Breeding for breech flystrike resistance Armidale NSW

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

Summary

Flock structure
Fleece traits
Breech strike rates
Indicator traits and breech strike
Components of wrinkle
Ewe physiological state
Indicator traits and production traits
Reproduction rates in 2012
Other Activities

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Flock structure 2011 onward

- End 2010 flock design was changed
  - from 3 selection lines to 2 (resistant and susceptible)
  - Primary selection criterion was breech flystrike history, then indicator traits
  - Wool type restricted to Fine/Superfine
- Continued phenotyping for flystrike, flystrike indicators, production traits

	Breech flystrike	
Indicator phenotype (breech wrinkle)	Struck BUT low wrinkle (28)	Not struck AND low wrinkle (175)
	Struck AND high wrinkle (95)	Not struck BUT high wrinkle (109)

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Flock structure

Initially very wide range in sheep/wool types - Breeding flock

GFW mean 3.6kg, range 2-6.5kg

MFD mean 17.4 µm, range 14-24 µm

CURV mean 102 º/mm, range 60-150 º/mm

Selection process removed broad edge

ASBVs at selection Early in 2011

	ASBVs (09/03/2011 run)										
Line	**YWT**	**YCFW**	**YFD**	**YDCV**	**YCUR**	**YSL**	**YSS**	**EBWR**	**EBCOV**	**LDAG**	**10%SS**
Resistant	2.2	-8.7	-1.5	-1.5	6.4	1	3	**-0.47**	-0.08	-0.08	119
Susceptible	0.0	-11.1	-2.0	-1.1	9.9	-5	3	**0.43**	-0.02	0.06	121
SG Superfine mean 2010	-0.1	-5.2	-2.1	-0.7		-3.1	-0.1	0.0			129

Fleece traits

- Breeding flock fleece traits at 2011 shearing
- Wool type now fits the Superfine/Fine category, but there remains significant difference between Resistant and Susceptible lines in some fleece traits

Trait	Susceptible	Resistant	P
BWT (kg)	45.39 (0.42)	47.62 (0.37)	***
GFW (kg)	3.67 (0.05)	3.55 (0.04)	*
CFW (kg)	2.99 (0.04)	2.90 (0.04)	*
MFD (µm)	16.91 (0.10)	17.42 (0.09)	***
CVD (%)	17.00 (0.16)	16.65 (0.14)	ns
CURV (º/mm)	99.53 (0.90)	97.47 (0.81)	ns
SL (mm)	83.57 (0.86)	87.94 (0.77)	***
SS (N/kTex)	38.46 (0.67)	40.28 (0.60)	ns

*** P<0.001, * P<0.05, ns not significant

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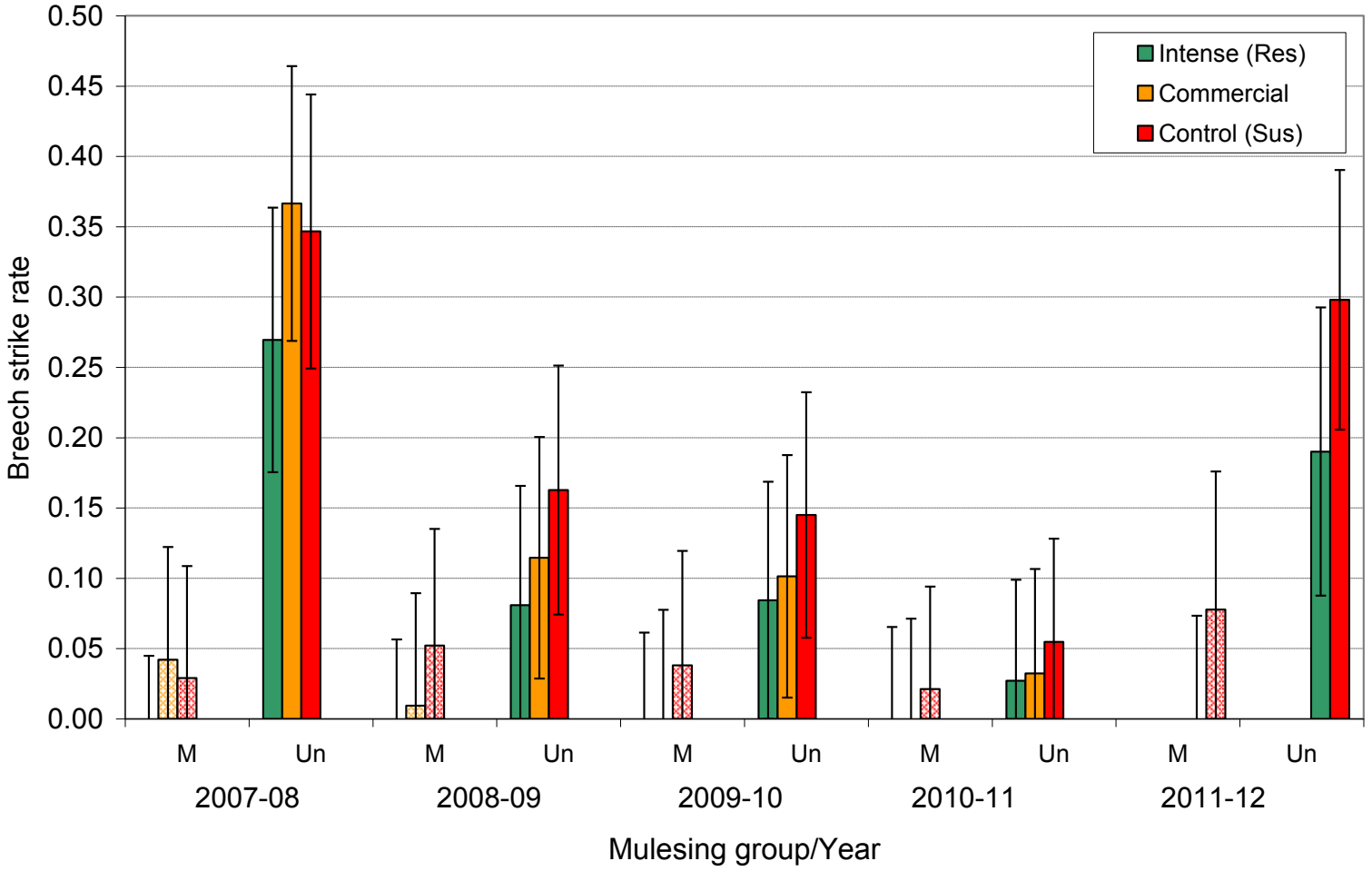
Breech strike in breeding ewes

