Update on Breech strike project at Mt Barker research station WA

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Department of Agriculture and Food Western Australia

A national flystrike R&D technical update 1st August 2012

Objectives - Scientific

- Identify and quantify indicator traits for breech strike in un-mulesed sheep in summer (Armidale NSW) and winter rainfall (Mt Barker WA) regions
- Estimate genetic parameters to design effective breeding programs for multi-trait improvement
- Provide industry with ASBVs of indicator traits

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Key indicator traits

Wool colour

Suint

Experimental flocks - established in 2006

Group (200/line)	Purpose
• Select A	Intense selection for resistance
• Select B	Demonstrate progress in a normal commercial flock
• Control	Unselected control
Mulesing	Demonstrate benefits of different groups

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STOPPED (WA)

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SIRES (WA)

STOPPED (WA)

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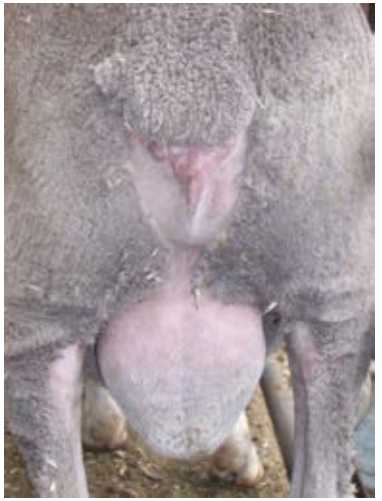
Some sires used in WA

Rylington Merino

Cranmore Park

AMS (Abbot)

O'Halloran



Kojak

Garreth

Centre Plus

2007 born drop - bioclipped

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Management of flocks

- Full production measurements are collected
- Fly activity is monitored with traps
- No blanket preventative treatments are applied.
- No crutching
- Flystruck animals are treated immediately with short acting treatment and information is recorded.

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Flystrike measurements

- Flystrike
  - Breech strike
  - Poll strike
  - Pizzle strike
  - Body strike
- Birth to weaner shearing
- Weaner shearing to hogget shearing
- Adults

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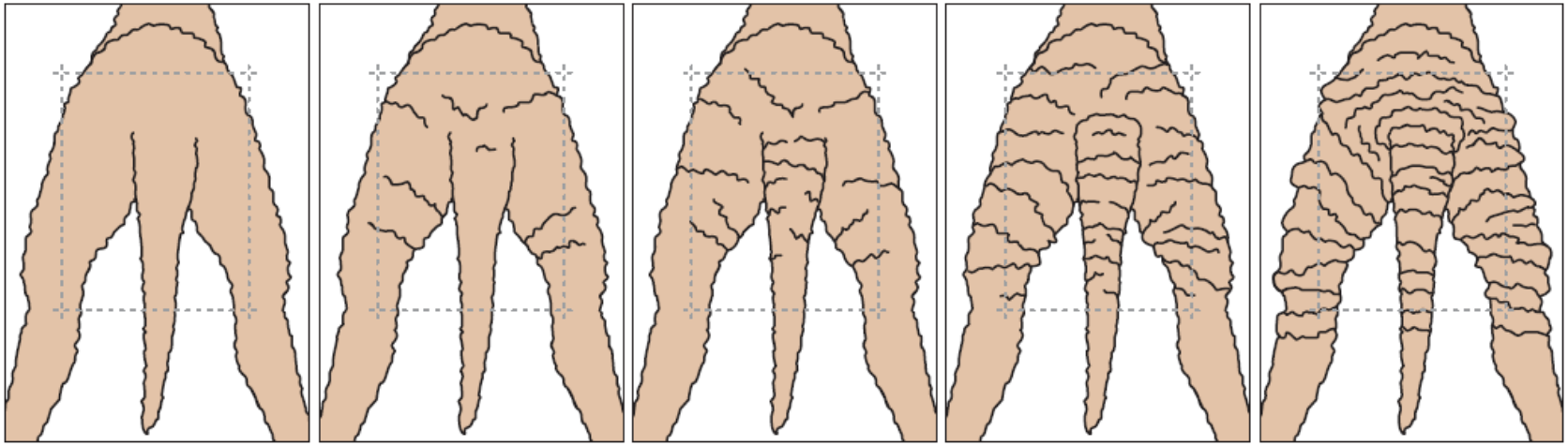
Wrinkles - lambs

Breech Wrinkle – Lambs



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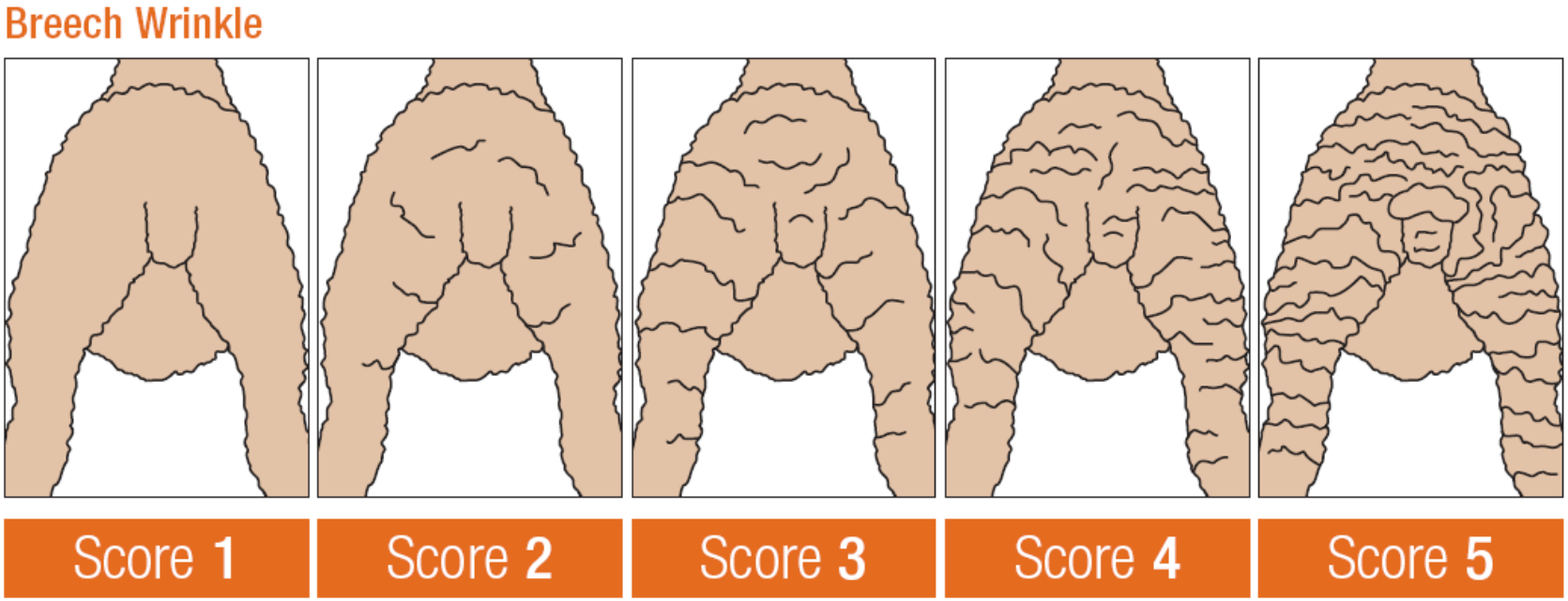
Breech wrinkle



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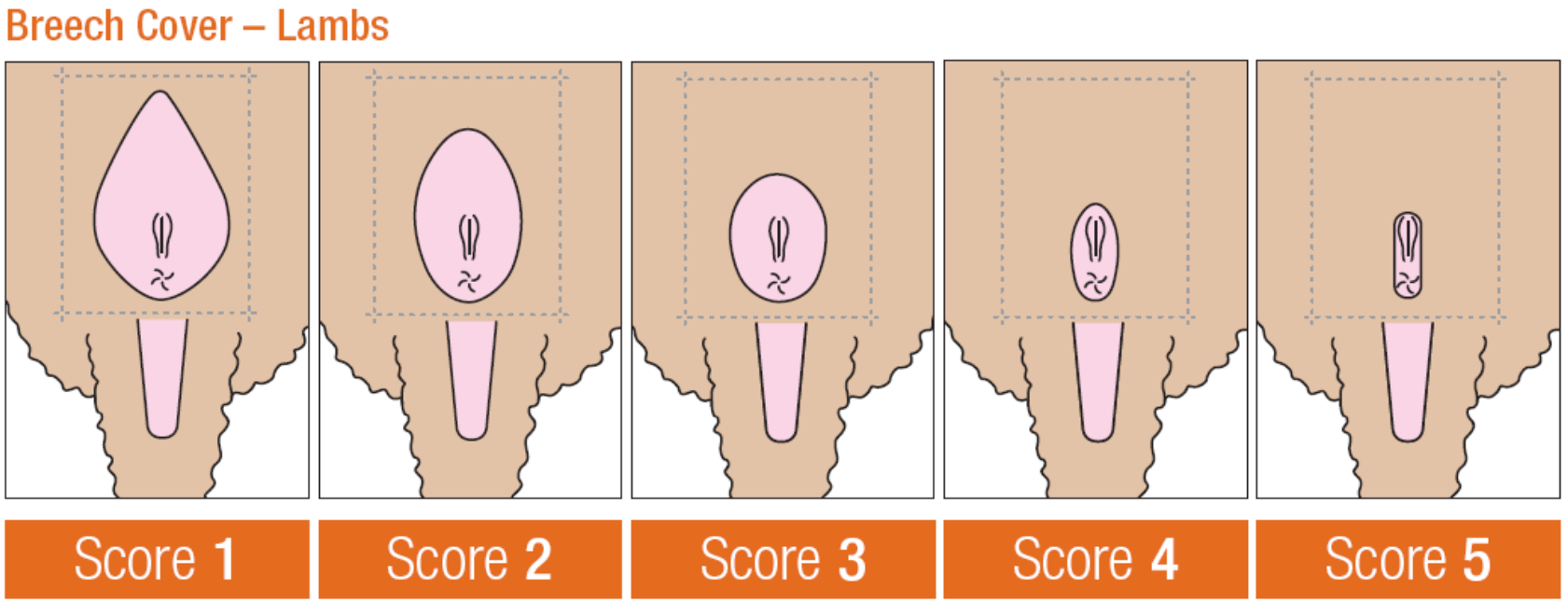
Breech cover - lambs



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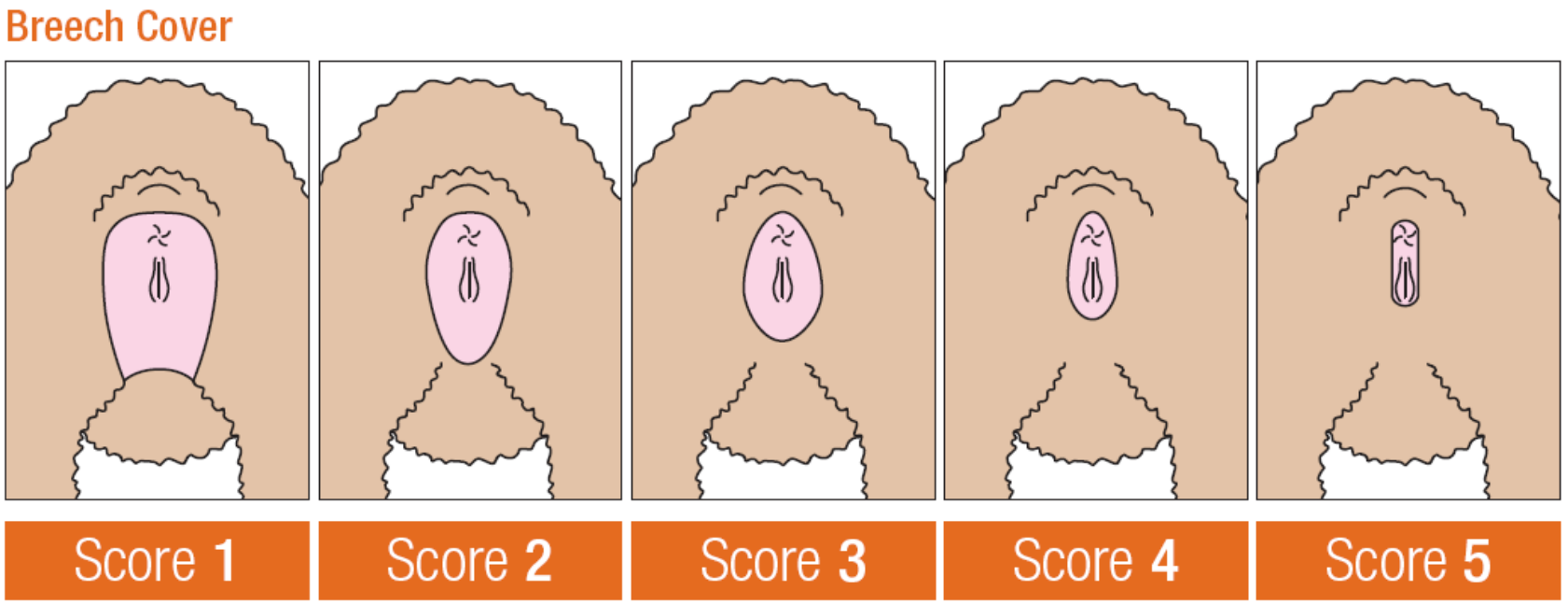
Breech cover



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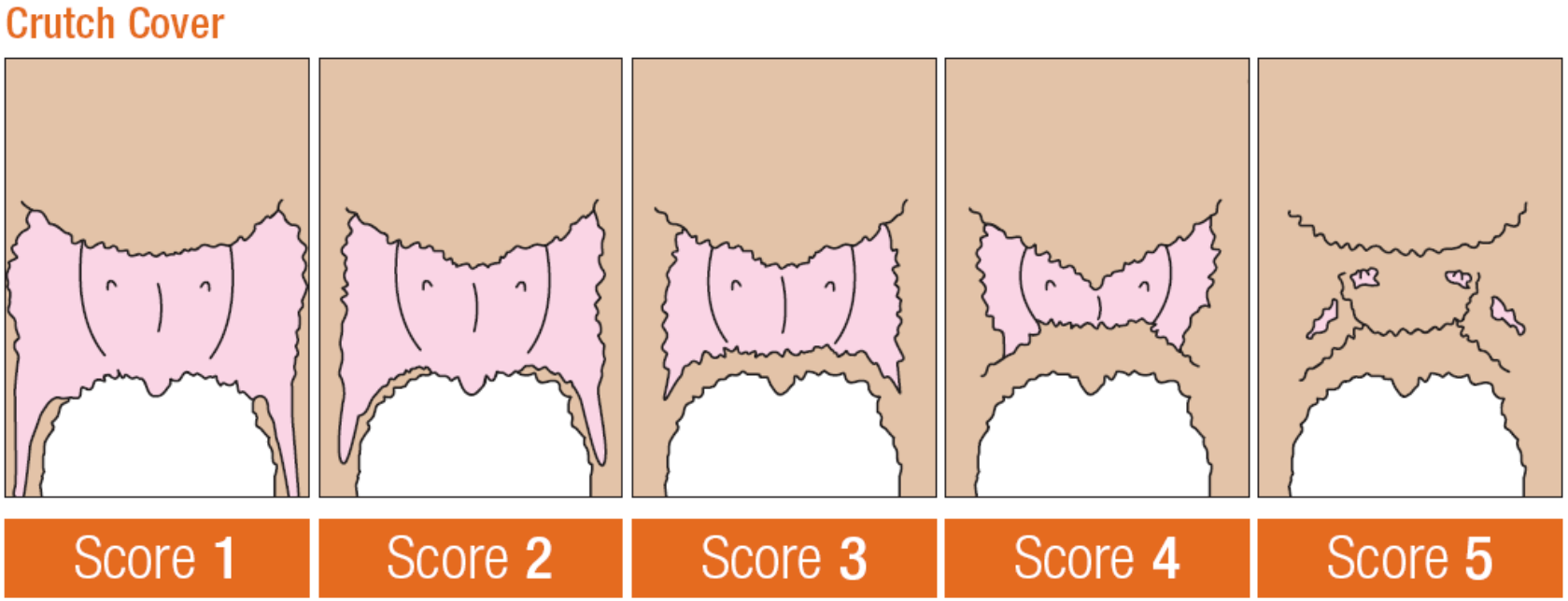
Crutch cover - ewes



