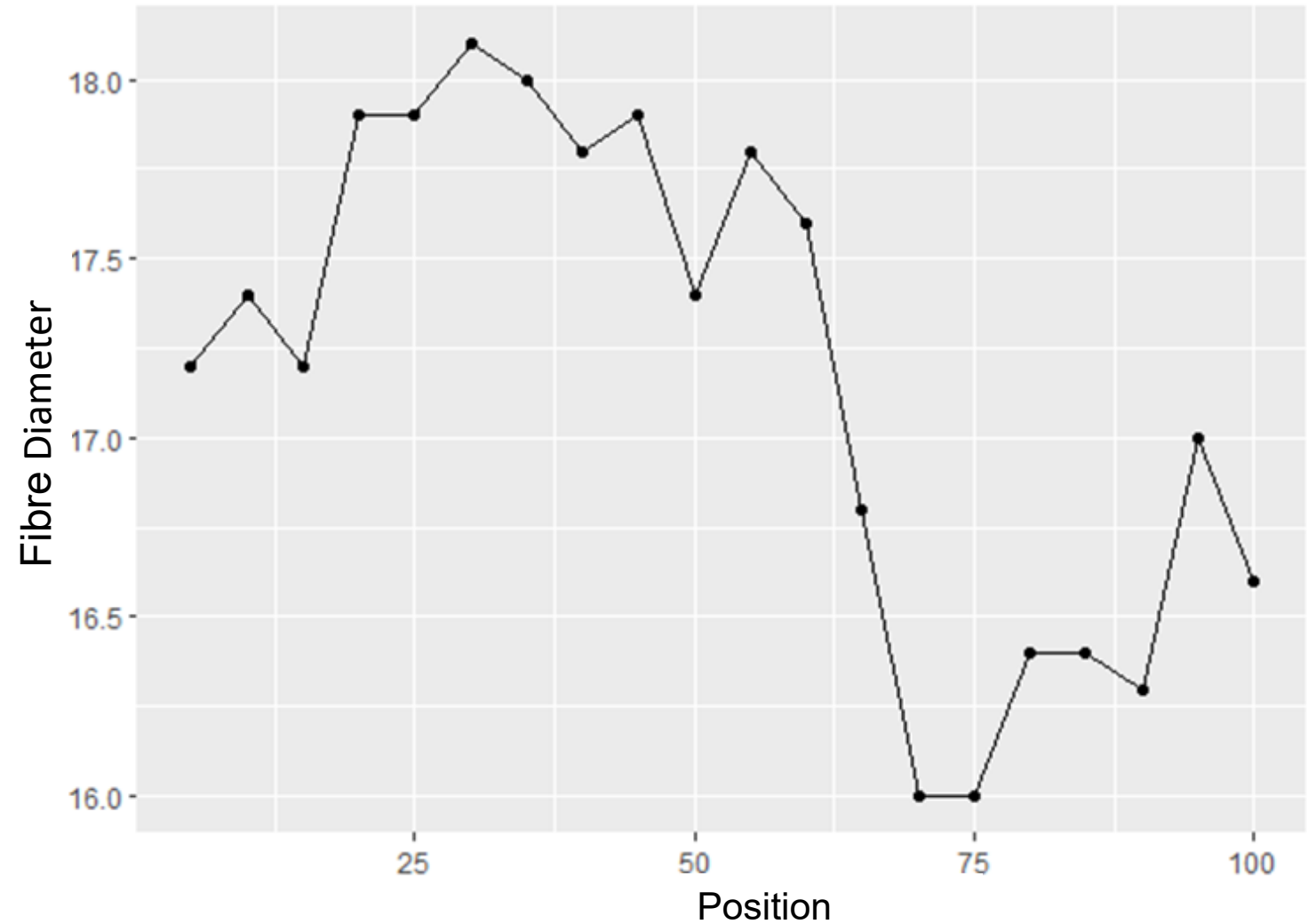
Trait definitions

- Along Fibre CV (%)