Selection line and mulesing group effects on breech strike rate in breeding ewes



(back-transformed means, error bars are approximate s.e.'s)

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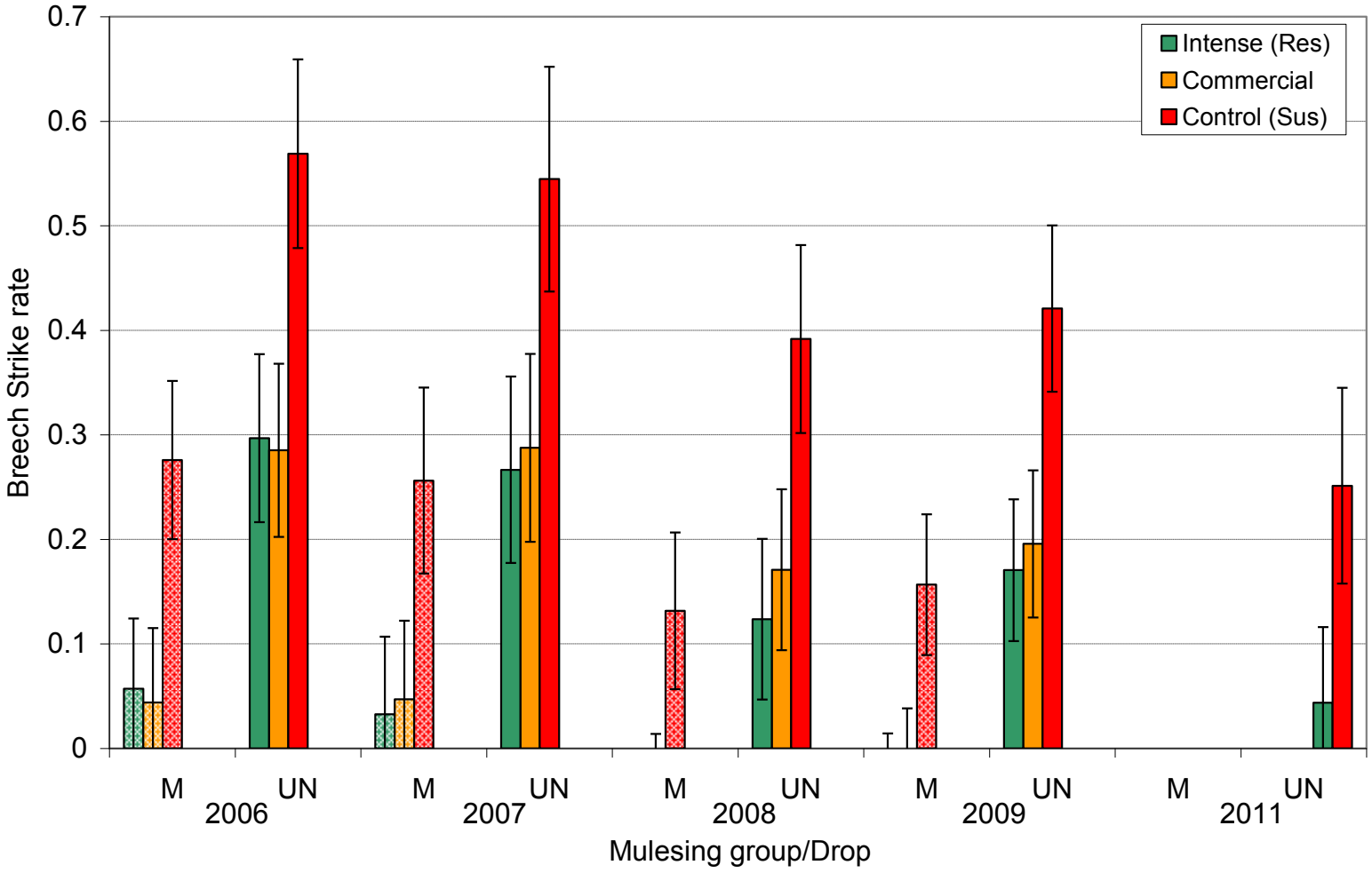
Breech strike in weaners

Selection line effect on breech strike rate in 2011 drop weaners



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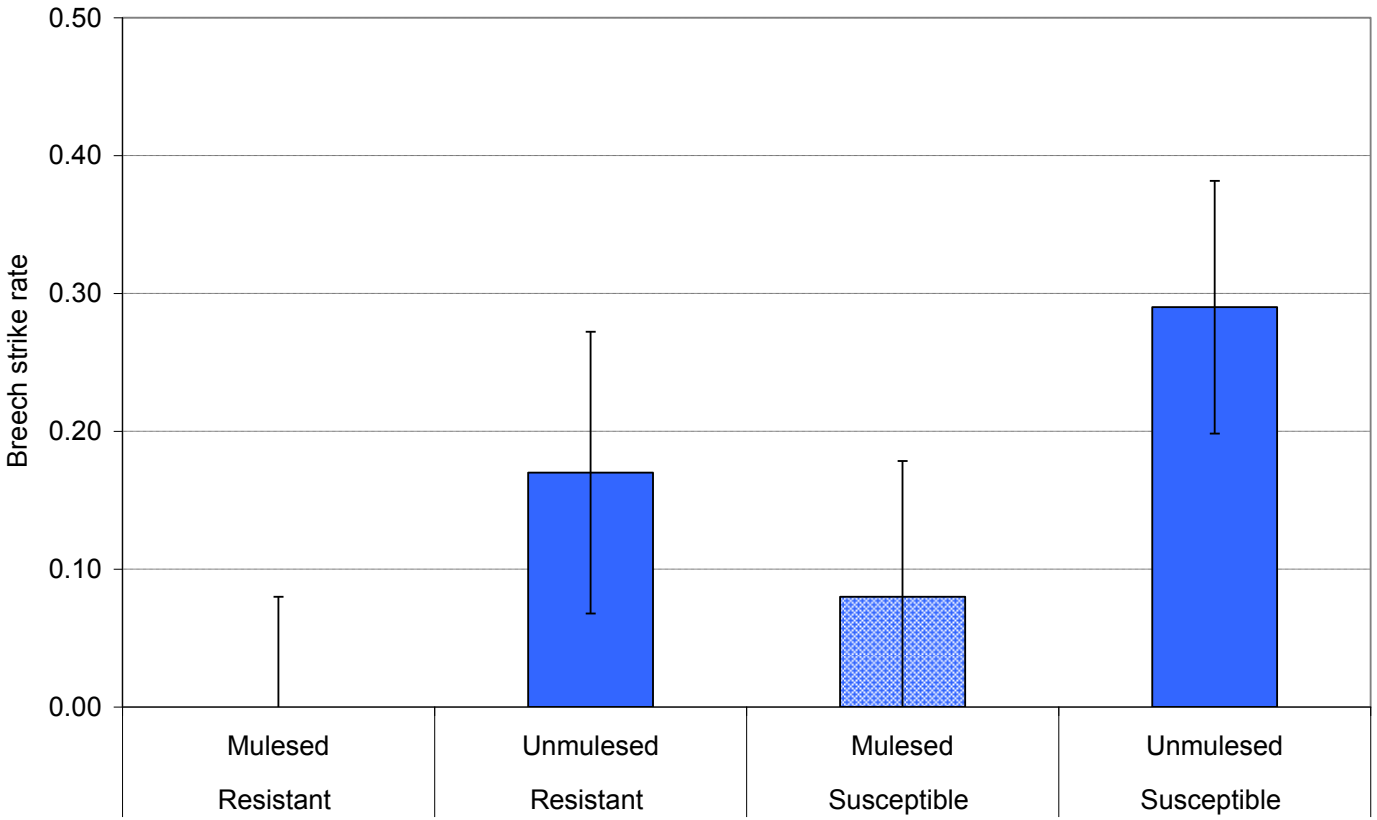
Breech strike 2011-12