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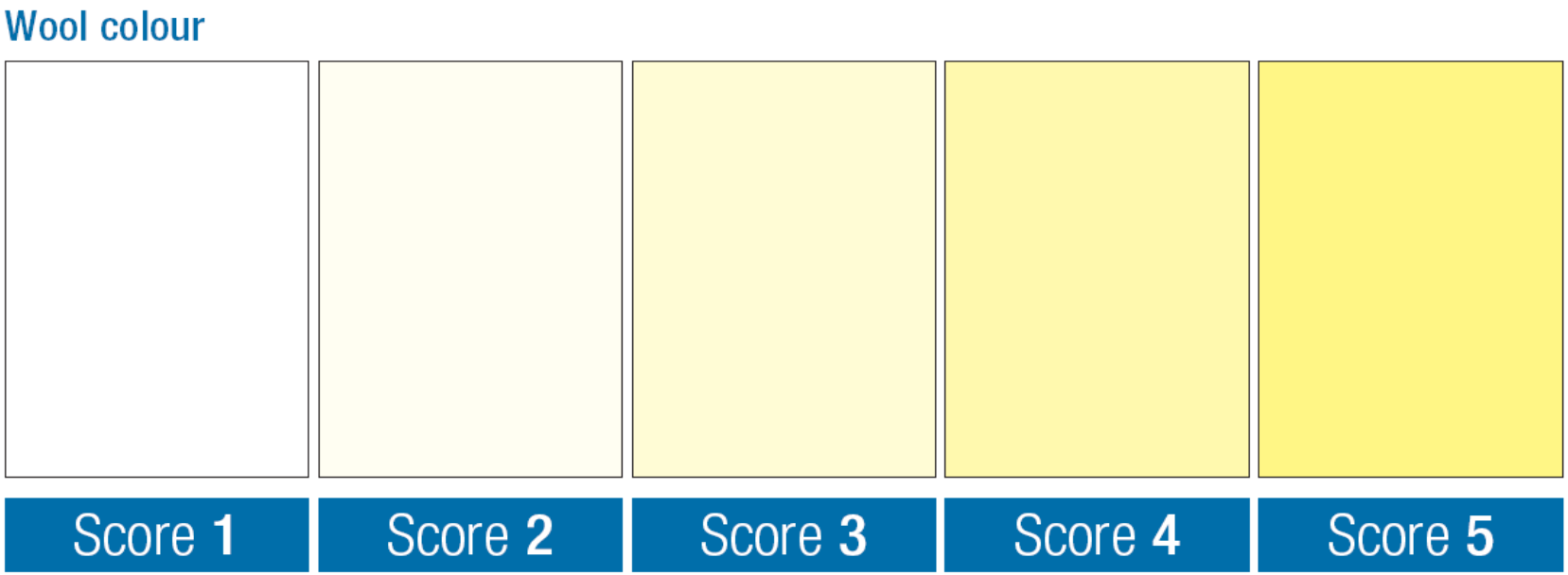
Wool colour



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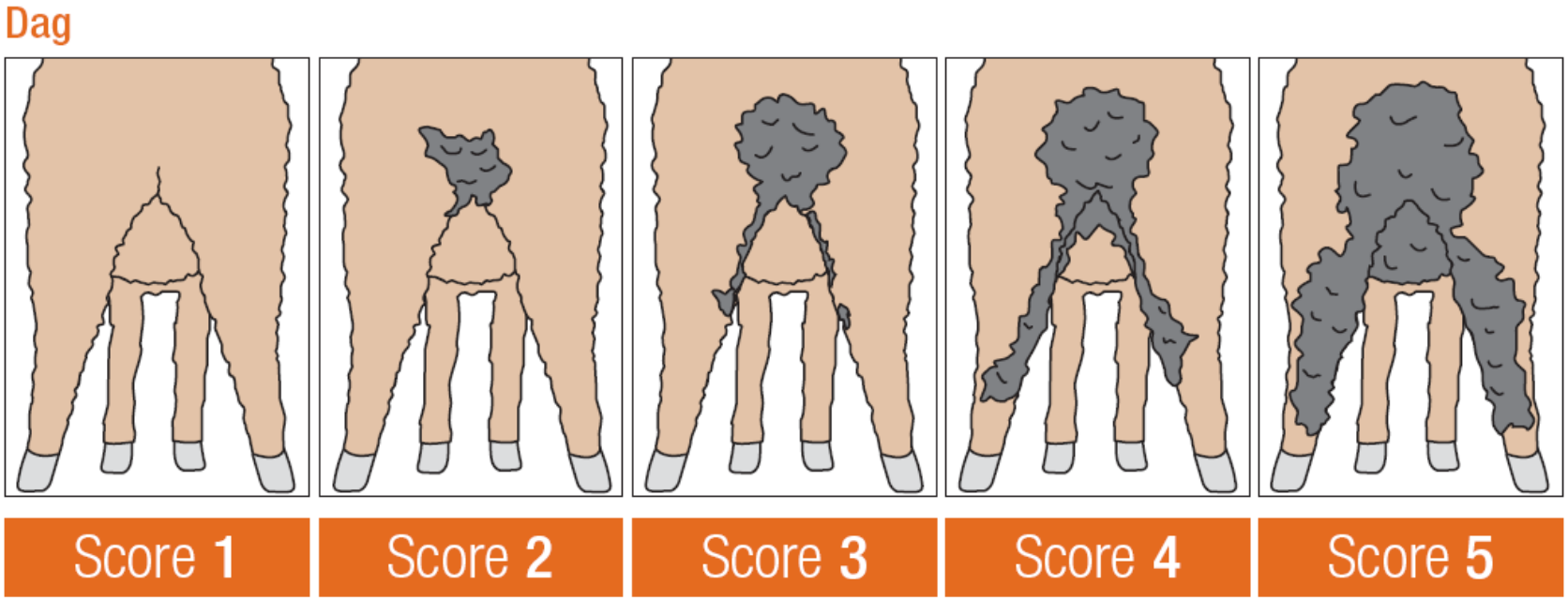
Dags



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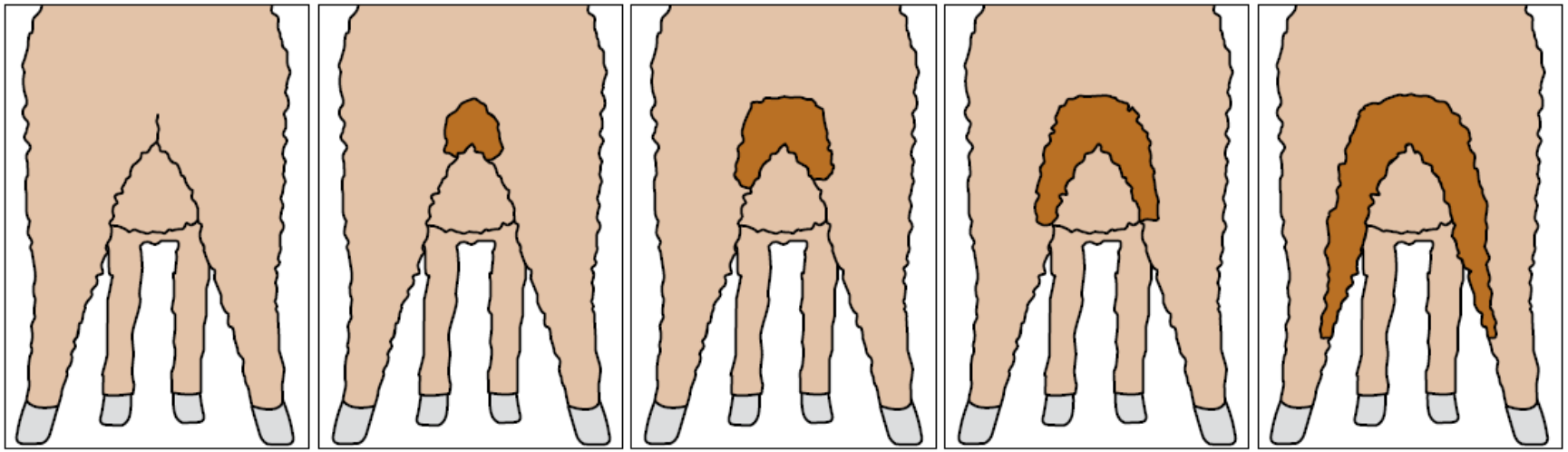
Urine stain



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Wrinkle data

	Birth	Marking	Weaning	Post Weaning	Yearling	Dags and flies present: Pre hogget shearing	Post hogget shearing
Neck			X	X	X	X	X
Body	X		X	X	X	X	X
Rump			X	X	X	X	X
Breech		X	X	X	X	X	X
Tail		X	X	X	X	X	X
Age (mth)	1	2	4	7	12	16	18
Month	July	Sept	Oct	Apr	Jul	Oct/Nov	Jan

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Dag, worm and urine stain

	Marking	Weaning	Post weaning	Yearling	Spring	Dags and flies present: Pre hogget shearing
Dags	X	X	X	X	X	X
Dag moisture		X		X	X	X
Faecal worm egg count		X			X	
Faecal consistency		X			X	
Wool colour		X				X
Urine stain	X	X		X		X
Age (mth)	2	4	7	12	14	16
Month	Sept	Oct	Apr	Jul	Sept	Oct/Nov

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Wool coverage

	Marking	Weaning	Post weaning	Yearling	Dags and flies present: Pre hogget shearing	Post hogget shearing
Breech cover	X	X	X	X	X	X
Crutchcover			X		X	X
Belly cover			X		X	X
Face cover			X	X	X	X
Bare area around anus					X	
Width	X					
Depth	X					
Age (mth)	2	4	7	12	16	18
Month	Sept	Oct	Apr	Jul	Oct/Nov	Jan

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Tail

	Marking
Tail Length	X
Tail Width	X
Tail bare length	X
Tail bare width	X
Tail score (size)	X

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Data

- Wrinkle
- Dags and related traits
- Wool coverage
- Tail
- Urine stain
- Wool colour

- Wool traits
- Growth
- Reproduction

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Data

Total animals (3543)

710 mulesed sheep

2833 unmulesed sheep

49 sires

1535 dams

Average progeny group size = 41

Range 2 to 106

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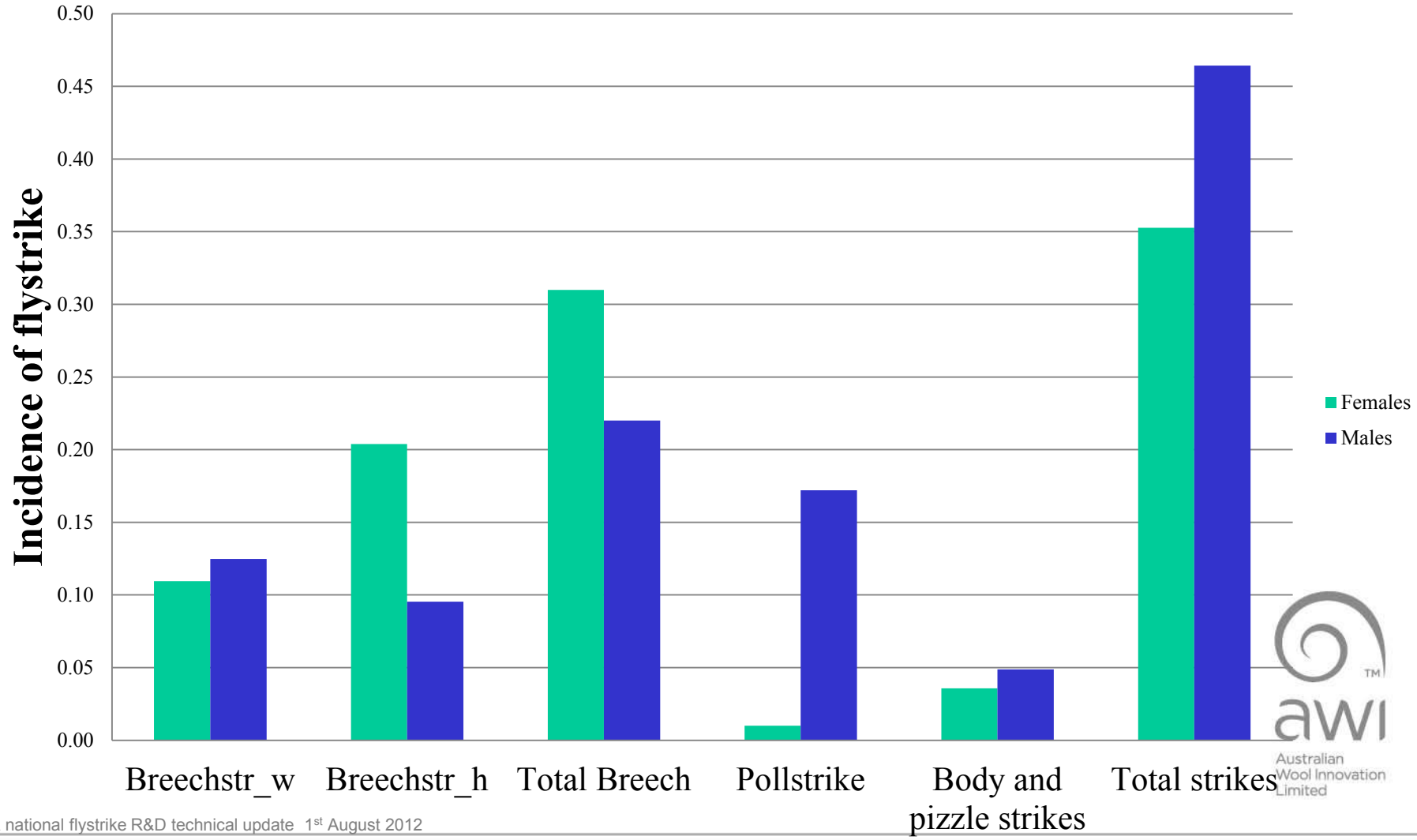
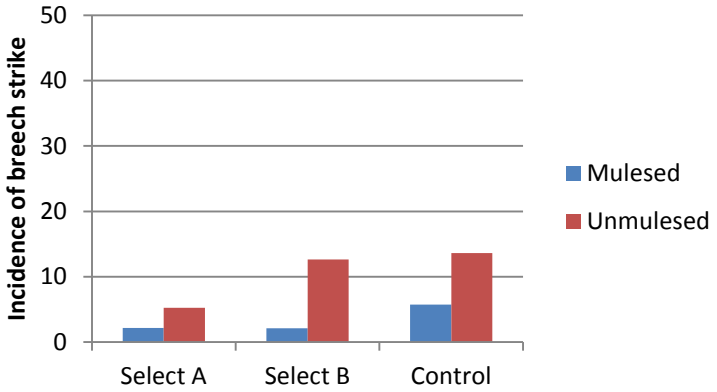
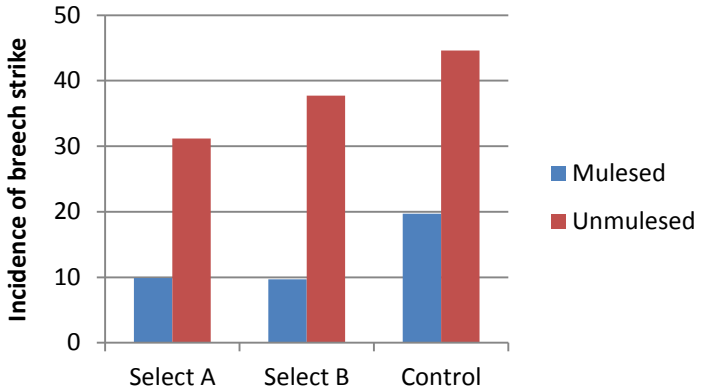
Average annual incidence of flystrike over 5 years in unmulesed sheep in WA (2006-2010)