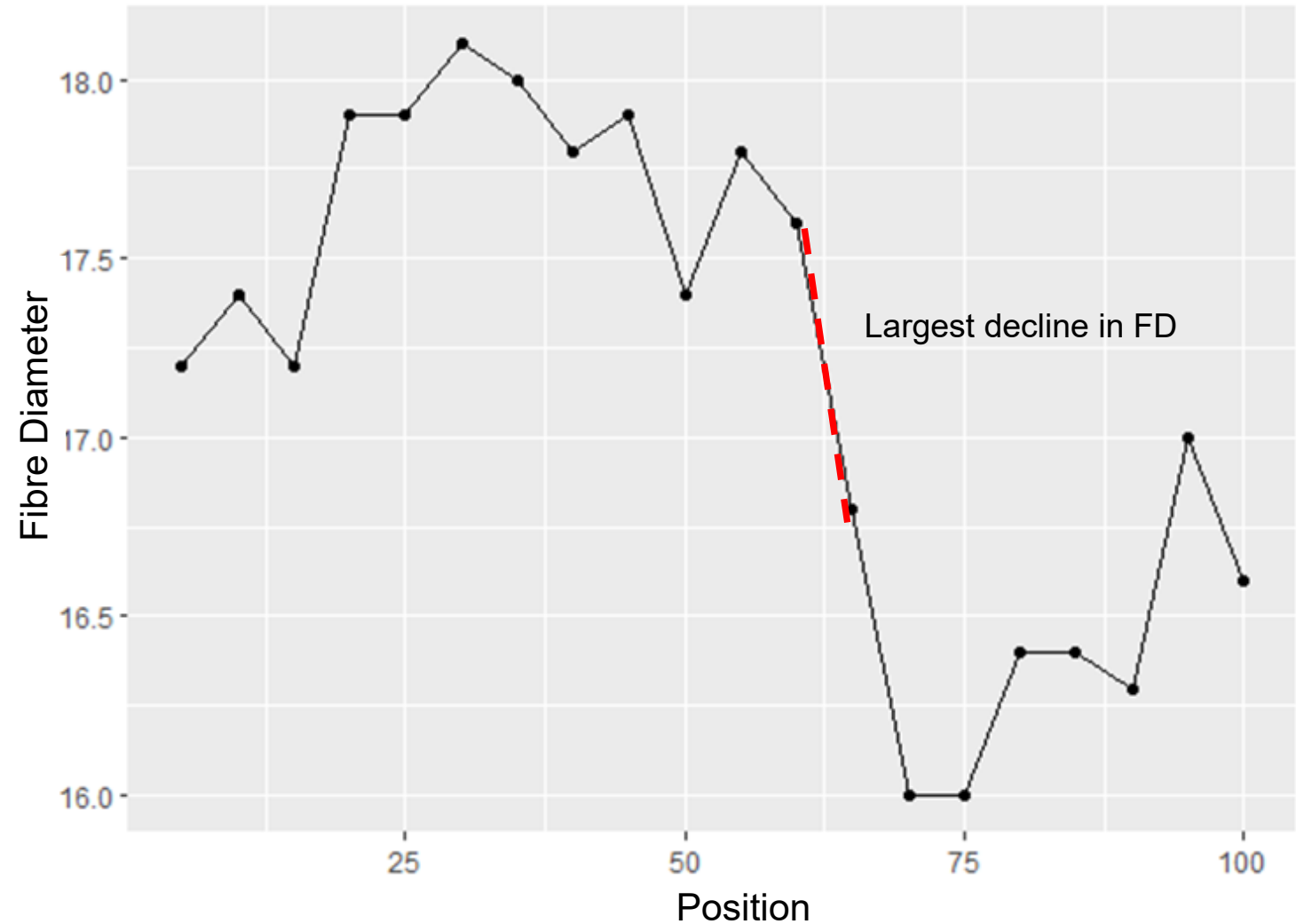
Trait definitions

- Along Fibre CV (%)
- Absolute change (μm)