Selection line and mulesing group effects on breech strike rate in breeding ewes



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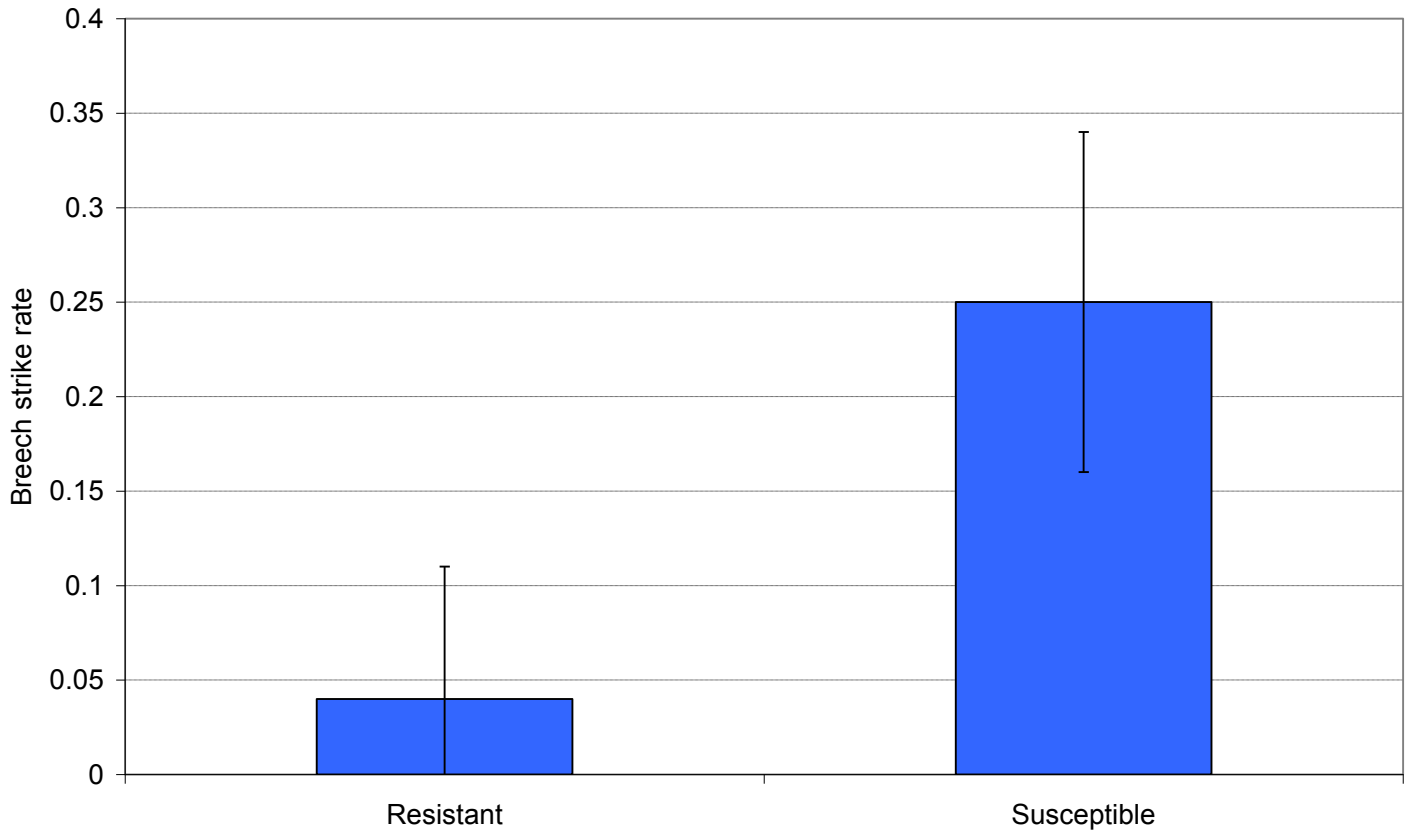
Breech strike 2011-12