Effect of mulesing on incidence of breech strike

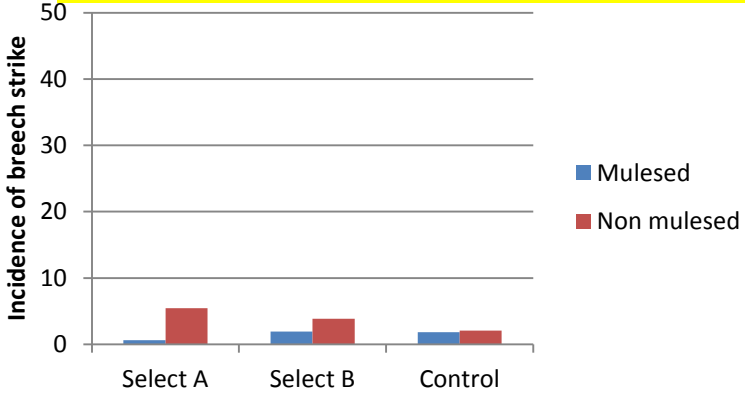
Hoggets in 2006 No crutching Hoggets in 2007

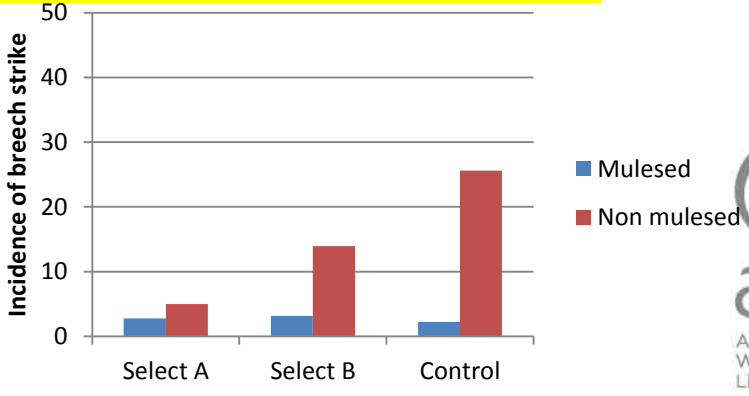




Mature ewes in 2006 Mature ewes in 2007

Crutched





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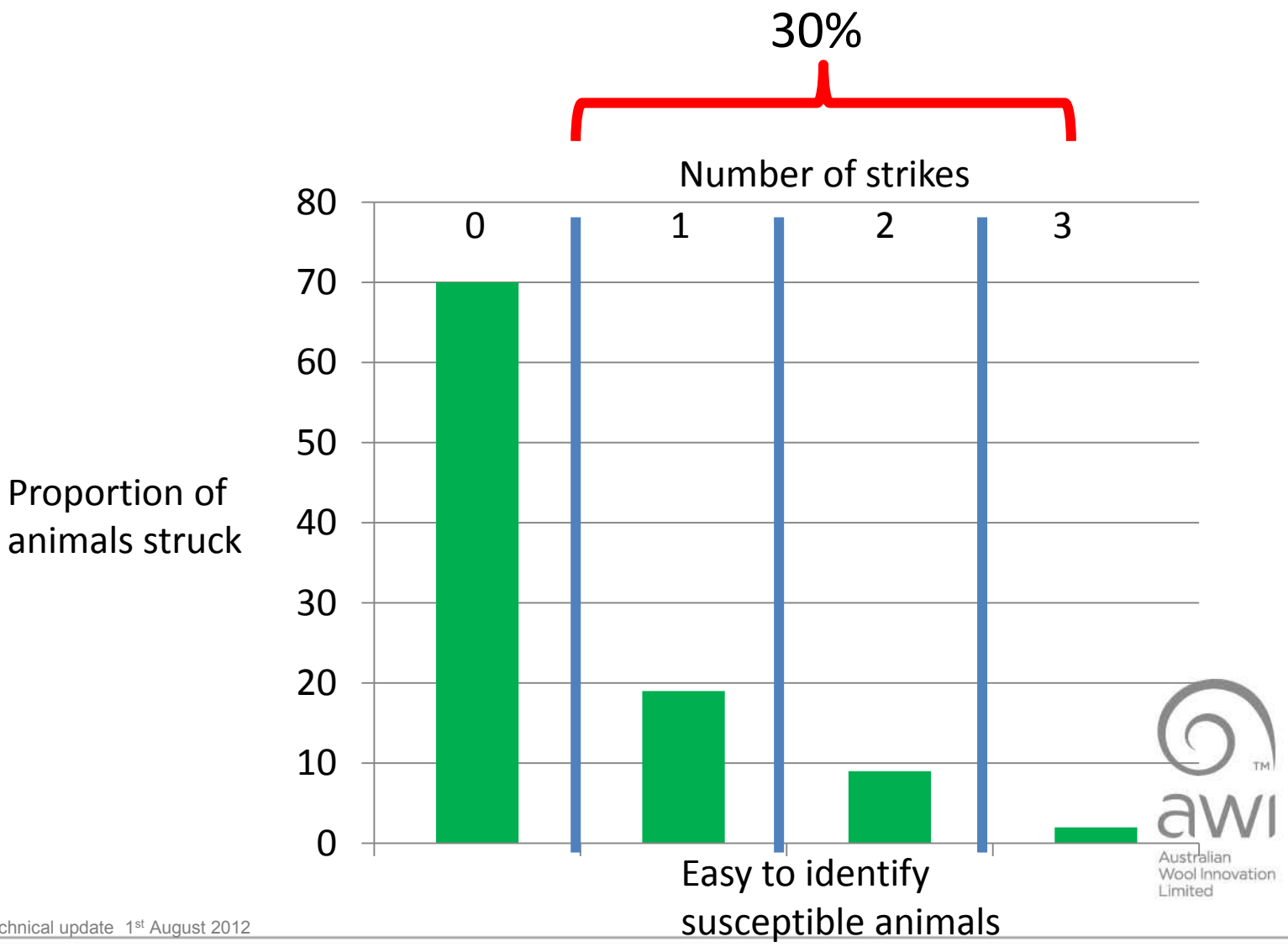
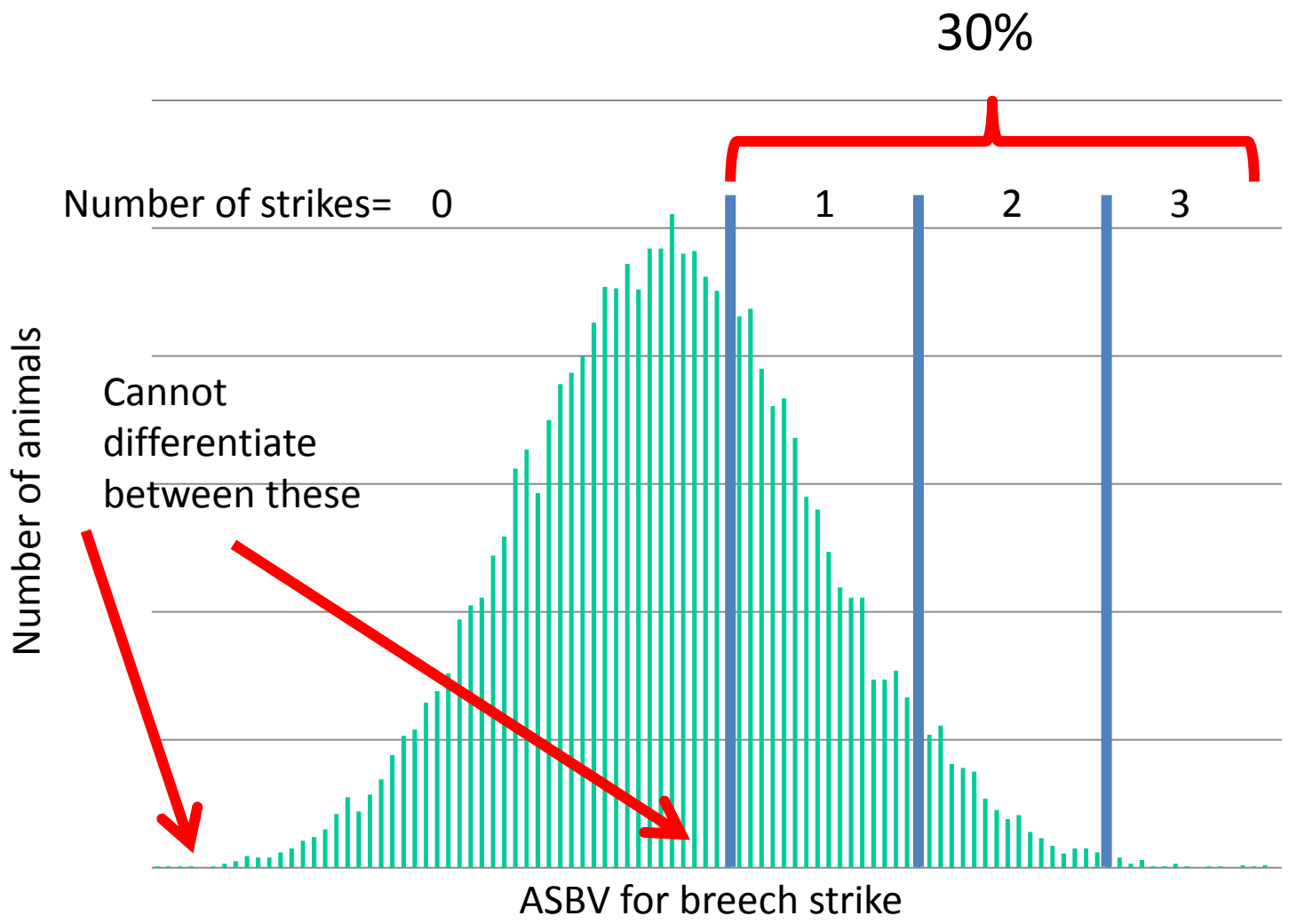
Breech strike is a Threshold trait



Breech strike is a Threshold trait but with an underlying continuous distribution



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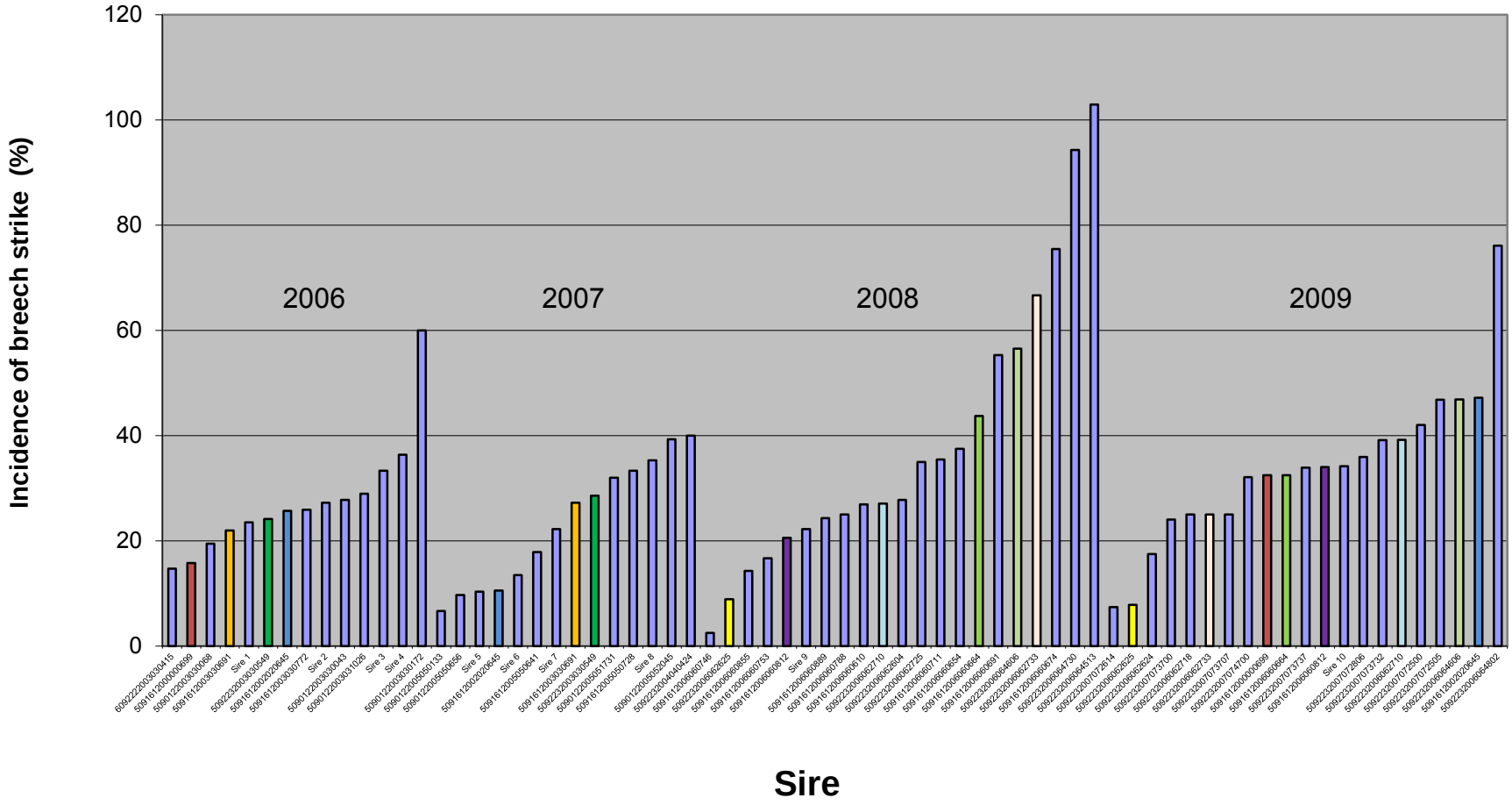
Sire progeny group differences in breech strike



Ewes from extreme lines

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Environmental factors

Type of birth	Twins vs Singles
Breech cover	
weaning	3% lower in twins
yearling	13% lower in twins
hogget	15% lower in twins
Breech wrinkles	
hogget	17% lower in twins

