



Breeding for Breech Flystrike Resistance - Project results update

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Recap design & objectives

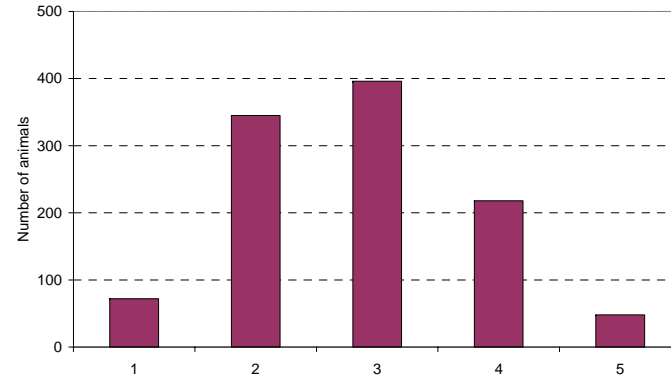
- Differences between Armidale NSW and Mt Barker WA flocks

In NSW flock:

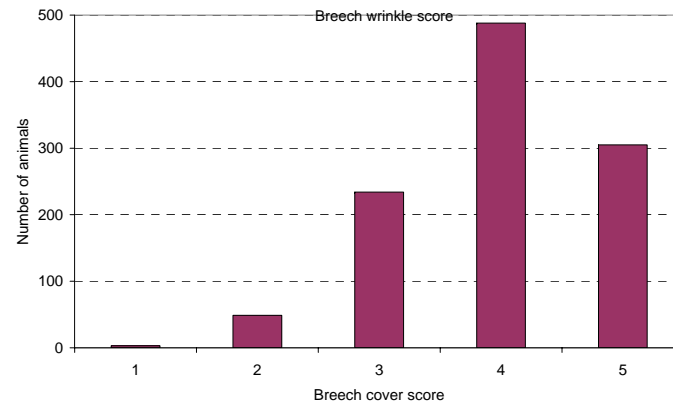
- no weaner shearing – 1st shorn as yearlings
- dag is only recorded once at ~6 months
- all sheep are managed under flystrike challenge conditions, delayed crutching etc (weaners, hoggets, breeding ewes, sires)
- ½ the sheep in each line were mulesed in every year

Distribution of key indicators – unmulesed sheep at Armidale

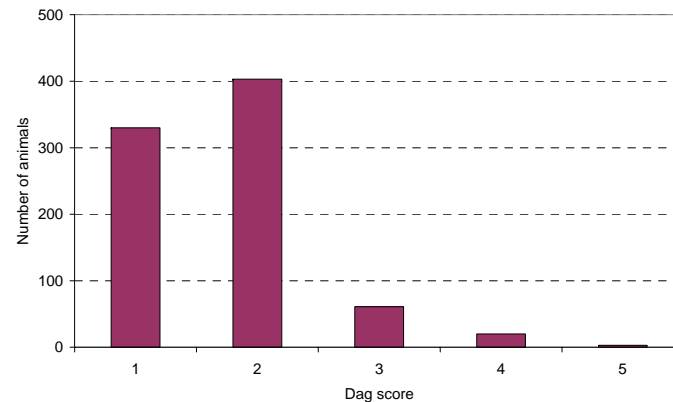
Breech wrinkle
Ave = 2.7



Breech cover
Ave = 4.0



Dags
Ave = 1.7



Ave Micron of flock:
Yearling = 15.5 mic
Adult = 17.4 mic

Higher breech wrinkle, higher
breech cover and less dags
than Mt Barker WA

What's been done since 2008 R&D Update

- Firmed up breech strike x indicator trait genetic parameters – which indicators are most important
- Summer rainfall weaner breech strike & post-weaning indicators

		Correlations		
	Variability	Heritability	Phenotypic	Genetic
BRSTR	Low	0.18 (0.06)	-	-
BRWR	High	0.39 (0.05)	0.23 (0.03)	0.18 (0.19)
DAG	Mod	0.13 (0.04)	0.28 (0.02)	0.91 (0.15)
BCOV	Mod	0.34 (0.05)	0.08 (0.03)	0.20 (0.19)

What's been done since 2008 R&D Update

- Firmed up indicator trait x production trait genetic parameters
- Combined with info from other sources
 - Atkins & Richards (NSW I&I) reviewed literature on wrinkle genetic parameters
 - A. Swan and J. Smith – other CSIRO resource flocks
 - Industry data in Sheep Genetics
 - SCRC INFs
- To settle on a set of genetic parameters for wrinkle x production traits for use in Sheep Genetics for ASBV calculations