Selection line effect on breech strike rate in 2011 drop weaners



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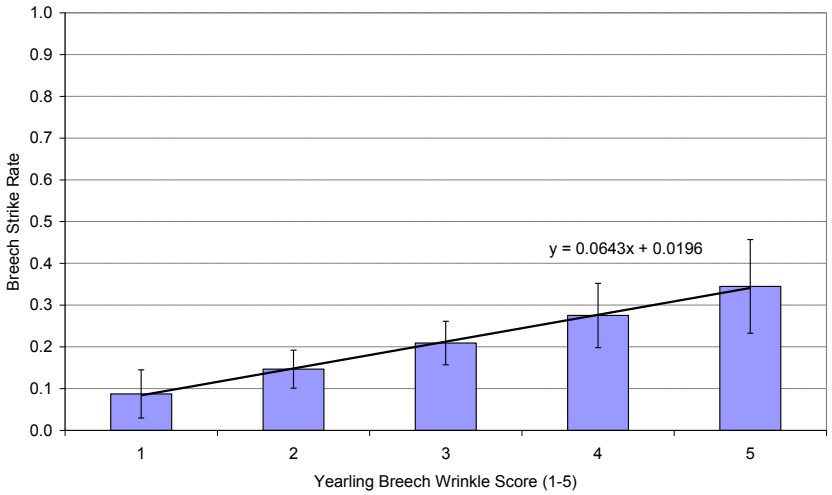
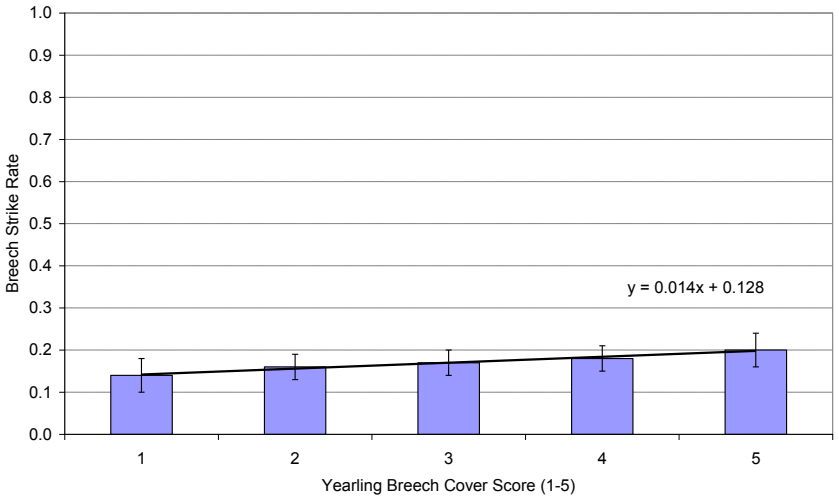
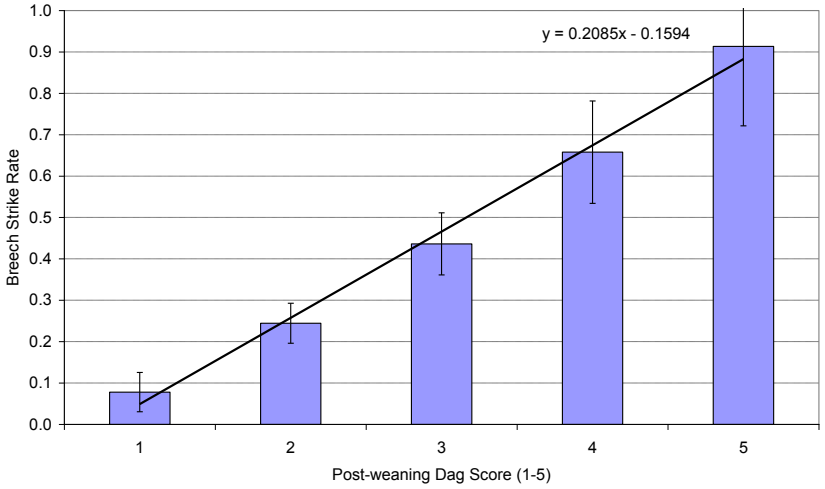
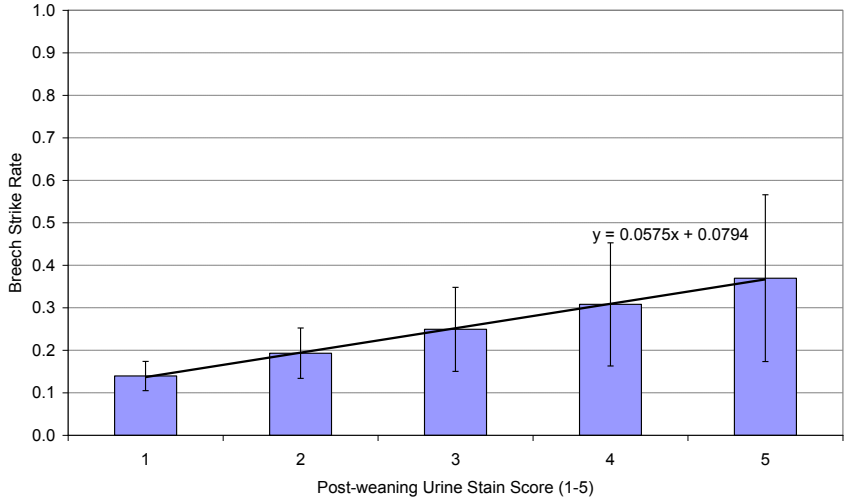
Indicators and breech strike – Yearling Age 06-11









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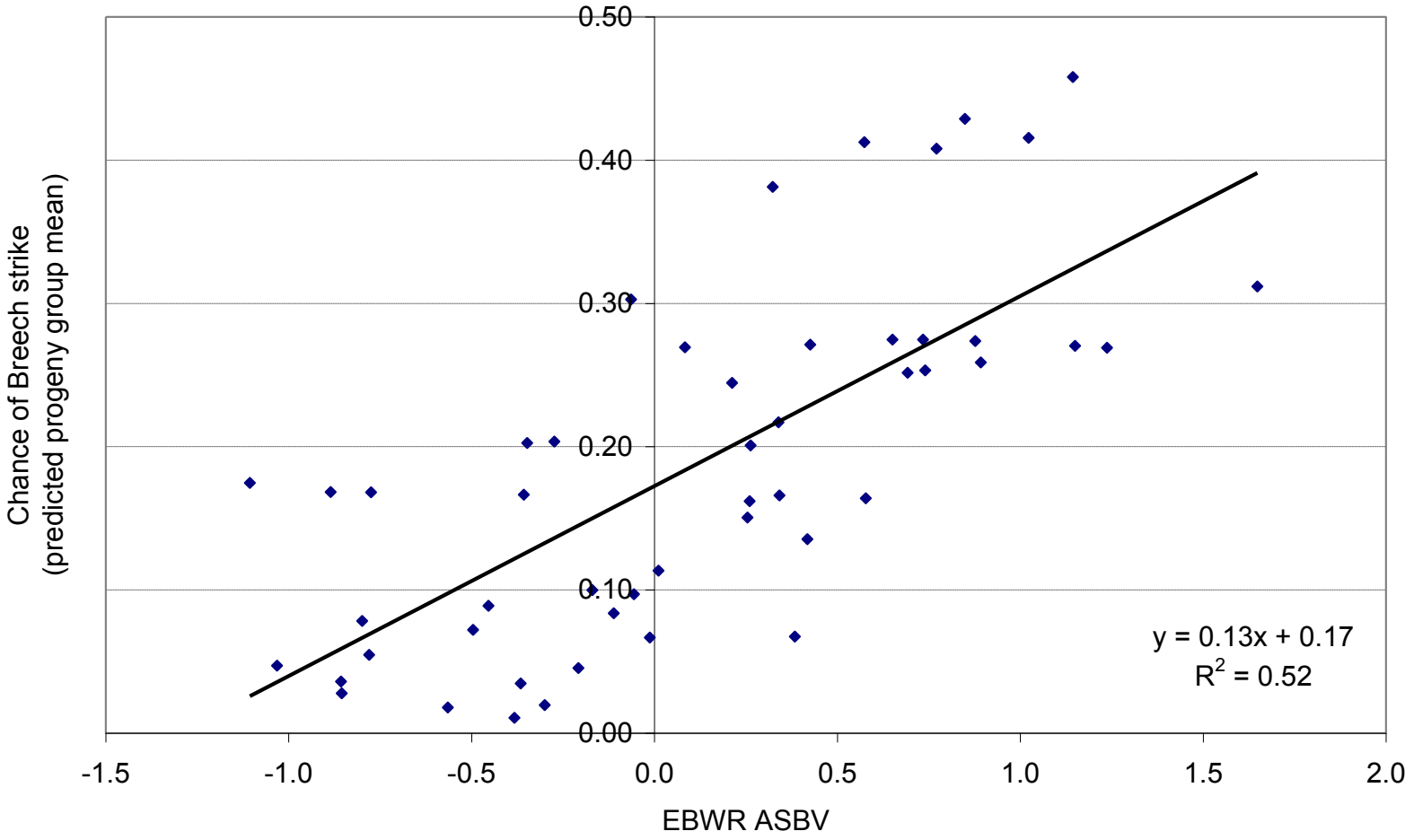
Breech strike and wrinkle