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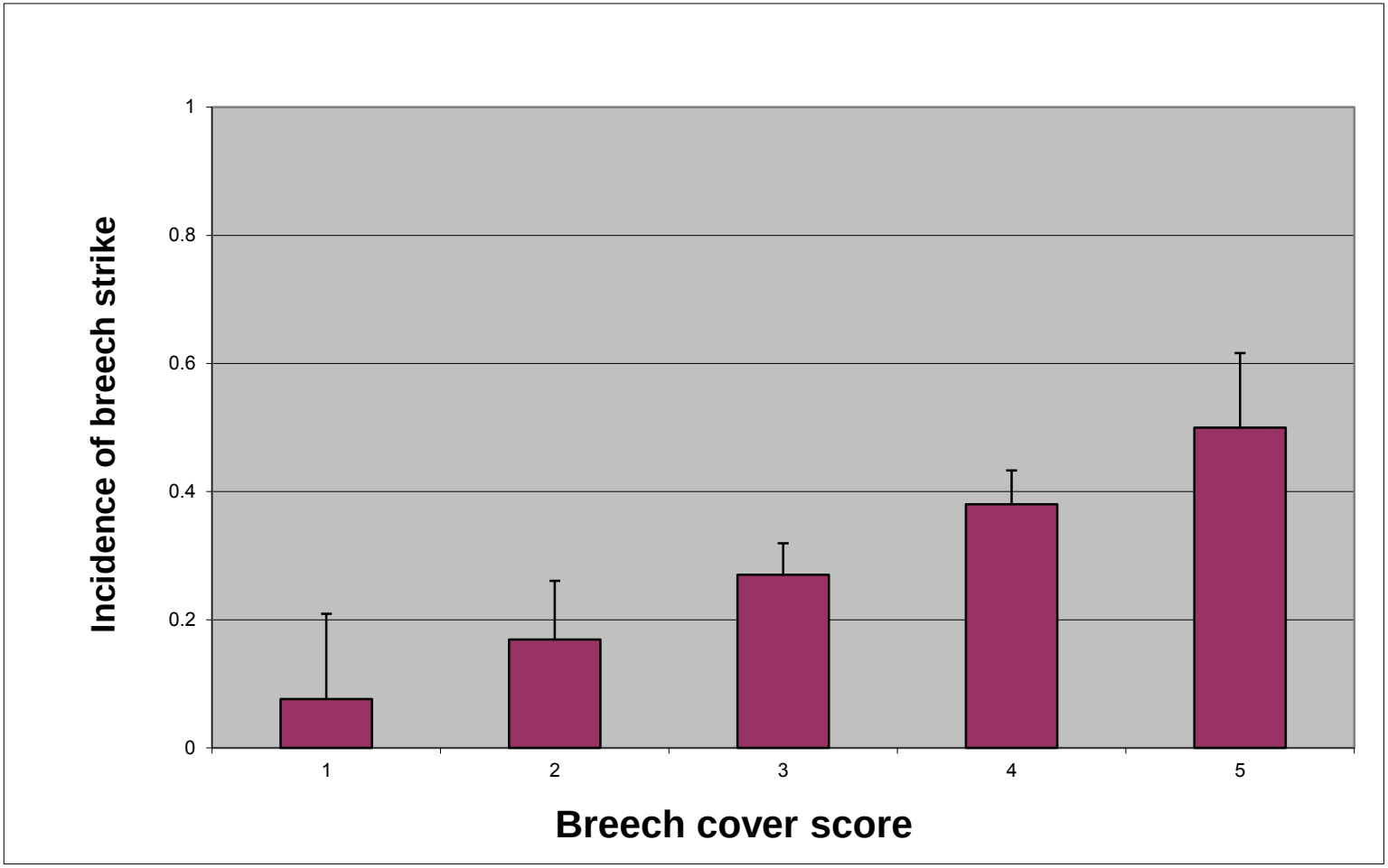
Importance of indicator traits

Breech cover at hogget age



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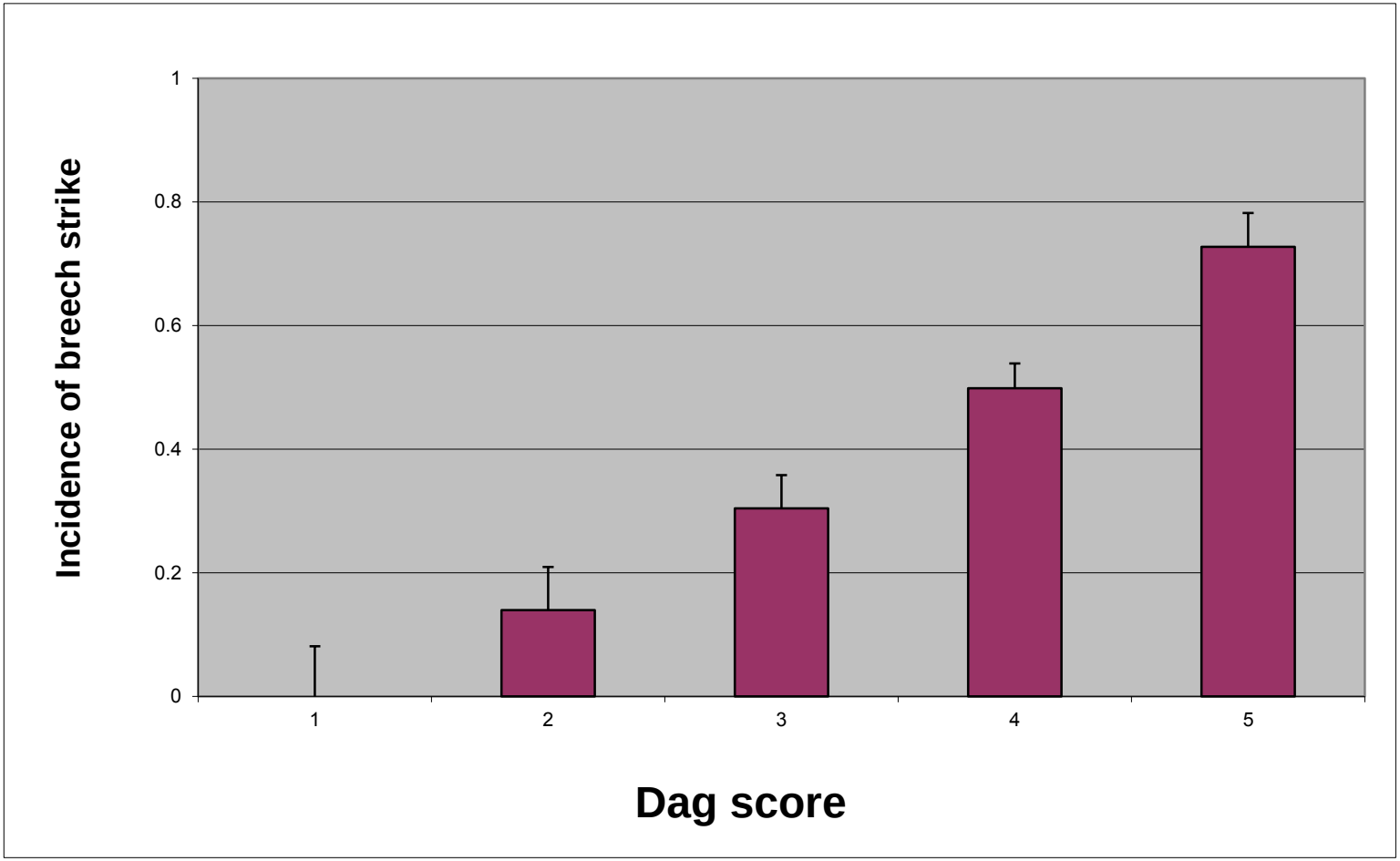
Dags at hogget age



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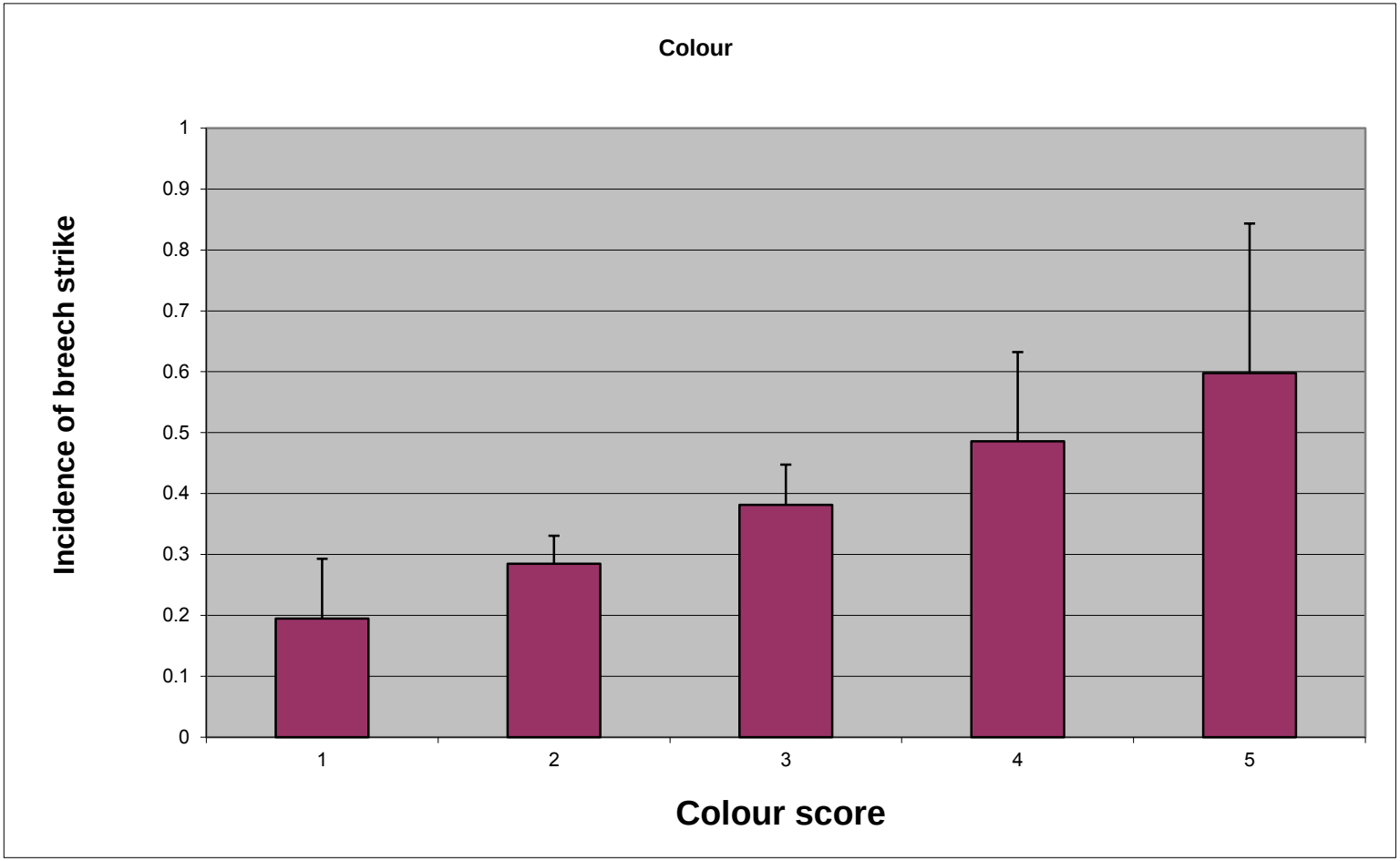
Wool colour at hogget age



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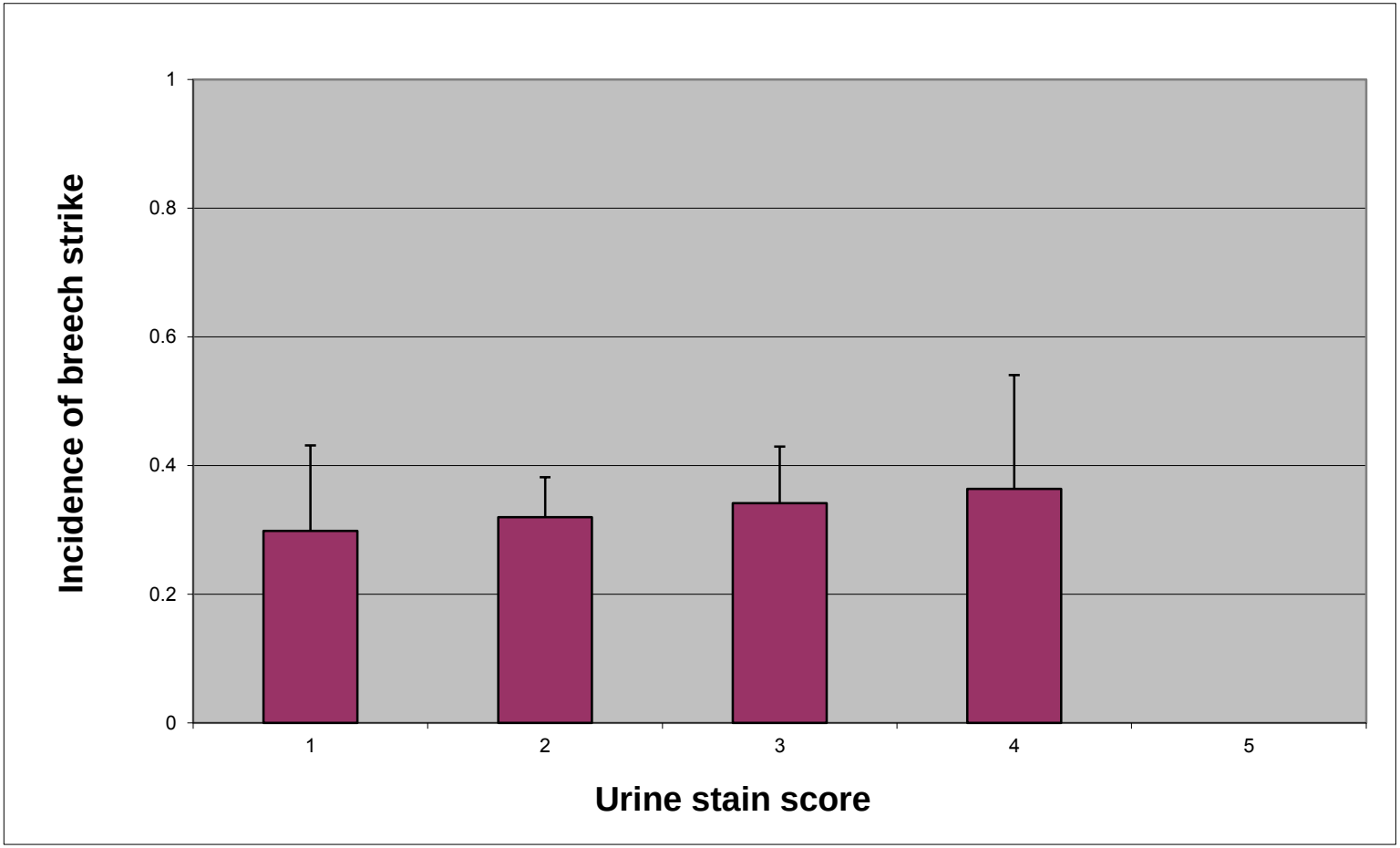
Urine stain at hogget age