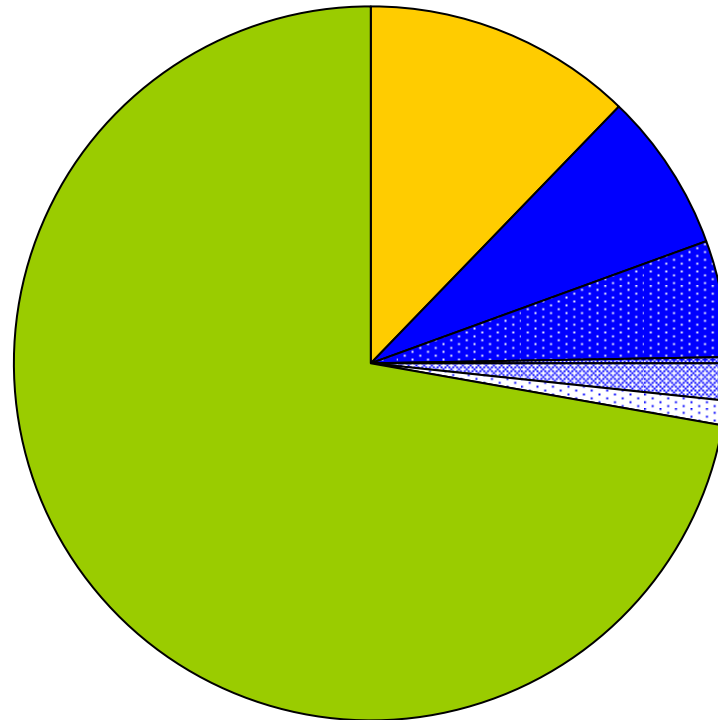
2 ways to use measurements of indicators

- a) Classing on phenotype
 - Impacts more on current drop
 - Different management for different phenotypes
 - Allows worst phenotype sheep to be culled

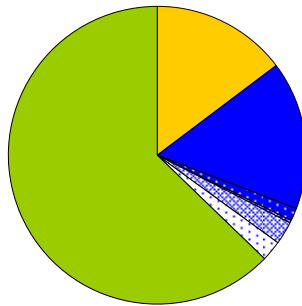
- b) Multi-trait selection
 - Impacts more on future generations
 - Change is cumulative and permanent

% variation in breech strike explained by indicator traits measured at post-weaning

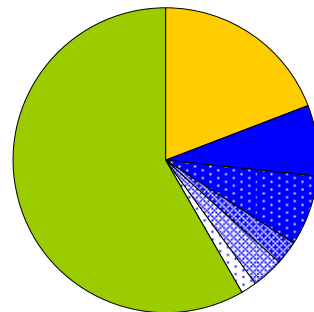
2006-2009



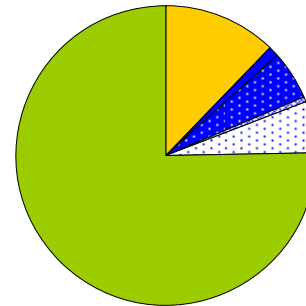
- Fixed effects (year, sex, brtype, wbwt) 12.1%
- Breech wrinkle (7.3%, $P < 0.001$)
- Dag (5.4%, $P < 0.001$)
- Breech cover (0.2%, $P < 0.05$)
- Bare width (1.7%, $P < 0.001$)
- Other (bare depth, urine stain, crutch cover, greasy wool colour, bare tail proportion, interaction) (1.2%, all ns)
- Residual (environment) (72.1%)



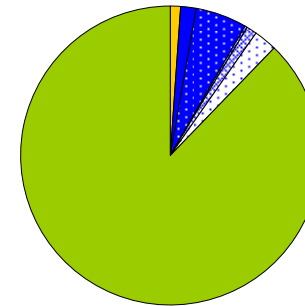
2006



2007



2008



2009



The 4 main indicator traits (**16%**) and known environmental factors such as year, sex and paddock (**12%**) currently explain around **28%** of all the variation between unmulesed animals that were breech struck

Approx **72%** of all the variation between unmulesed animals that were breech struck remained unexplained

This is very similar to Mt Barker WA

What does this mean

- There are other factors we don't know about.
- If there is something else is it likely to be cost effective to measure?
- One option is to focus on adoption of recording and selecting on wrinkles and dags?