Sires used at Armidale 2006-2011 inc.



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Components of wrinkle

‘horse-shoe’ ‘bat wings’ ‘inner folds’ ‘outer folds’

- All 4 component traits significantly different between
  - mulesed & unmulesed ewes
  - between resistant & susceptible ewes (all $P<0.001$)

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Components of wrinkle

Phenotypic variance (V_p) and phenotypic correlations among breech strike, breech wrinkle and the four components of breech wrinkle (all s.e.0.02-0.05)

Trait	V_p	BRWR	Horse-shoe	Bat wings	Inner-fold	Outer-fold
wBRSTR	0.16	0.26	0.23	0.19	0.15	0.21
BRWR	0.56		0.63	0.42	0.48	0.71
Horseshoe	0.61			0.48	0.33	0.50
Bat wings	0.50				0.30	0.43
Inner-fold	0.44					0.45
Outer-fold	0.79					

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Components of wrinkle

- Independently, the wrinkle component traits were associated with breech strike incidence
- Highest correlations:
  - overall breech wrinkle x breech strike (0.26)
  - 'horse-shoe' x breech strike (0.23)
  - 'outer folds' x breech strike (0.21)

  (interesting given >90% of strikes start on breech rather than tail)
- No components significantly added to prediction of breech strike over and above overall breech wrinkle score currently used by industry

- Conclusion: current wrinkle score method used by industry is suffice

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Ewe physiological state

- Anecdotal evidence for increasing bareness with age
- Has implications for assessing breech traits on adult sheep (and why its better to assess breech traits on young animals)
- Possibility for manipulation of breech bareness?

- 2011 ewes measured pre-mating (Mar), late pregnancy (Jul), post-weaning (Jan) for breech wrinkle (BRWR), breech cover (BCOV), crutch cover (CCOV), breech bare width (BW) and depth (BD)
- Reproduction traits:
  - initially Fertility (pregnant/not), fecundity (litter size born), and lambs weaned in current year and previous years
  - For final analyses condensed to combined fertility & lambs weaned in current and previous years (4 levels, dry, lambed & lost, reared once (or 1), reared twice or more (or 2)

Ewe physiological state

- Ewes were least wrinkly in late pregnancy (not surprising, evidence for stretching with increasing abdominal dimensions?)
- Crutch cover was lowest post-weaning – suggests association with lactation?
- Breech bareness was lowest at late pregnancy (contrasts with breech wrinkle result)
- Previous reproductive performance was a non-significant effect on all traits
- But, the flock was not mated in 2010 (the immediate previous year) so this work is being repeated in 2012
- Reproductive performance in the current year was significant or approached significance for all traits except Bare Width

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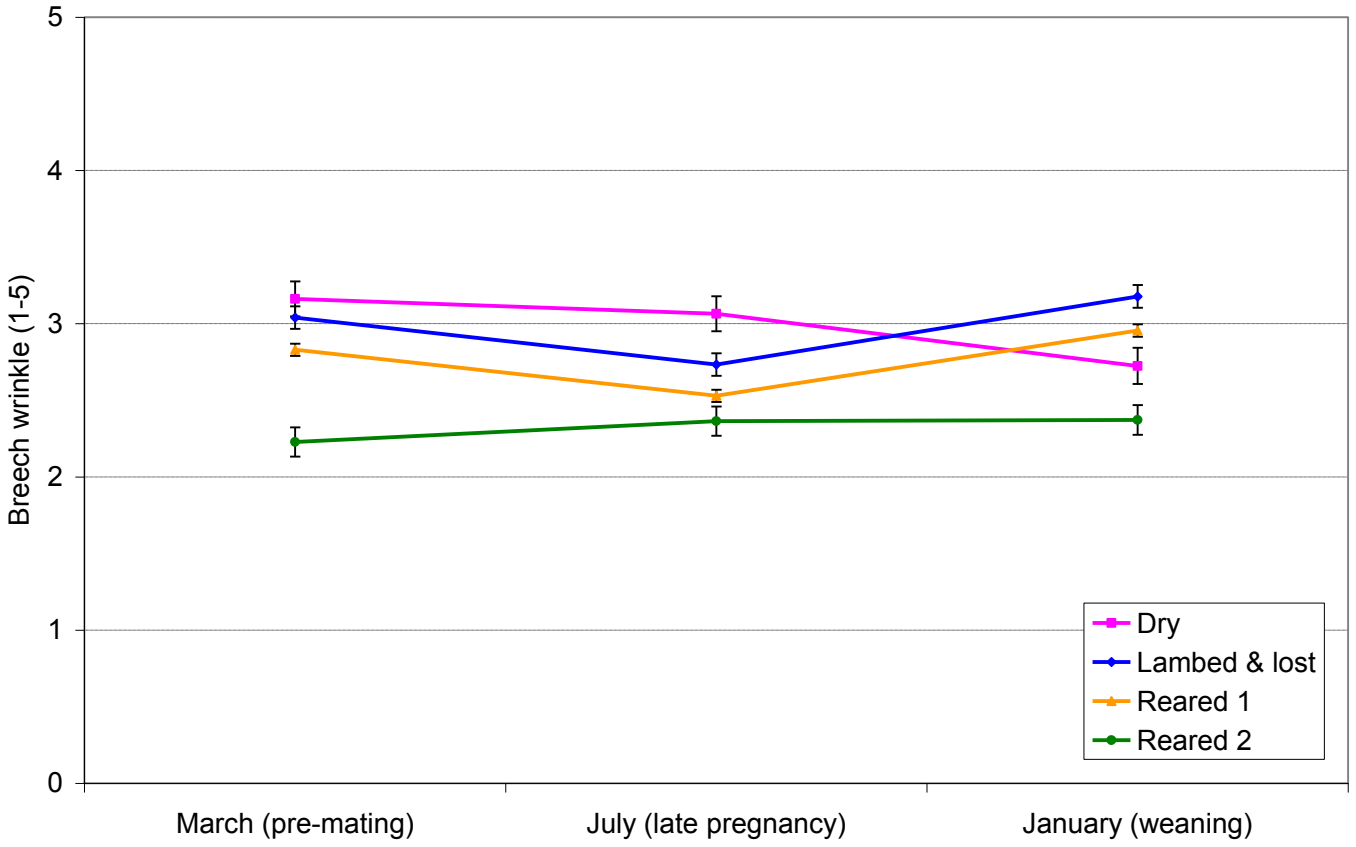
Ewe physiological state