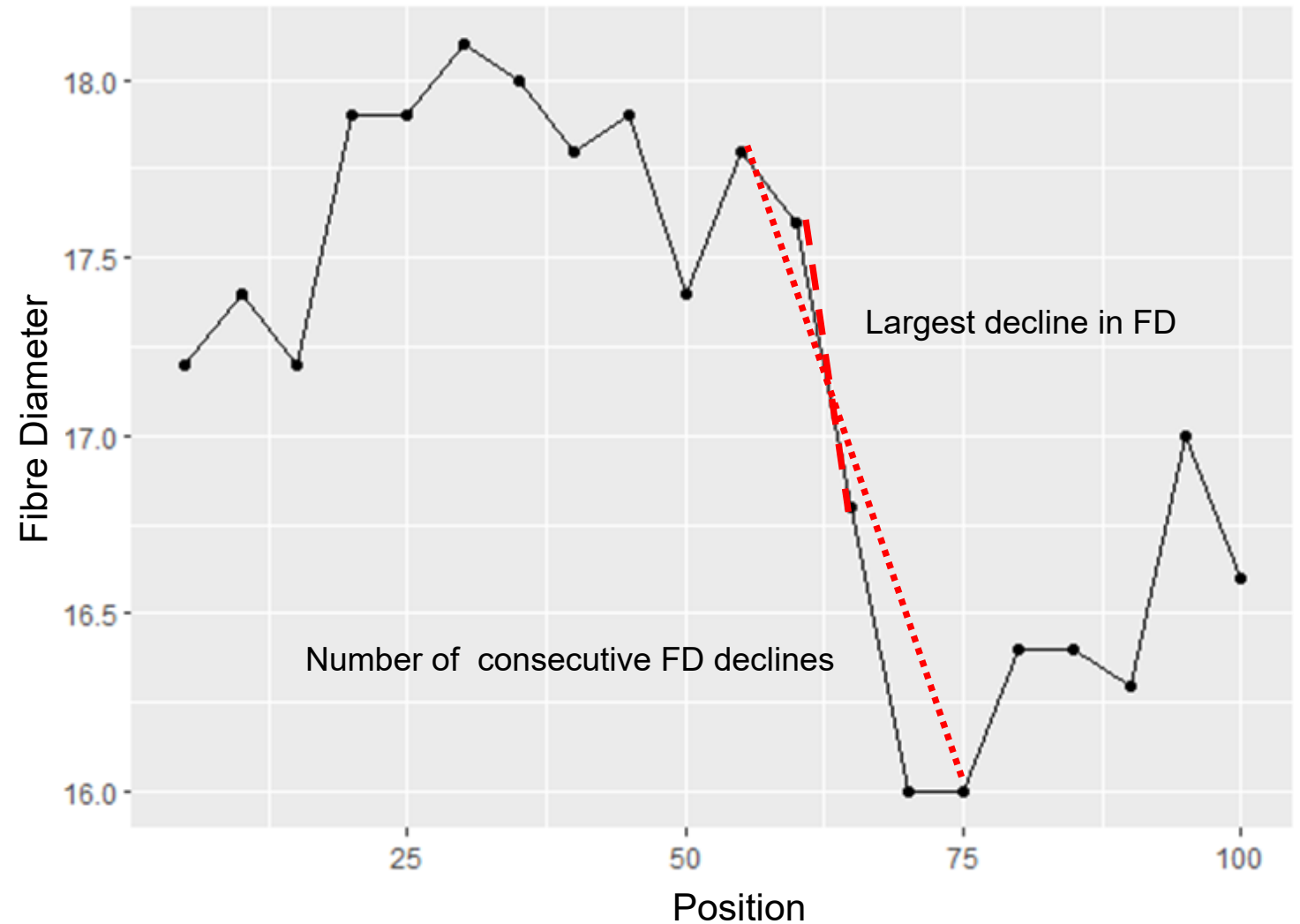
Trait definitions

- Along Fibre CV (%)
- Absolute change (μm)
- Largest decline in FD (μm)



Trait definitions

- Along Fibre CV (%)
- Absolute change (μm)
- Largest decline in FD (μm)
- Number of consecutive FD declines (count)