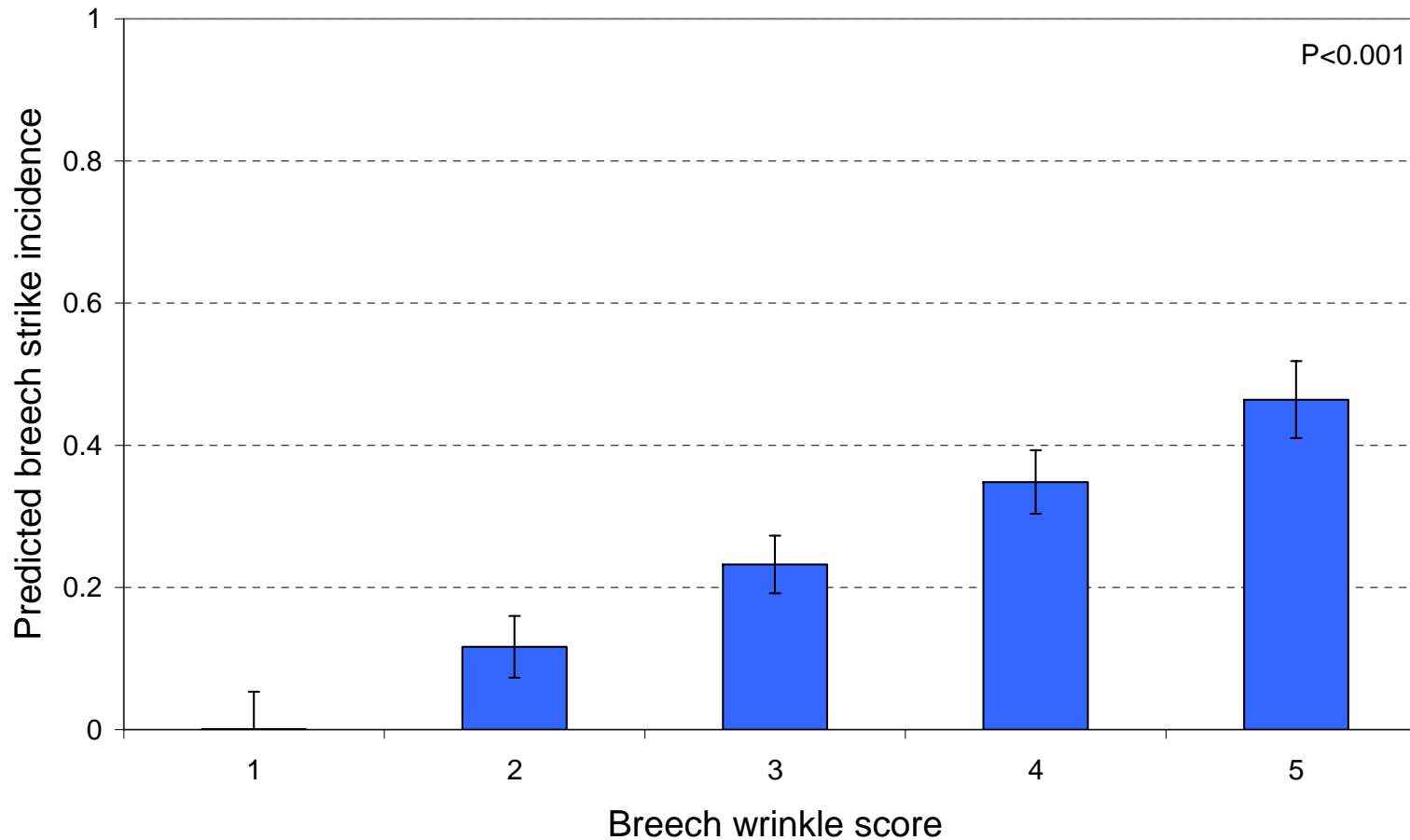
- How useful is this?