Effect of pregnancy and lactation on breech wrinkle in 2011



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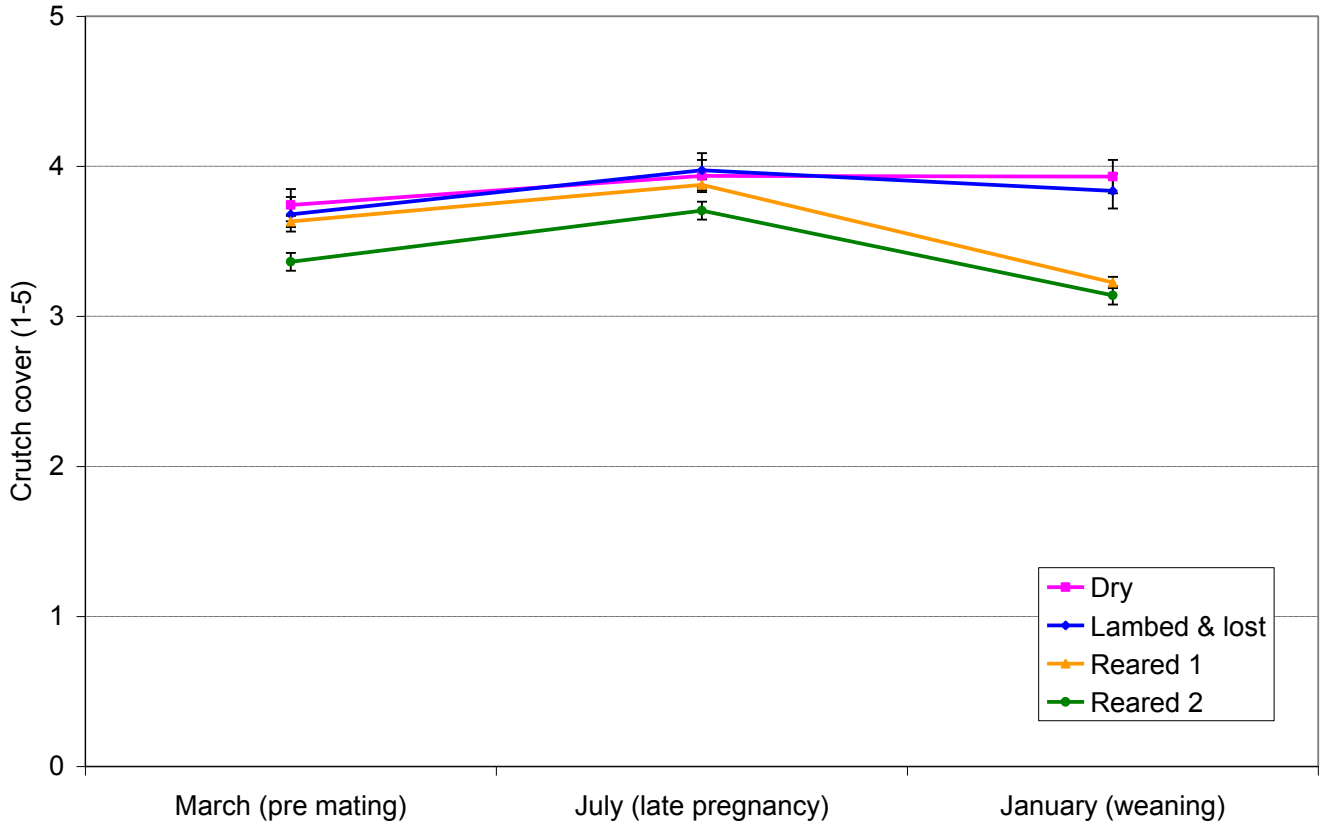
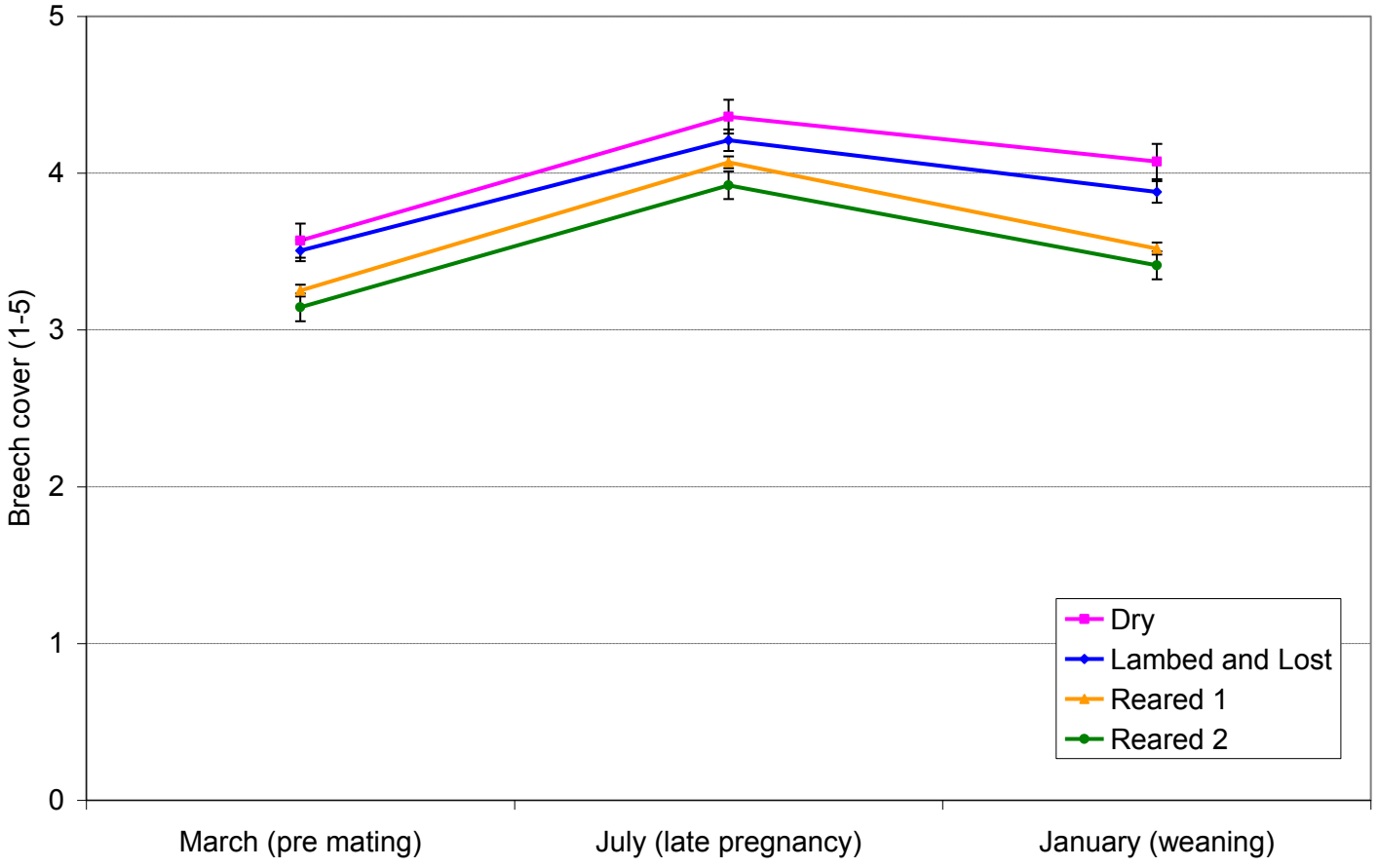
Ewe physiological state