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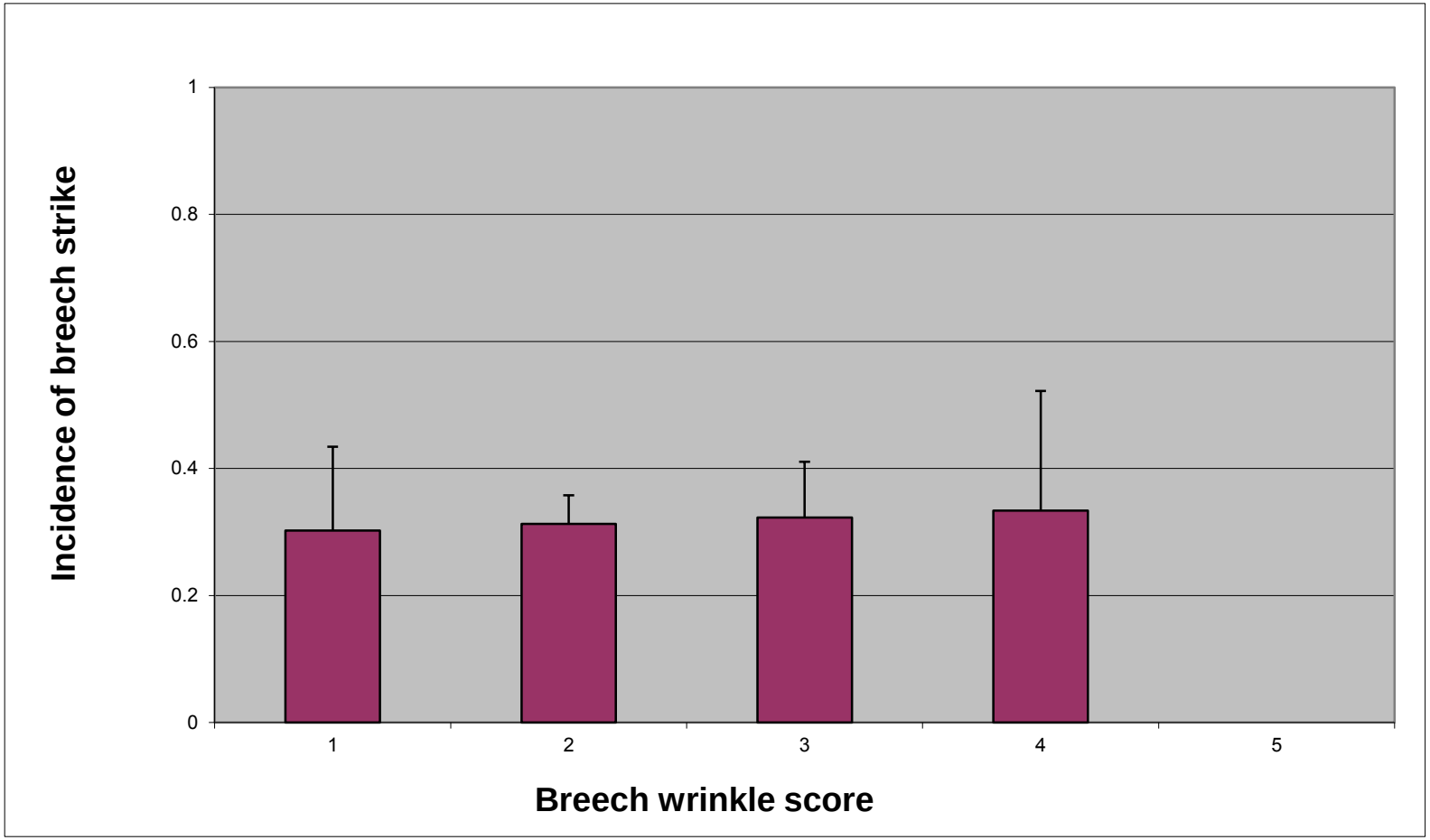
Breech wrinkle at hogget age



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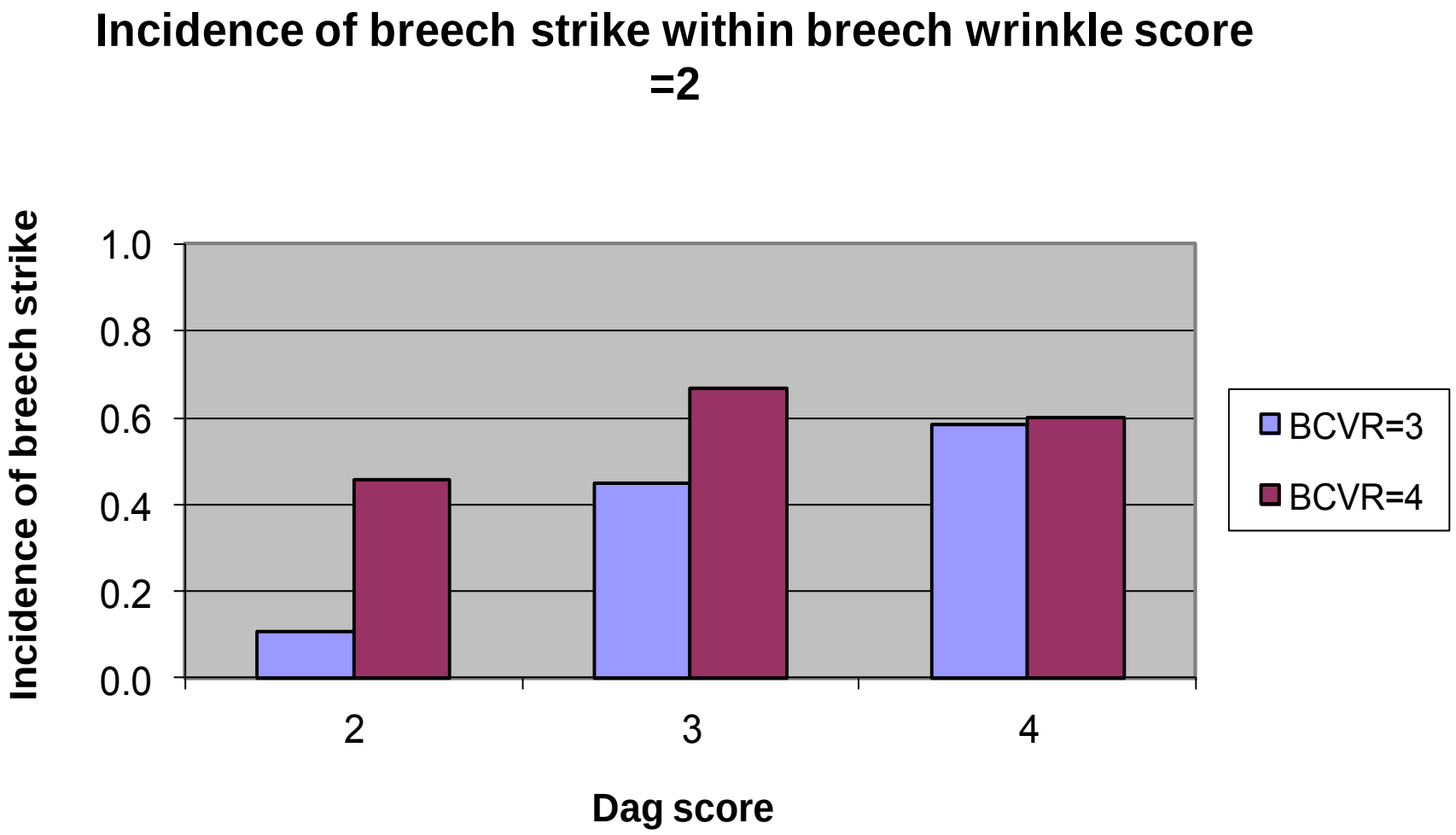
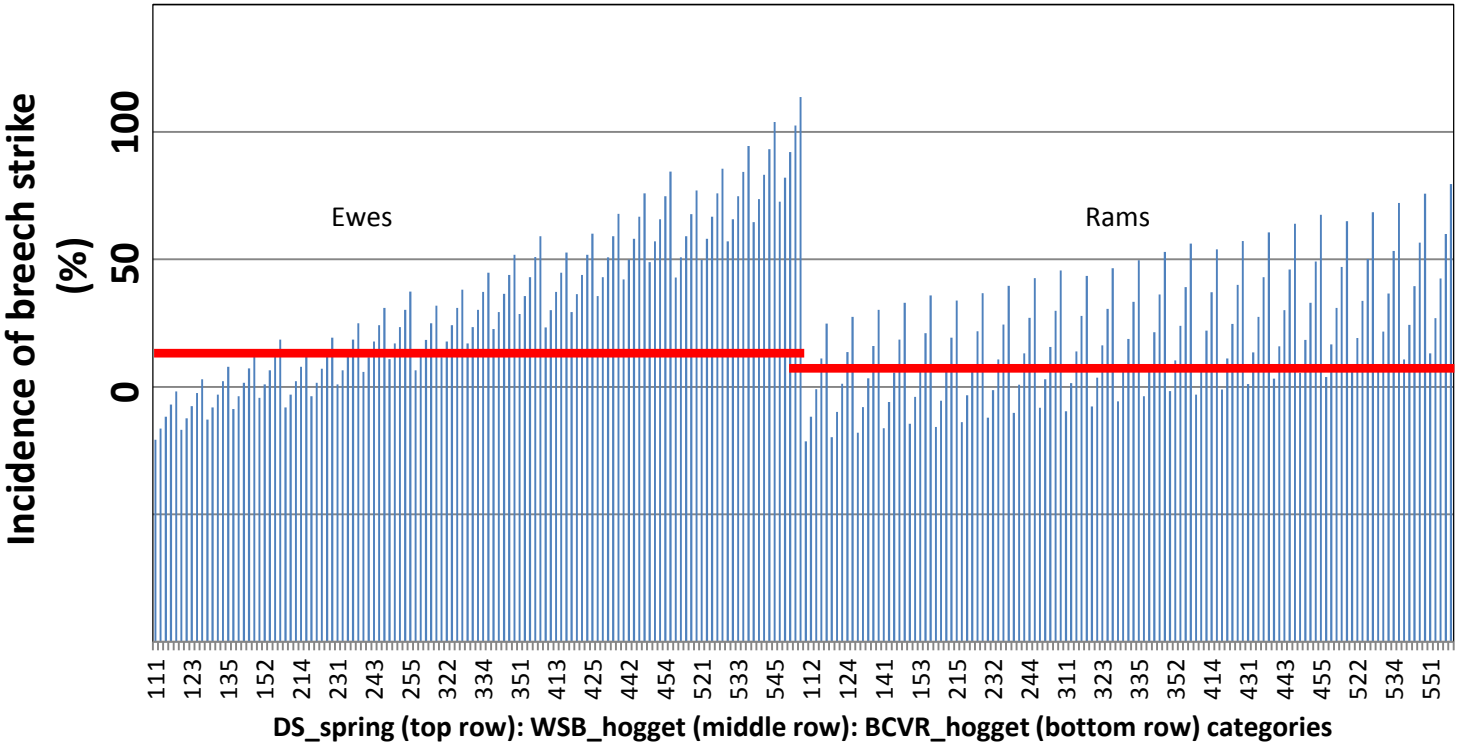
All major traits contribute

All major traits contribute



Predicted incidence of breech strike for unmulesed ewes and rams for different dag, wrinkle and breech cover scores (1 to 5)



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Inheritance of breech strike

Trait	Phenotypic variation	h^2	se
Breech_Total	0.73	0.51	0.10
Breechstr_W	0.55	0.57	0.13
Breechstr_H	0.58	0.57	0.16

Breech strike is very heritable

Relationship between weaning and hogget

$r_g = 0.44$

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Finding effective indicator traits for breech strike

Genetic response

Direct response (R) = $i \times h^2_{breechstrike} \times Variation_{breechstrike}$

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Finding effective indicator traits for breech strike

Genetic response

Correlated response
(select on indicator and gains in breech strike)

$$CR = i \times r_g \times h_{indicator} \times h_{breechstrike} \times Variation_{breechstrike}$$

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Finding effective indicator traits for breech strike

Genetic response

$$R = i \times h^2_{breechstrike} \times Variation_{breechstrike}$$

$$CR = i \times r_g \times h_{indicator} \times h_{breechstrike} \times Variation_{breechstrike}$$

$$CR/R = r_g \times \frac{h_{indicator}}{h_{breechstrike}}$$

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Effective indicator traits for breech strike

Indicator trait	Heritability	r_g	CR/R
Dags pre-hogget shearing	0.37	0.81	0.60
Urine stain at weaning	0.55	0.54	0.59
Dags in spring pre-shearing	0.37	0.77	0.57
Neck wrinkles at marking	0.62	0.38	0.47
Neck wrinkles at post-hogget shearing	0.50	0.46	0.47
Body wrinkle post hogget shearing	0.68	0.34	0.45
Dags post weaning	0.36	0.62	0.45
Dag dry matter content at yearling age	0.63	0.34	0.44
Dags at yearling age	0.63	0.34	0.44
Face cover at weaning	0.79	0.28	0.44
Dag dry matter content pre hogget shearing	0.24	0.85	0.41
Face cover at yearling age	0.73	0.27	0.39
Breech wrinkle at yearling age	0.73	0.27	0.39
Dag dry matter content in spring	0.25	0.73	0.37
Dags at weaning	0.28	0.64	0.36
Dags at marking	0.34	0.50	0.34
Neck wrinkles post weaner shearing	0.64	0.26	0.34

Effective indicator traits for breech strike

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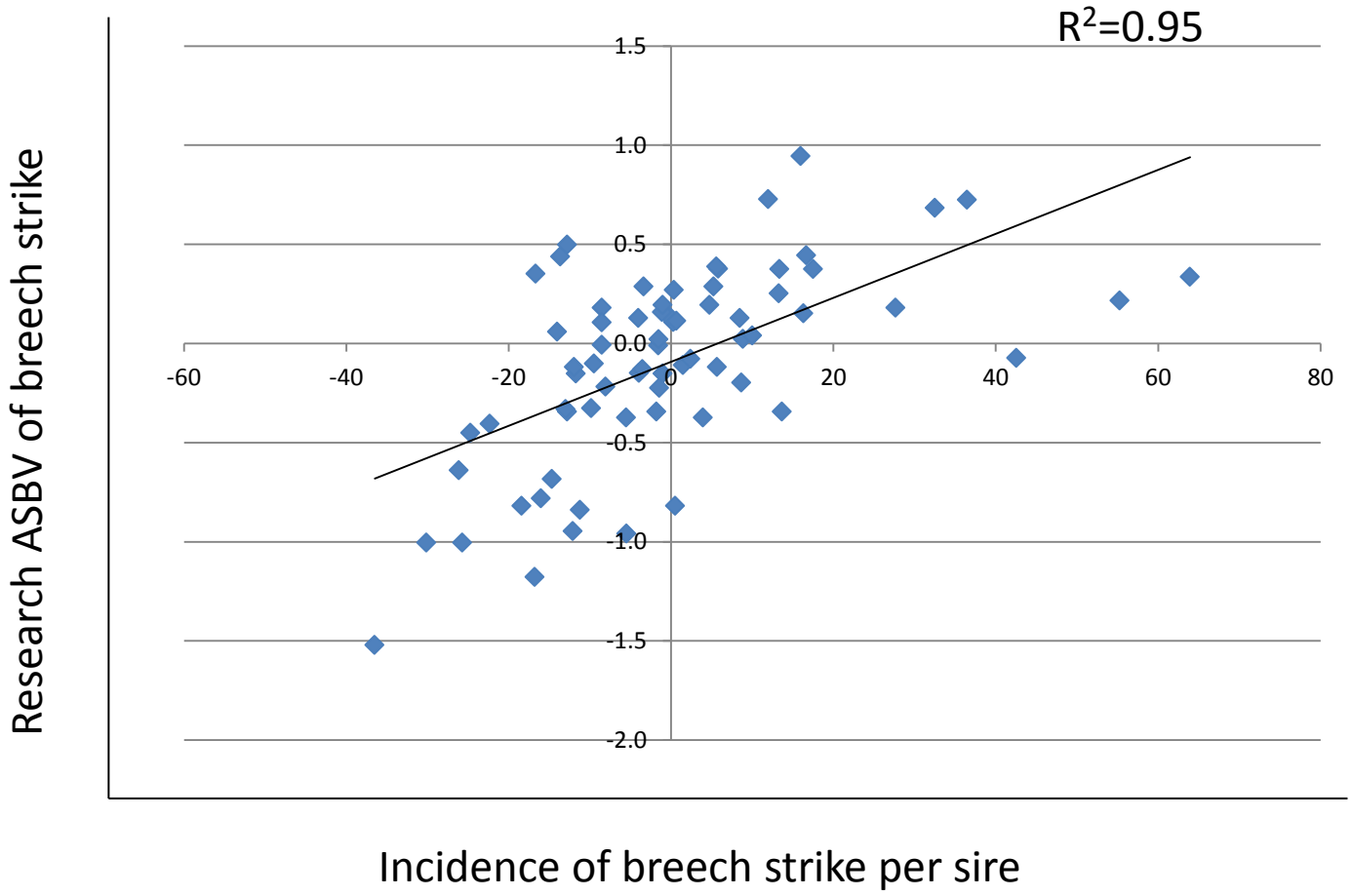
Neck wrinkles post weaner shearing	0.64	0.26	0.34