Comparison with another example

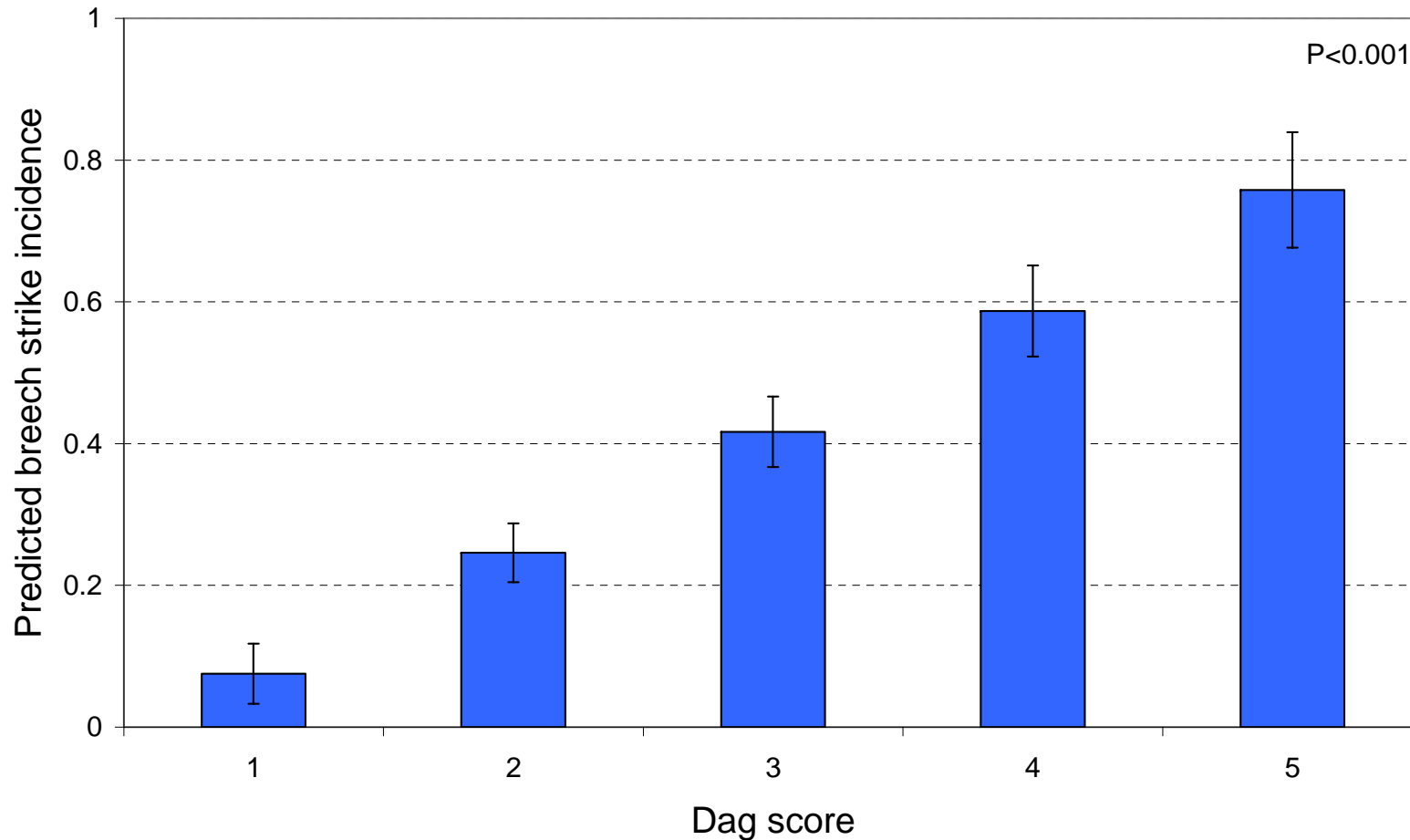
- % contribution to total variation

Objective	Breech strike	Staple strength	
Selection criterion	Wrinkle and dag	CVD	
Heritability	Mod	Mod	Selecting for SS based on CV of FD is comparable to using breech indicators traits to select for breech flystrike
Phenotypic correlation	Mod	Mod	
Genetic correlation	Mod	Mod	
Fixed effects	12	24	
Selection criterion	16	9	
Residual (Unexplained)	72	67	

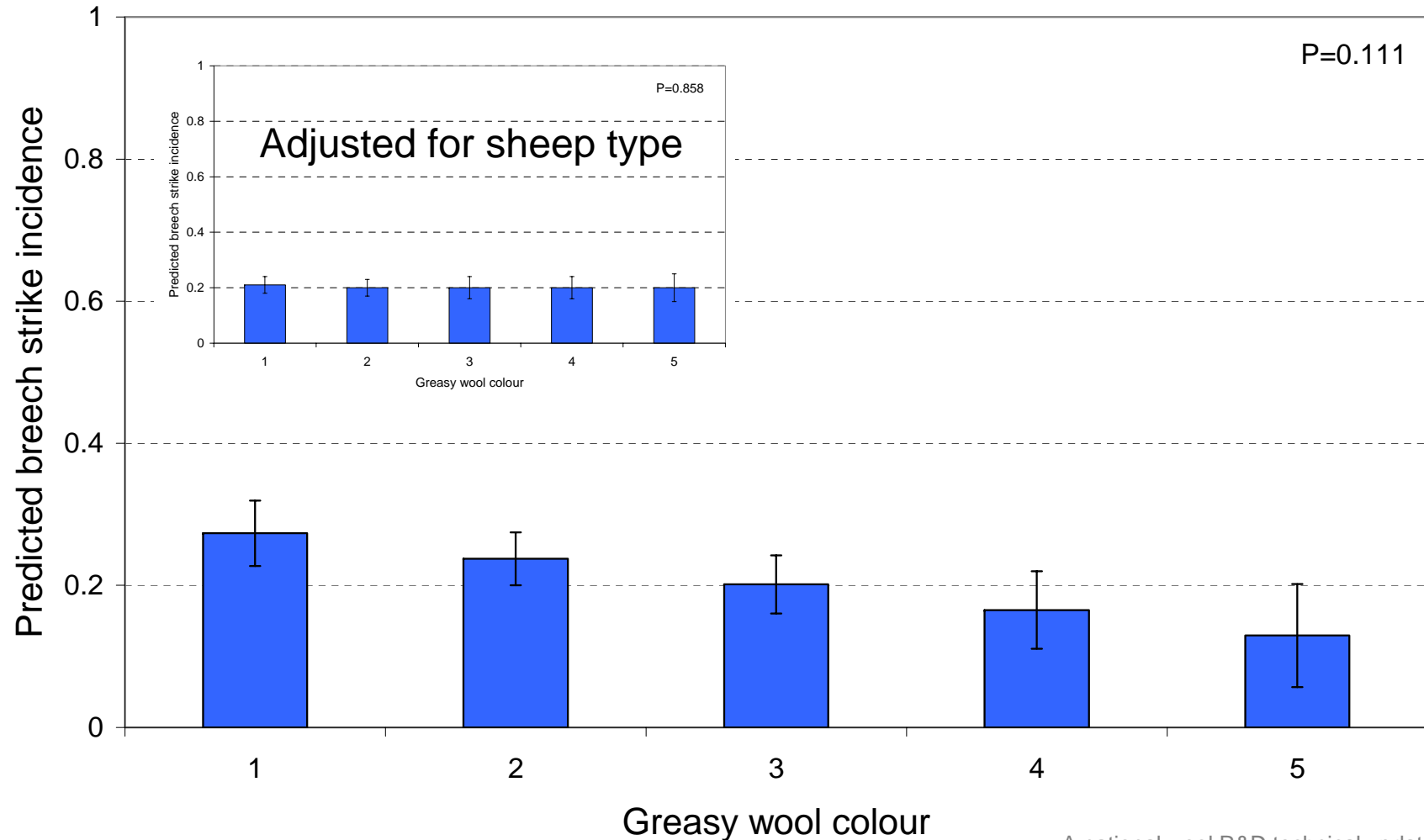
Relationship between breech strike and breech wrinkle (post-weaning)