Effect of lactation on crutch cover



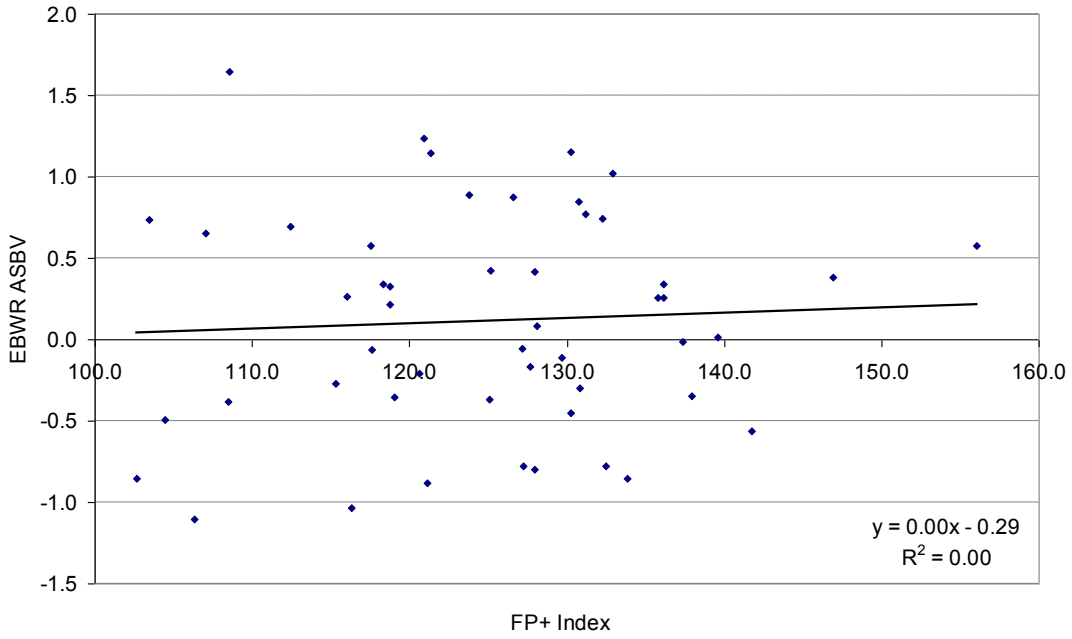
Ewe physiological state

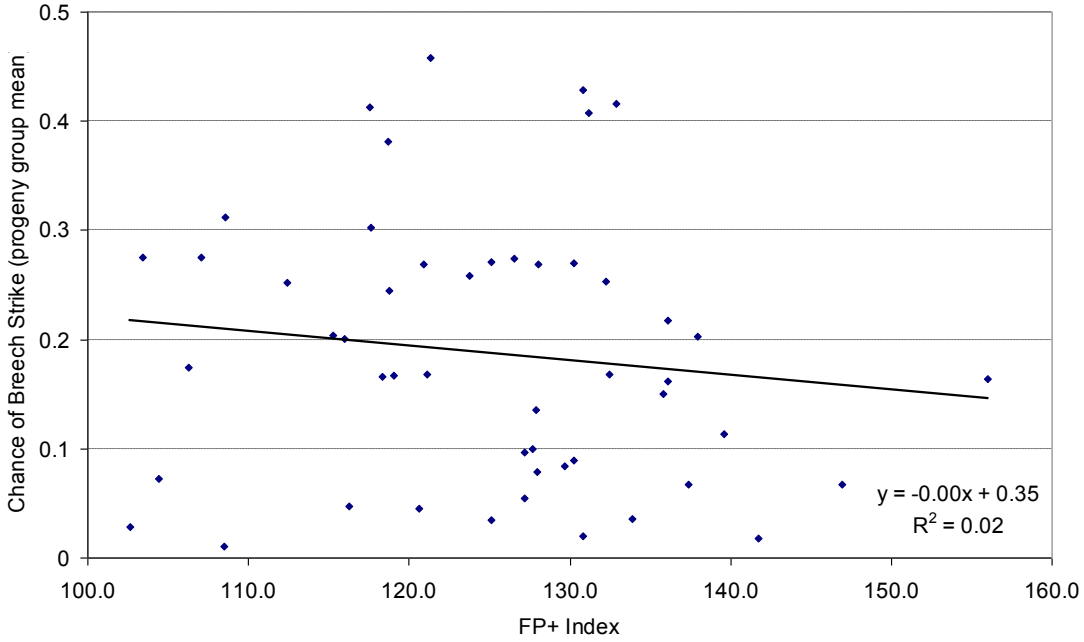
Effect of reproduction class on breech cover



Fleece Production+ Index

ASBVs of sires used 2006-2011 inc.