Sire relationship between research ASBV of breech strike and breech strike



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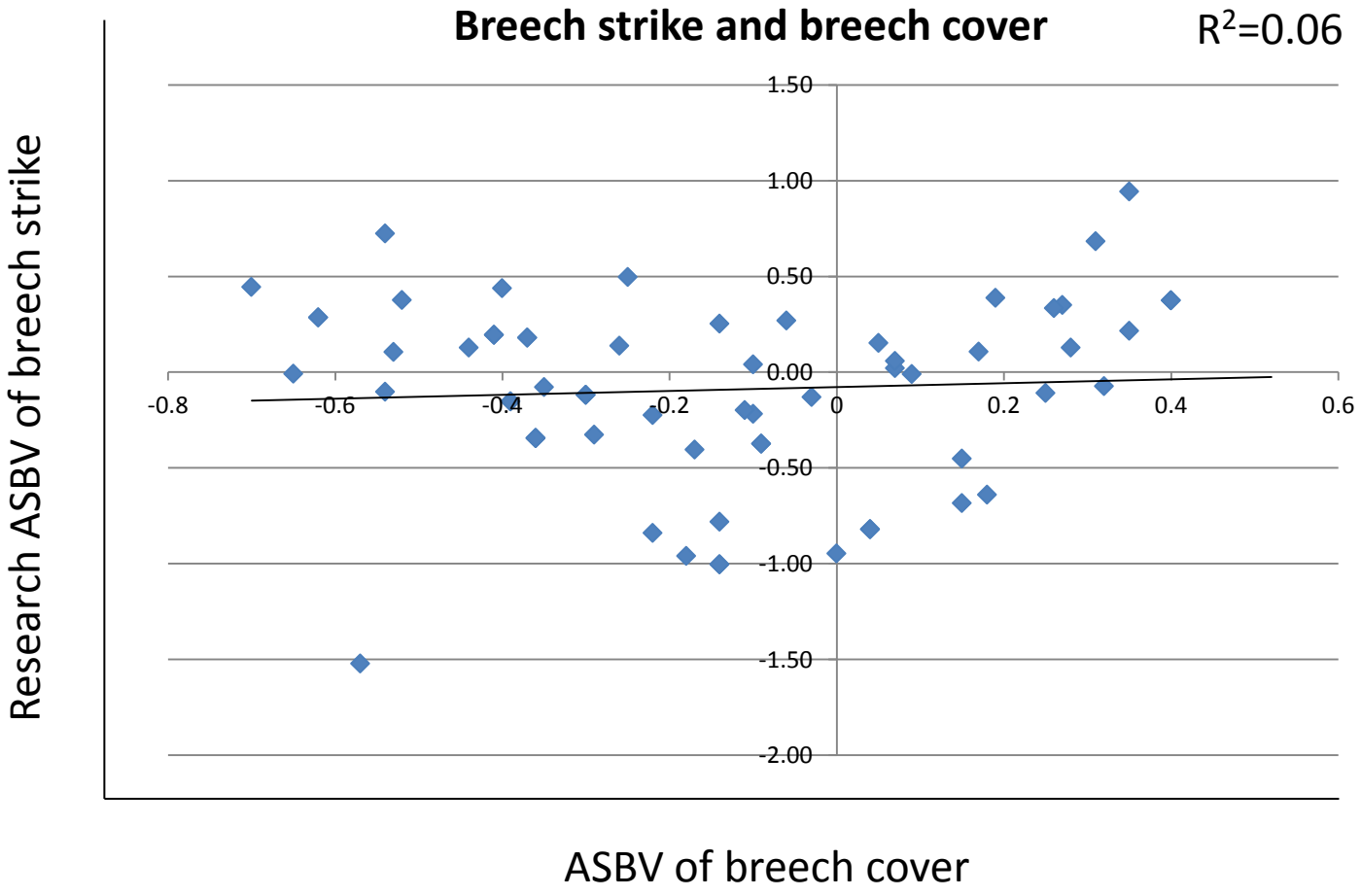
Sire relationship between breech strike and breech cover



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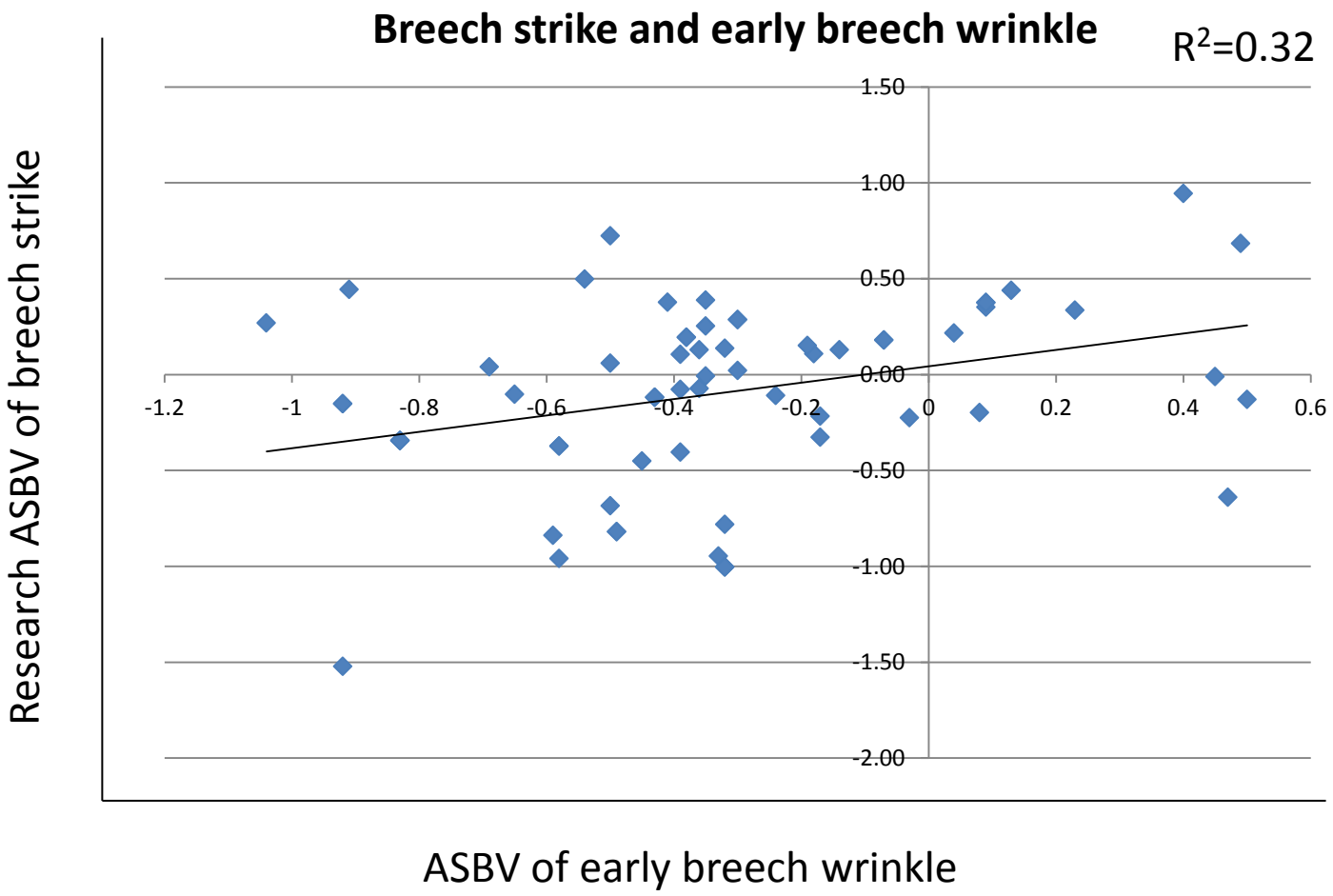
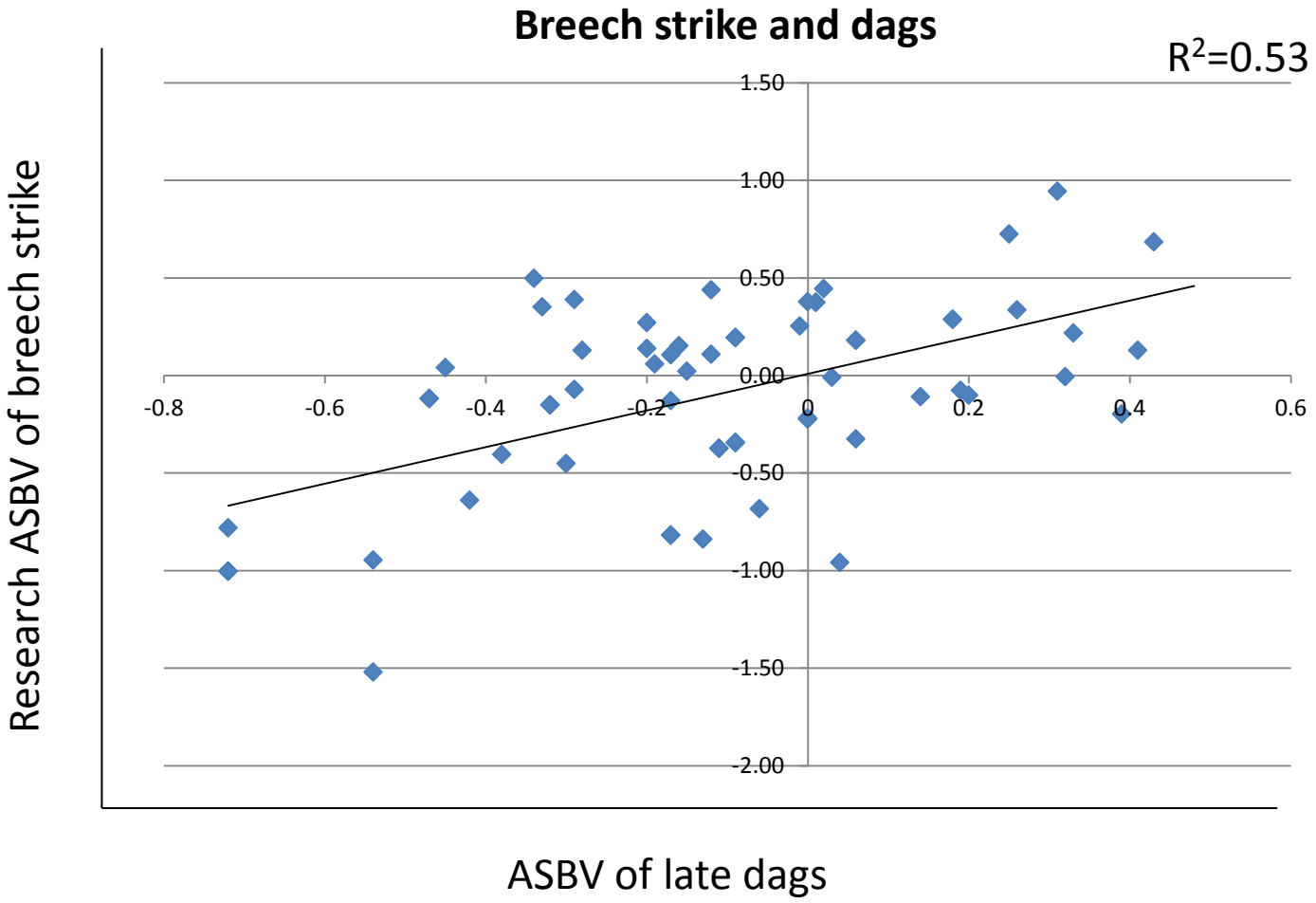
Sire relationship between breech strike and early breech wrinkle



Sire relationship between breech strike and dags



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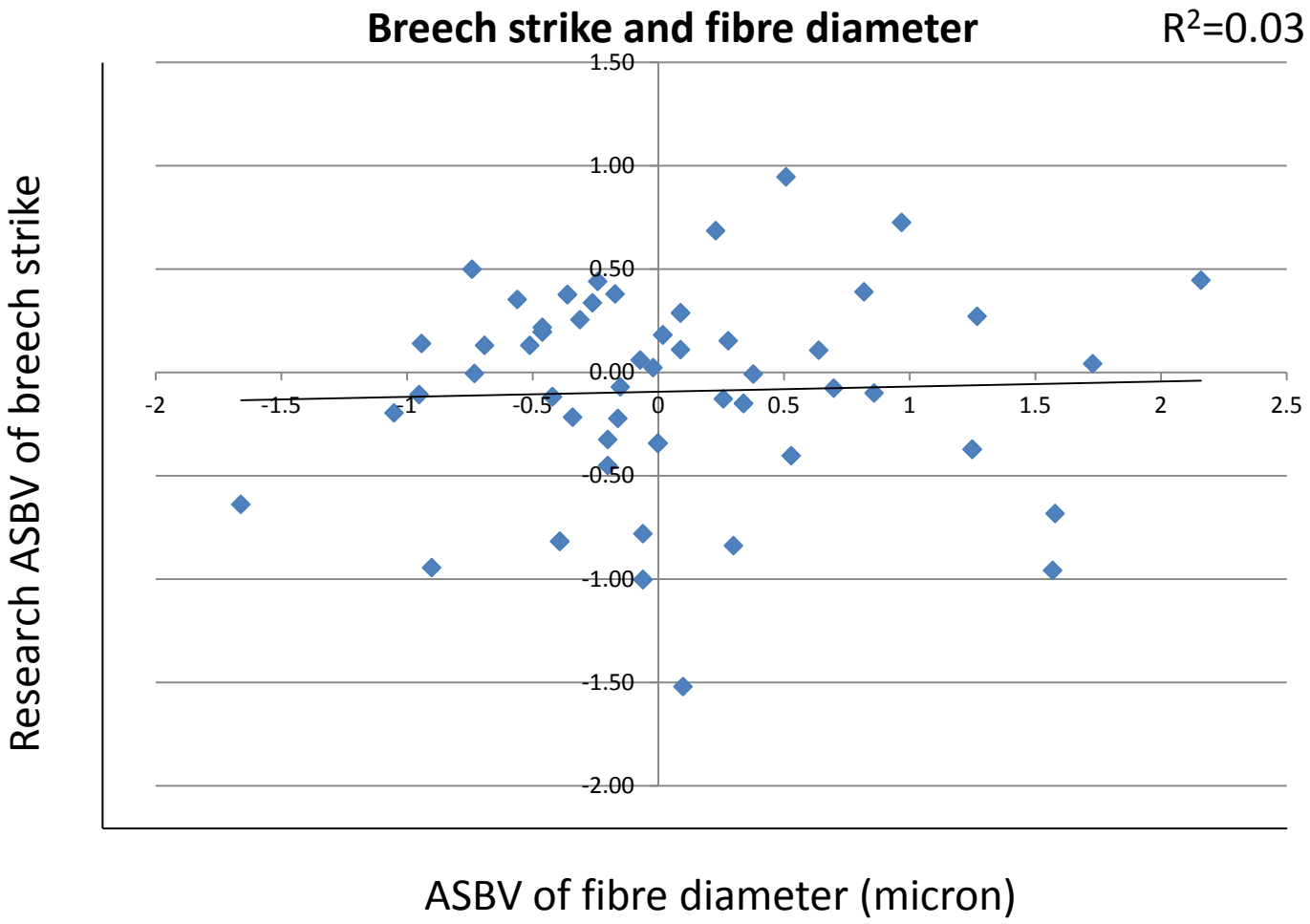
Sire relationship between breech strike and Fibre diameter