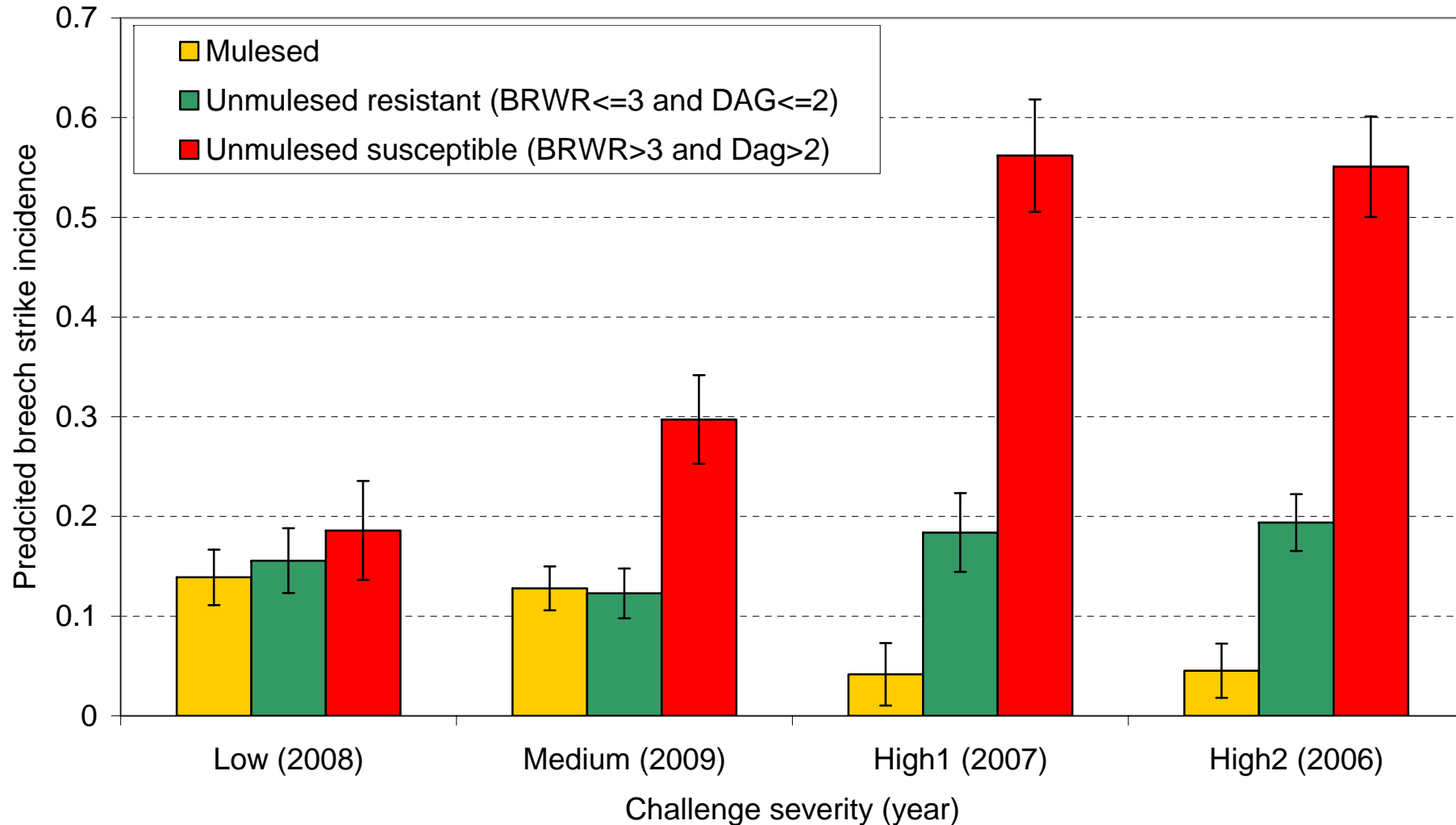
Relationship between breech strike and dags (post-weaning)