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Reproduction 2012

- Previously this flock has been mated by AI so caution in relating reproduction results with breech traits
- In 2012 was natural

Pregnancy scanning results (%), 'hot' from scanner, no statistical analysis yet

Sire	Singles	Twins	Dry
	Resistant		
2008C0370	44	56	0
2009C0011	50	44	6
2009C0192	42	56	2
2009C0497	52	48	0
Total	**47**	**51**	**2**
	Susceptible		
2005A3156	55	45	0
2008C0434	67	27	6
2009C0256	33	49	18
2009C0295	43	43	14
Total	**50**	**41**	**9**

Note:
All adult ewes as no mating in 2010
Mix of 'new' and 'experienced' sires similar in both selection lines

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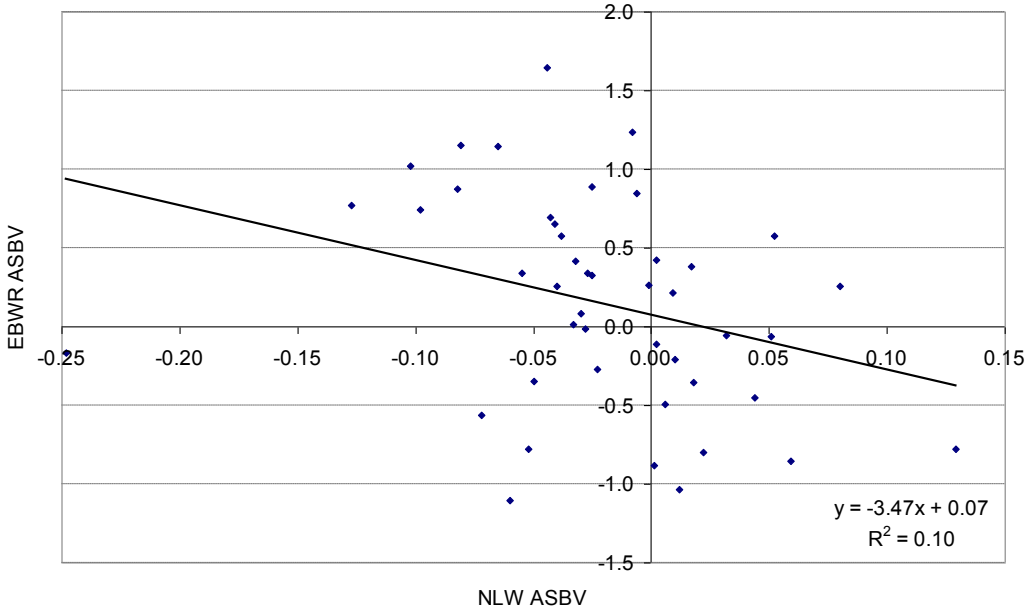
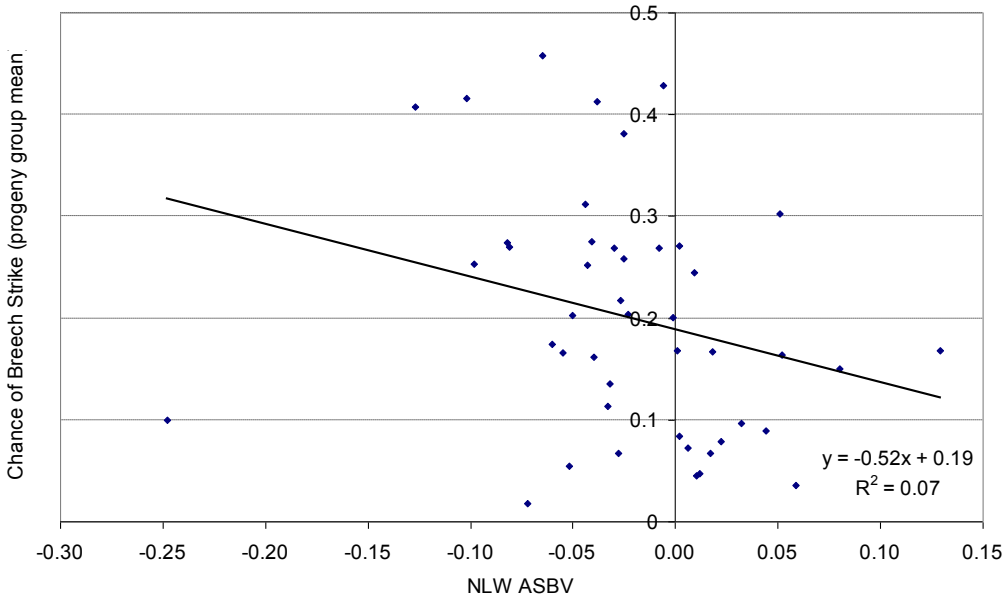
Number of lambs weaned

ASBVs of sires used 2006-2011 inc.





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Other Activities

Supply of wool samples for odour studies
Supply of breech records and access to sheep for Skintraction studies

Genomics study

Currently finalising experimental design for pooled DNA study

Uses animals from Armidale and WA
Contemporary groups based on site, drop and sex
Phenotypes based on flystrike history and key breech traits
(BRWR and BCOV for Armidale, DAG and BCOV for Mt Barker)
Genotypes of some individuals and in pools of 5-6 animals
Develop prediction equations for breech strike based on SNP results

Summary

•Differences between Resistant and Susceptible animals are often not statistically significant, but at a practical there are real and useful differences between Resistant and Susceptible animals in breech flystrike rates

•We’re looking into other indicators of breech strike susceptibility, and about to work on genomic-assisted selection, but at the moment Breech Wrinkle, Breech Cover and Dags are the best indicators we have, and they are pretty good

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