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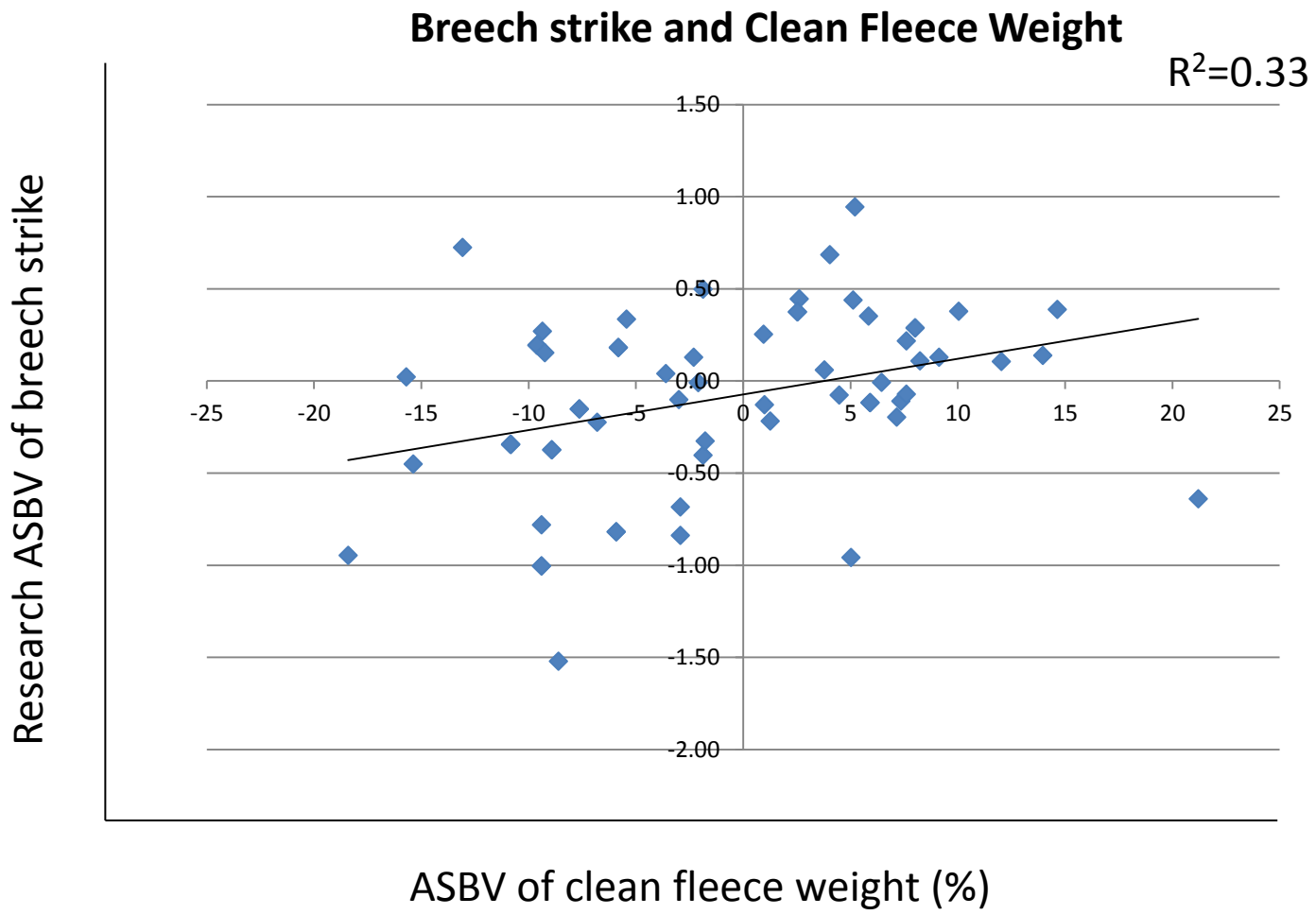
Sire relationship between breech strike and clean fleece weight



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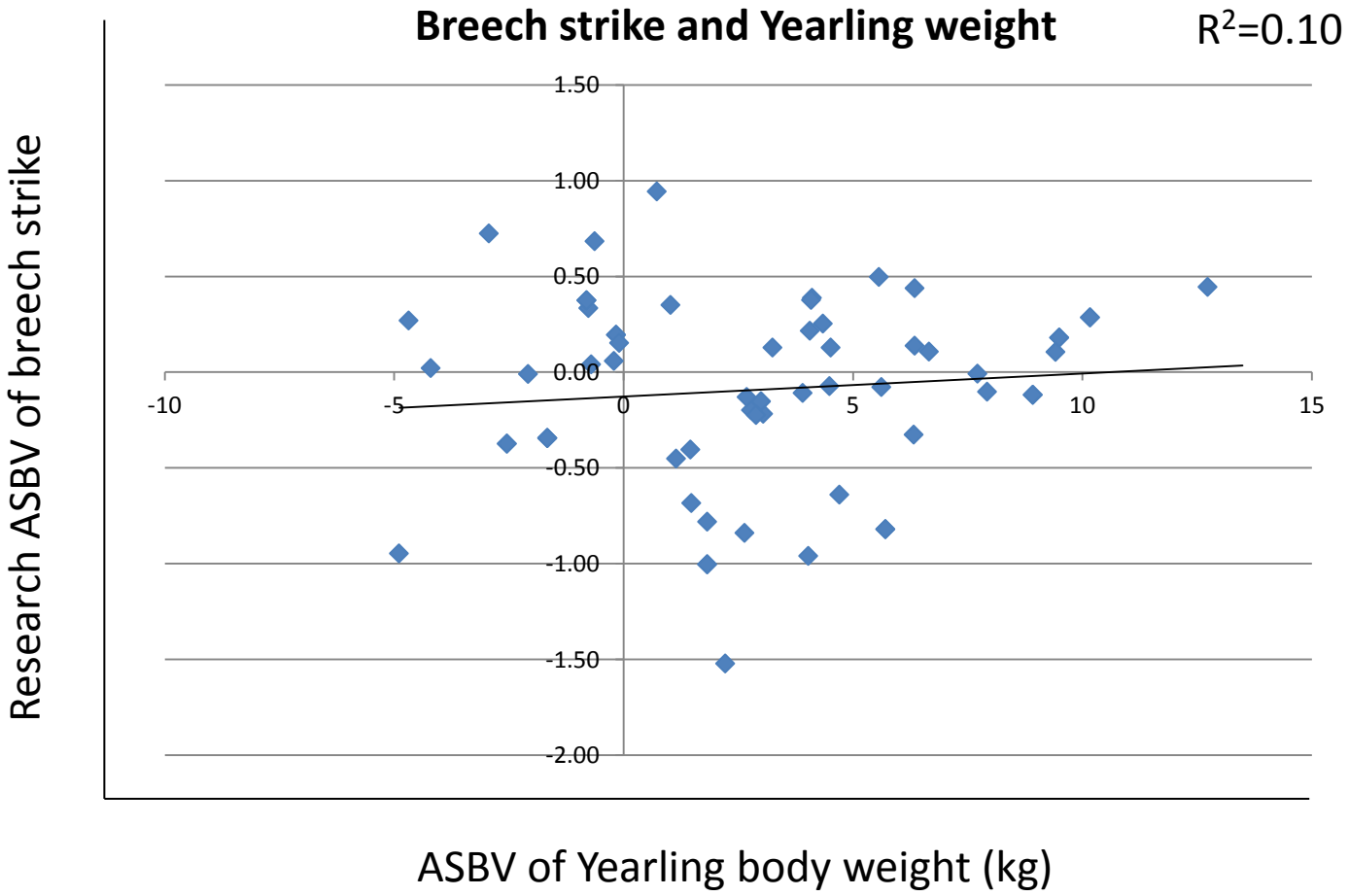
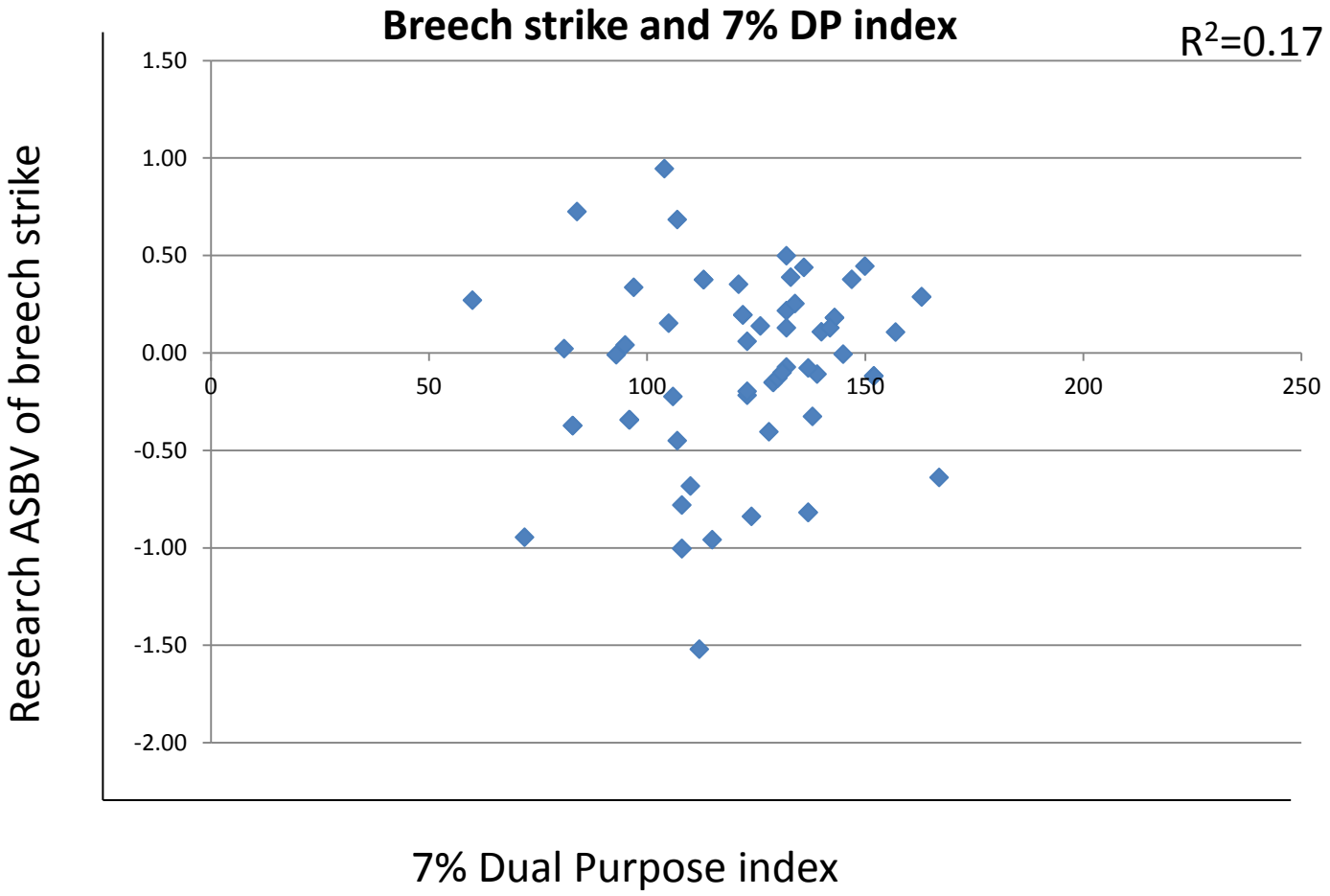
Sire relationship between breech strike and yearling body weight



Sire relationship between breech strike and 7% Dual Purpose index



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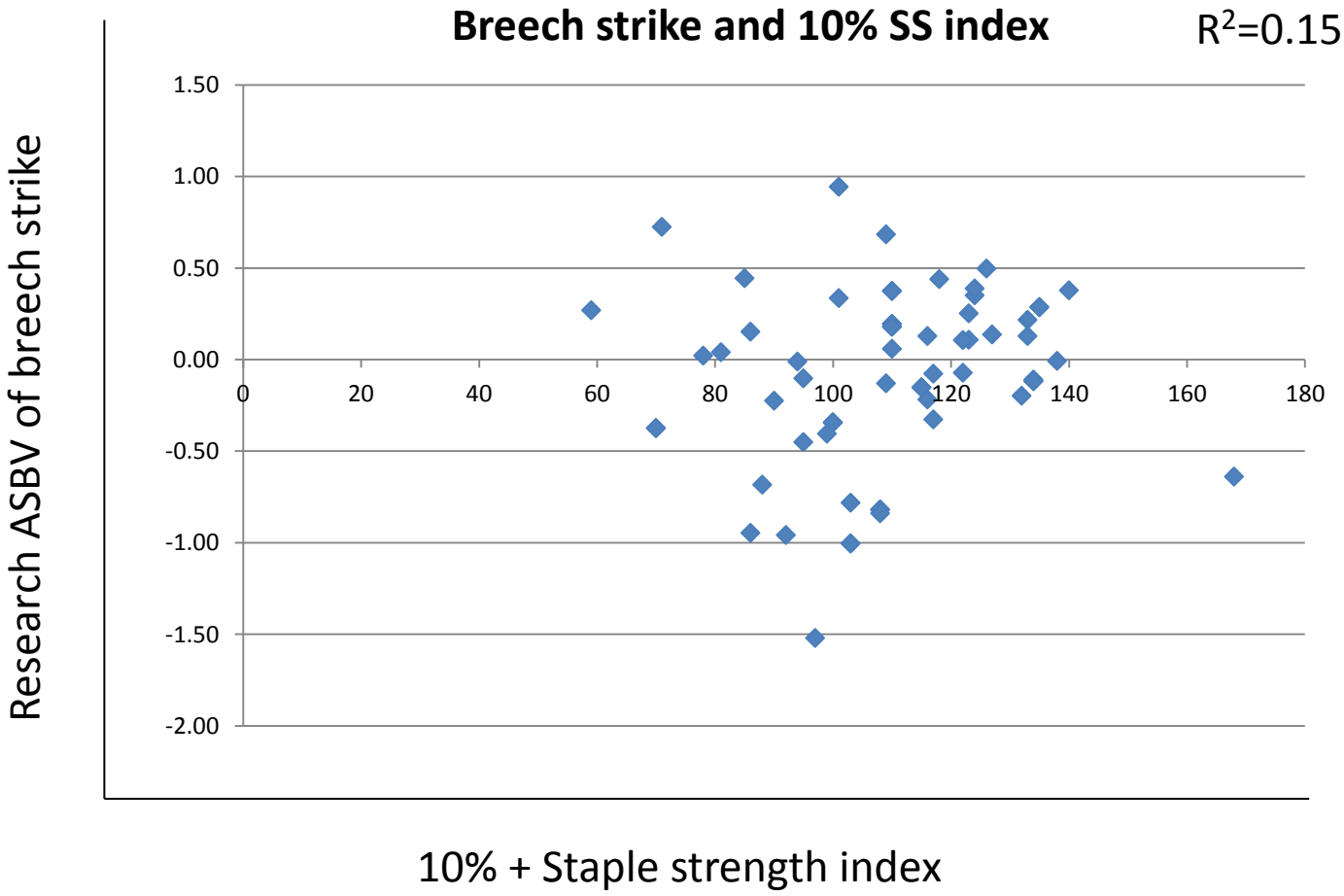
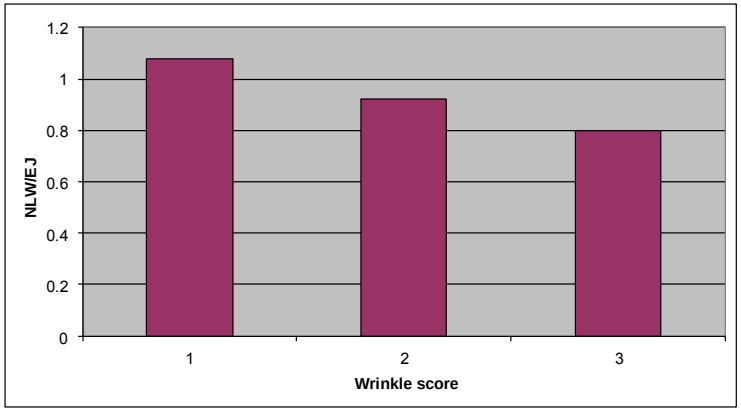
Sire relationship between breech strike and 10% + Staple strength index