Relationship between breech strike and greasy wool colour (post-weaning)



Importance of phenotype changes with differing severity of challenge



Response to selection

- Single trait selection, although not practical, indicates 'upper limit' of response
 - Breech wrinkle ~1.2 scores/10yrs
 - Dags ~0.4 scores/10yrs

} Based on within flock selection
- Andrew Swan, AGBU – including wrinkle in selection indices
 - Breech wrinkle added as desired gains trait to the F10SS index at **25, 50 and 66%** emphasis
 - 'Standard' assumptions about full pedigree, comprehensive fleece trait recording, flock structure, 100% emphasis on index

Response to selection

(10%+SS index + BRWR)

More Wool (YCFW)

0% BRWR
+ 0.1

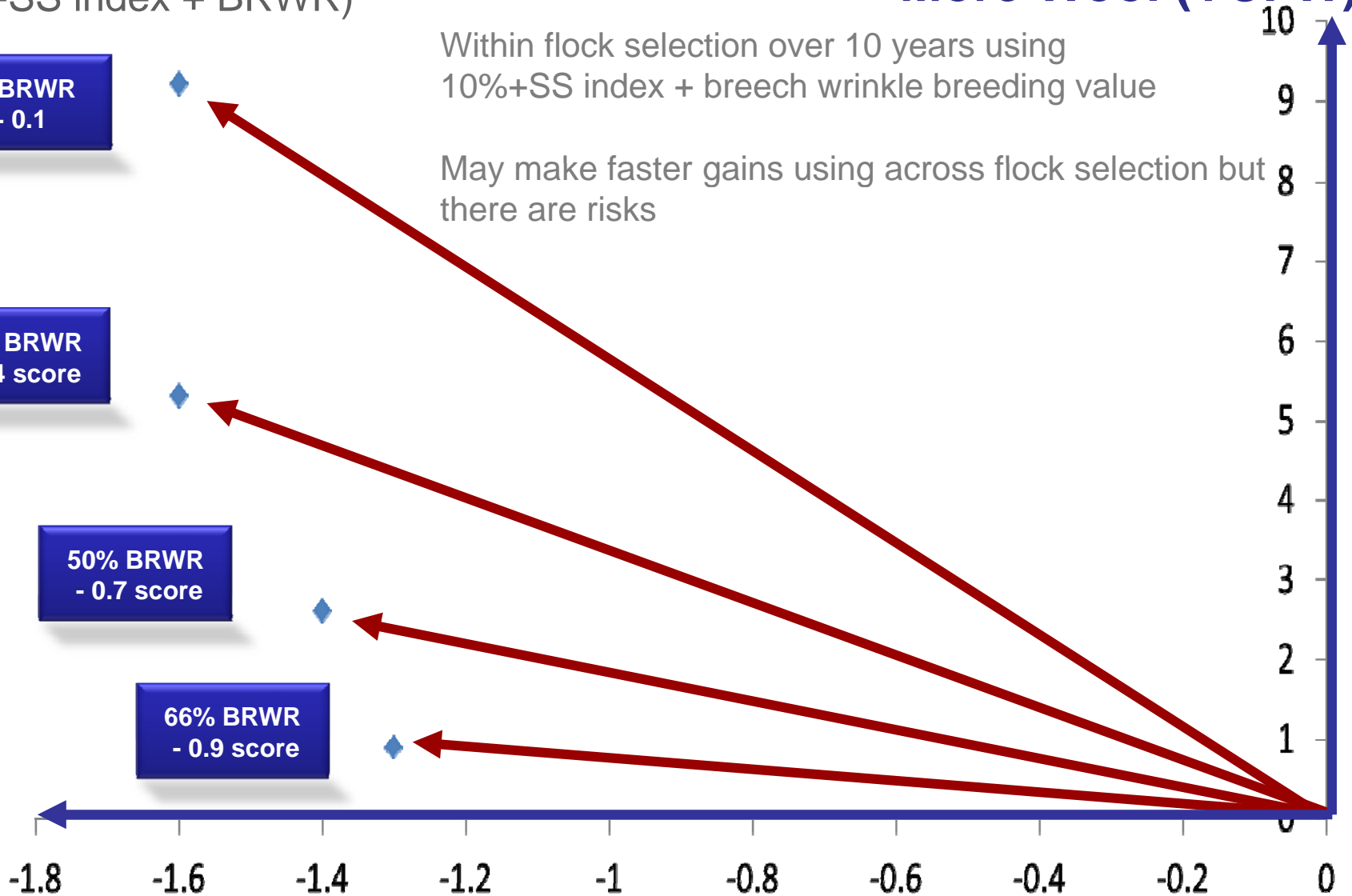
25% BRWR
- 0.4 score

50% BRWR
- 0.7 score

66% BRWR
- 0.9 score

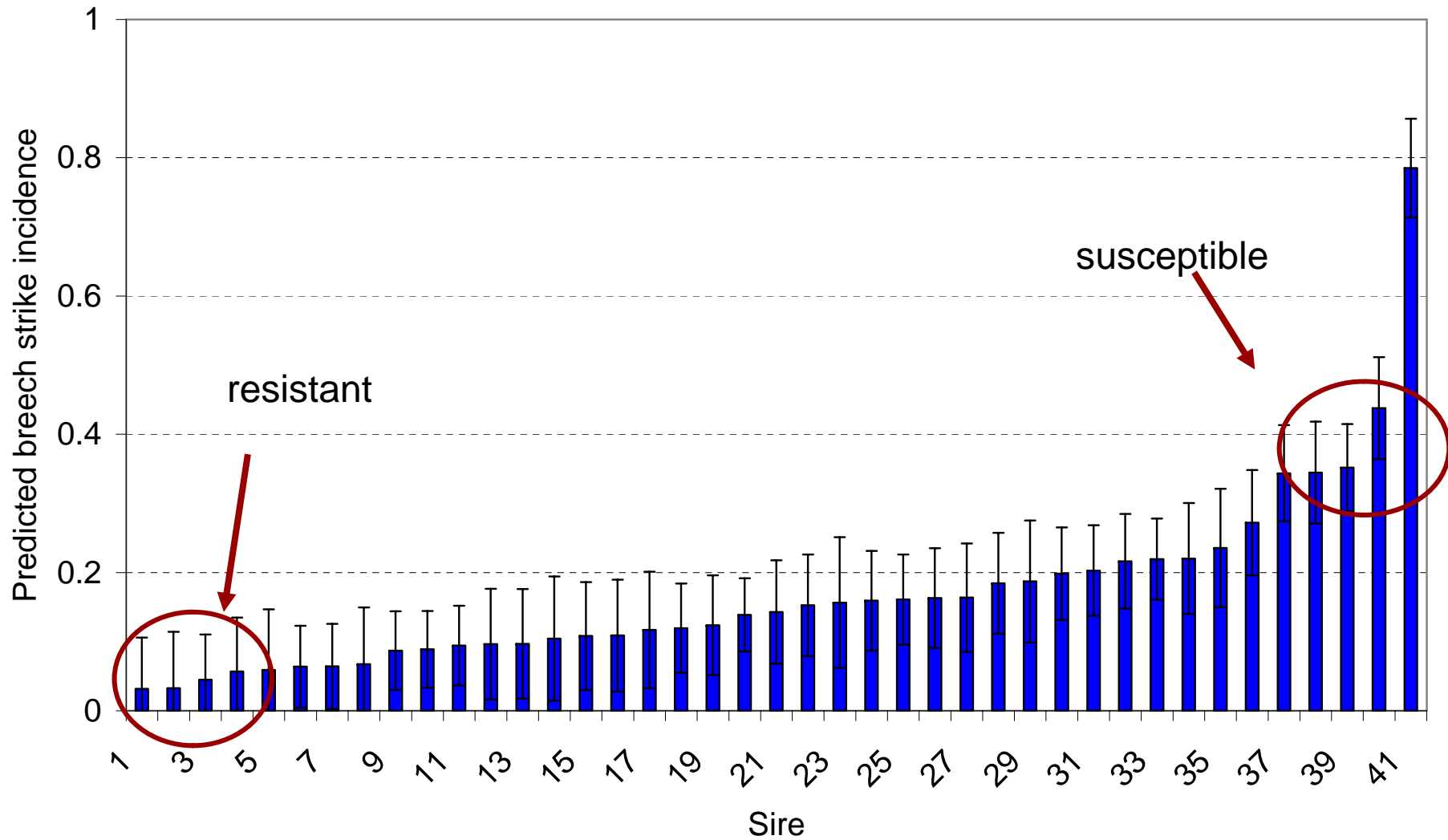
Within flock selection over 10 years using
10%+SS index + breech wrinkle breeding value

May make faster gains using across flock selection but
there are risks



Finer Wool (YFD)