Methods

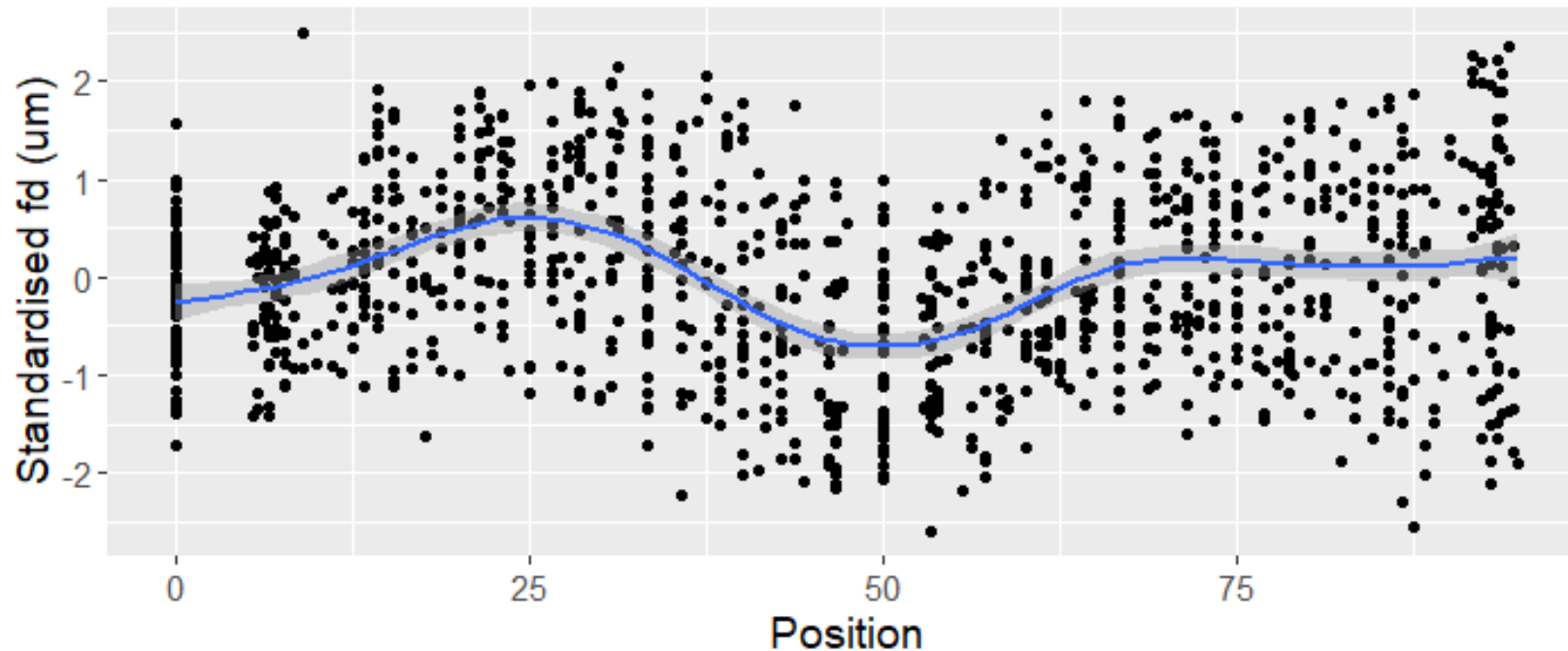
- 6,140 Merinos from the Information Nucleus Resource flock
- Pedigree based animal models
- Fixed effects; Contemporary group and wool type

Results

Trait	Heritability \pm s.e
Along Fibre CV (%)	0.26 \pm 0.03
Absolute change (μ m)	0.33 \pm 0.03
Largest decline in FD (μ m)	0.11 \pm 0.03
Number of consecutive FD declines (count)	0.02 \pm 0.03

What next?

- Potentially better ways to model fibre diameter variation
 - Random regression models
 - Splines
- Relationship between these traits and existing health, fitness and production traits



Summary

- Fibre diameter variation may be one way to define resilience in sheep
- Fibre diameter variation along the staple is heritable
- More work to be done

Acknowledgements

- Meat and Livestock Australia
- Animal Breeding and Genetics Unit (AGBU)