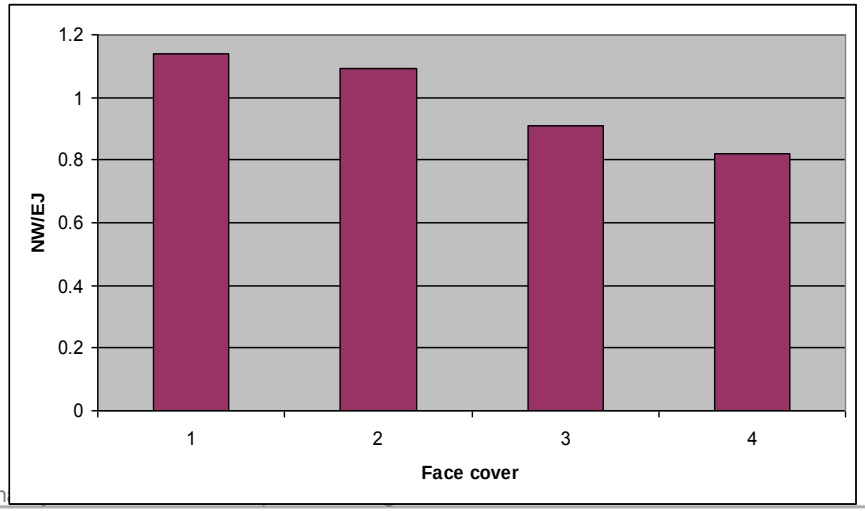


Effect of indicator traits on the number of lambs weaned per ewes joined

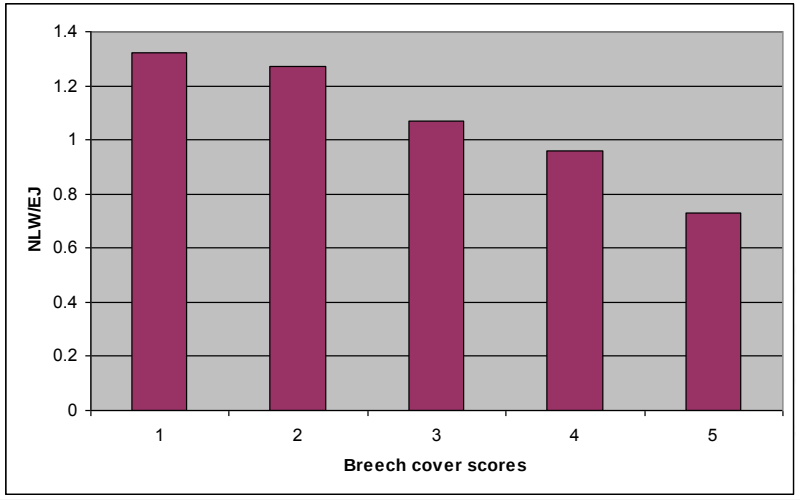
Breech Wrinkle



Face cover



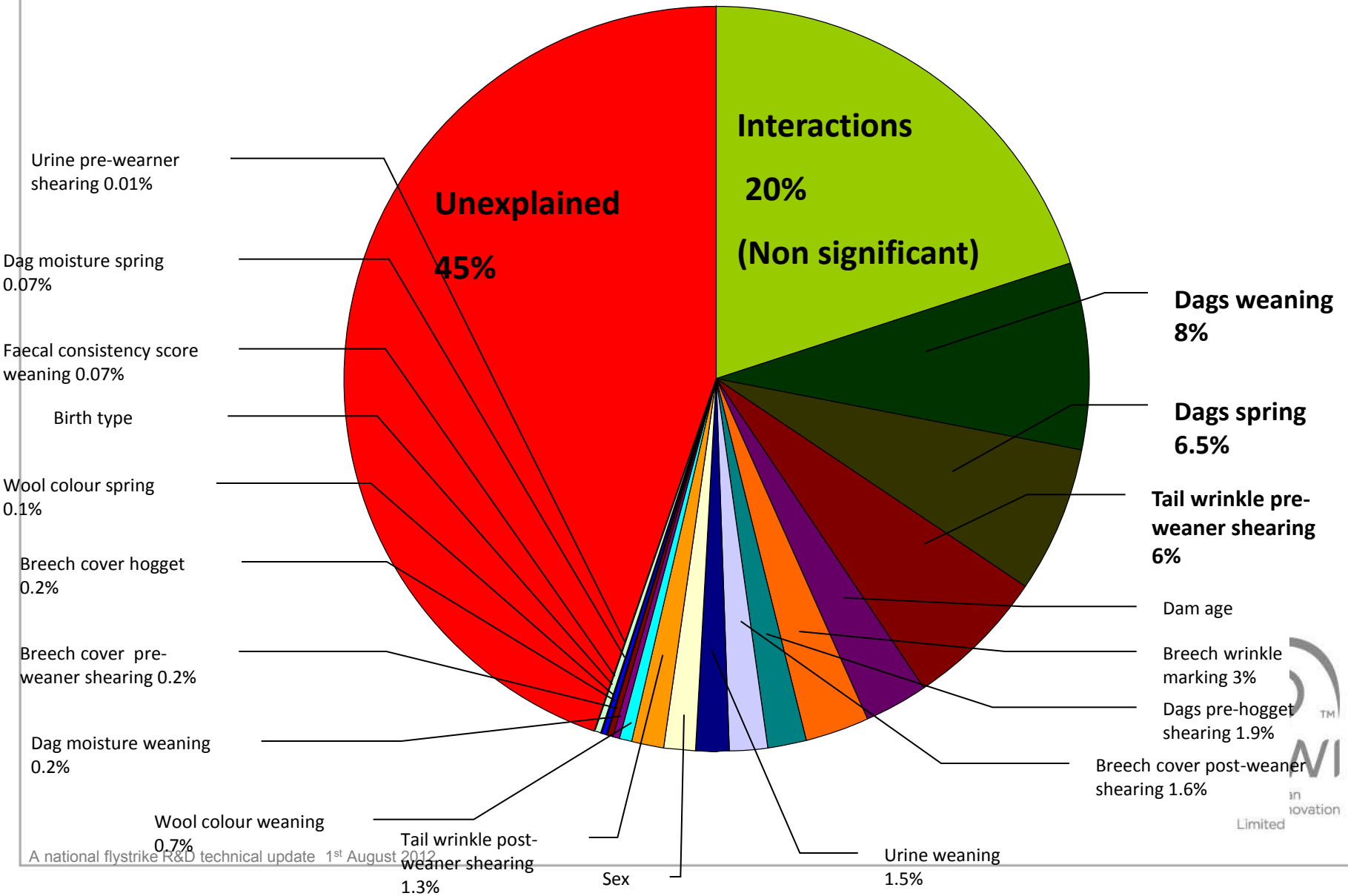
Breech cover



Gross returns from wool and lamb

Future

Proportion of variation explained in 2009



Potential traits

Skin bacteriology

Odour secretions

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Scoping study – Bacteria populations between resistant and susceptible sheep at different times

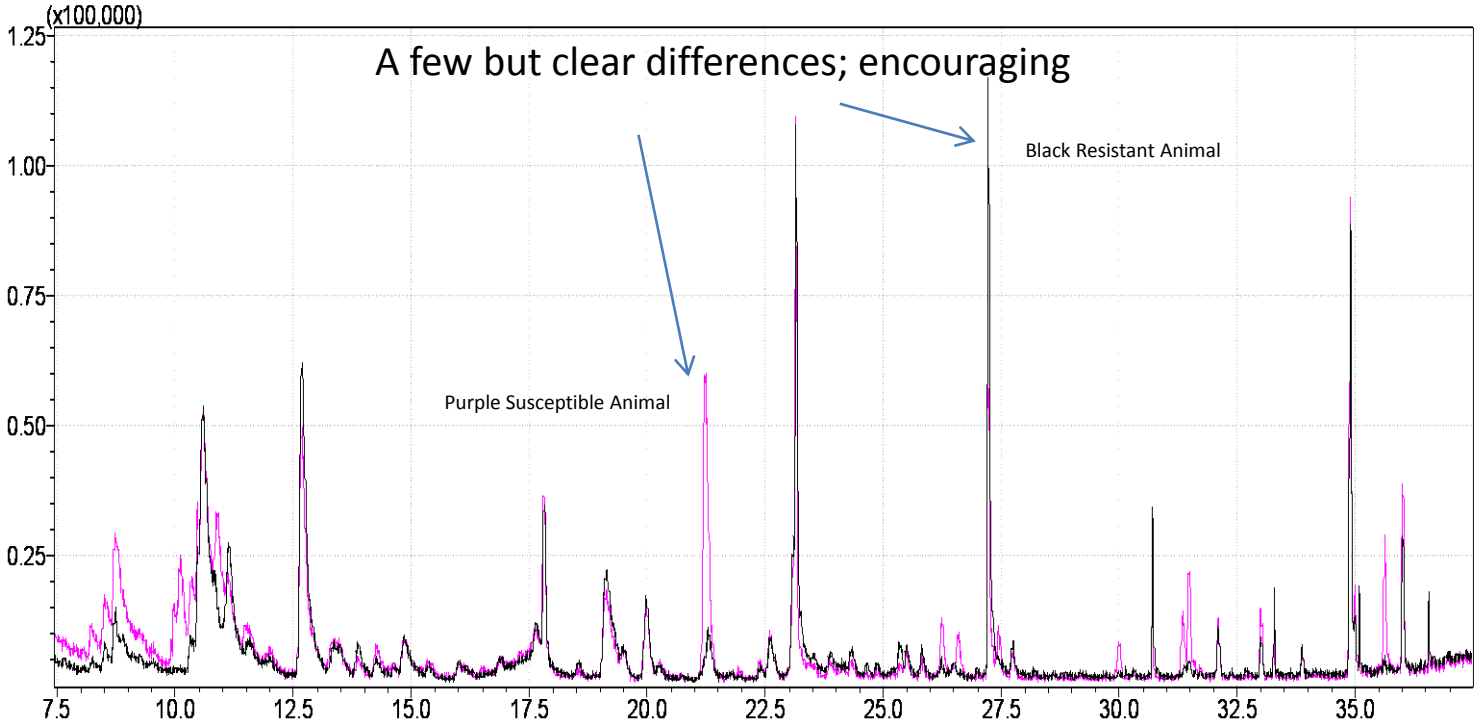
(Percentage in brackets, initial sampling from back not breech)

	Dry conditions		Wet conditions	
Resistance Level in sheep	*Resistant*	*Susceptible*	*Resistant*	*Susceptible*
Total number of isolates obtained	**99**	**93**	**89**	**87**
Bacterial species				
Staphylococcus sp.	*32 (32.2)*	*29 (31.2)*	*30 (33.7)*	*27 (31)*
Micrococcus sp.	*9 (9.1)*	*14 (15.1)*	*16 (18)*	*14 (16.1)*
Bacillus cereus sp.	*14 (14.1)*	*9 (9.7)*	*5 (5.6)*	*12 (13.8)*
Bacillus licheniformis	*18 (18.2)*	*13 (14)*	*10 (8.9)*	*11(12.6)*
Bacillus sp.	*1 (1)*	*10 (9.3)*	*6 (6.7)*	*9 (10.3)*
Neisseria sp.	*0 (0)*	*3 (3.2)*	*0 (0)*	*0 (0)*
Paeni-bacillus sp.	*0 (0)*	*0 (0)*	*0 (0)*	*1 (1.1)*
Moraxella sp.	*0 (0)*	*1 (1.1)*	*1 (1.1)*	*2 (2.3)*
Acinetobacter sp.	*7 (7.1)*	*1 (1.1)*	*7 (7.9)*	*0 (0)*
Lactobacillus sp.	*0*	*1 (1.1)*	*0 (0)*	*0 (0)*
Corynebacterium sp.	*7 (7.1)*	*1 (1.1)*	*0 (0)*	*0 (0)*
Bifidobacter sp.	*2 (2)*	*0 (0)*	*2 (2.2)*	*3(3.4)*
Elizabethkingia sp.	*1 (1)*	*0 (0)*	*0 (0)*	*0 (0)*
Sphingobacterium sp.	*1 (1)*	*0 (0)*	*0 (0)*	*0 (0)*
Enterobacter sp.	*1 (1)*	*0 (0)*	*0 (0)*	*0 (0)*
Chryseobacterium sp.	*5 (5.1)*	*0 (0)*	*0 (0)*	*1 (1.1)*
Flavobacterium sp.	*0 (0)*	*0 (0)*	*3(3.4)*	*1 (1.1)*
Actinomyces sp.	*0 (0)*	*3 (3.2)*	*3 (3.4)*	*0 (0)*
Streptococcus sp.	*0 (0)*	*0 (0)*	*1 (1.1)*	*1 (1.1)*

No significant differences between resistant and susceptible (Josh Hendry 2010)

Potential traits

Chemical components of Odour



Preliminary investigation: Gaschromatograph profile of odour components from a resistant and a susceptible animal (Joe Steer)

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Acknowledgements

Contributing Flocks – WA and NSW

Mount Barker, Western Australia

2005 drop ewe weaners:

- Billandri
- Cherry Tree Estate
- J Coole & Co
- Felspar Pty Ltd
- GSARI
- C D, D N & S H Herbert
- Kilandra Pastoral Co
- Majuba
- I & D Robertson
- W M & V A Webb

Ewes for 2006 mating:

DAFWA Research Stations:

- Badgingarra
- GSARI
- Mt Barker

Sire flocks 2006 mating:

- Calcookara (Cojack)
- Centre Plus
- Cherry Tree Estate
- Cranmore Park
- Rylington Merino
- Toland
- Yeendalong Farm (Abbott)
- GSARI (control)

Sire flocks 2007 mating

- Wallinar
- Margan
- Centre Plus WA
- Calcookara (Garreth)
- Majuba
- Rylington Merino

Armidale, New South Wales

2005 drop ewe weaners:

Auchen Dhu Park
Cressbrook
Gostwyck
Goyarra Poll
Hazeldean
Mirramoona
Quambaloo Poll
Ruby Hills
Whyworry Park
Yalgoo

Ewes for 2006 mating:

CSIRO Armidale resource flock
(fine wool base)

Sire flocks 2006 mating:

- Calcookara
- Centre Plus
- Cressbrook
- Parkdale
- Quambaloo Poll
- Ruby Hills
- Severn Park
- Toland
- T13 (control)

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