Distribution of sires in NSW flock

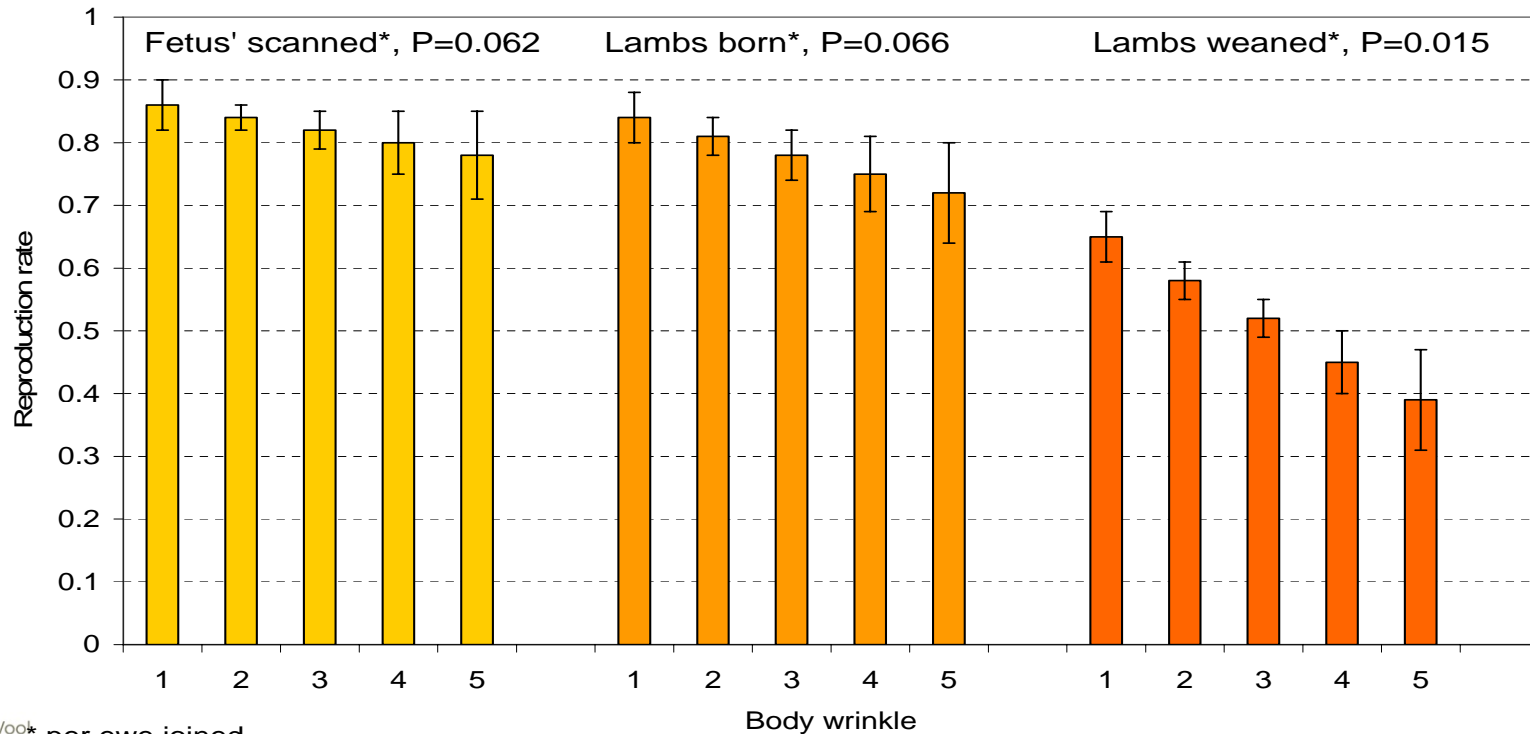


Difference between extreme sire progeny groups for weaner breech strike

	Resistant sires		Susceptible sires	
	Sire 1	Sire 2	Sire 40	Sire 41
n	36	24	35	40
Breech strike (%)	3	3	44	79
Weaning wt (kg)	19.7	19.7	19.6	18.9
pDAG	1.5	1.6	1.7	1.9
pBRWR	2.0	2.0	2.4	2.7
pBCOV	3.6	4.0	4.2	4.2
pURINE	1.7	1.6	1.7	1.7
yCOL	3.2	2.9	2.8	2.9

Wrinkles and reproduction rate – preliminary results (maiden ewes, AI only)

- Another reason to have plainer sheep?
- Trend toward plainer ewes with higher reproduction rate. Difference is not significant for scanned fetus' or lambs born. Difference significant for lambs weaned.



What now?

- Extension
 - Focus on increasing uptake of selection on existing indicators
- Further research
 - Improve precision of genetic parameters for breech strike?
 - Further phenotyping under natural challenge
 - Move to phenotyping under artificial challenge
 - Look for other indicators
 - Molecular tools to enhance response to selection
 - Further R&D approved by AWI



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