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Breeding Sheep for Breech Strike Resistance

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Project Background

- Selection to reduce body strike has been practiced for a long time, but less is known about how to select for breech strike
- Selective breeding - widely viewed to be the best long-term alternative to mulesing
- **Aim:** use indicator traits - e.g. breech & crutch cover, body & breech wrinkle, dags, urine stain, fleece traits



AWI Projects

- Breeding for Breech Strike Resistance (2005-2010)
 - CSIRO Armidale, summer rainfall/fine wool
 - DAFWA Mt Barker, winter rainfall/medium wool
- Calcookara Project (Uni. of Adelaide)



Armidale weaners

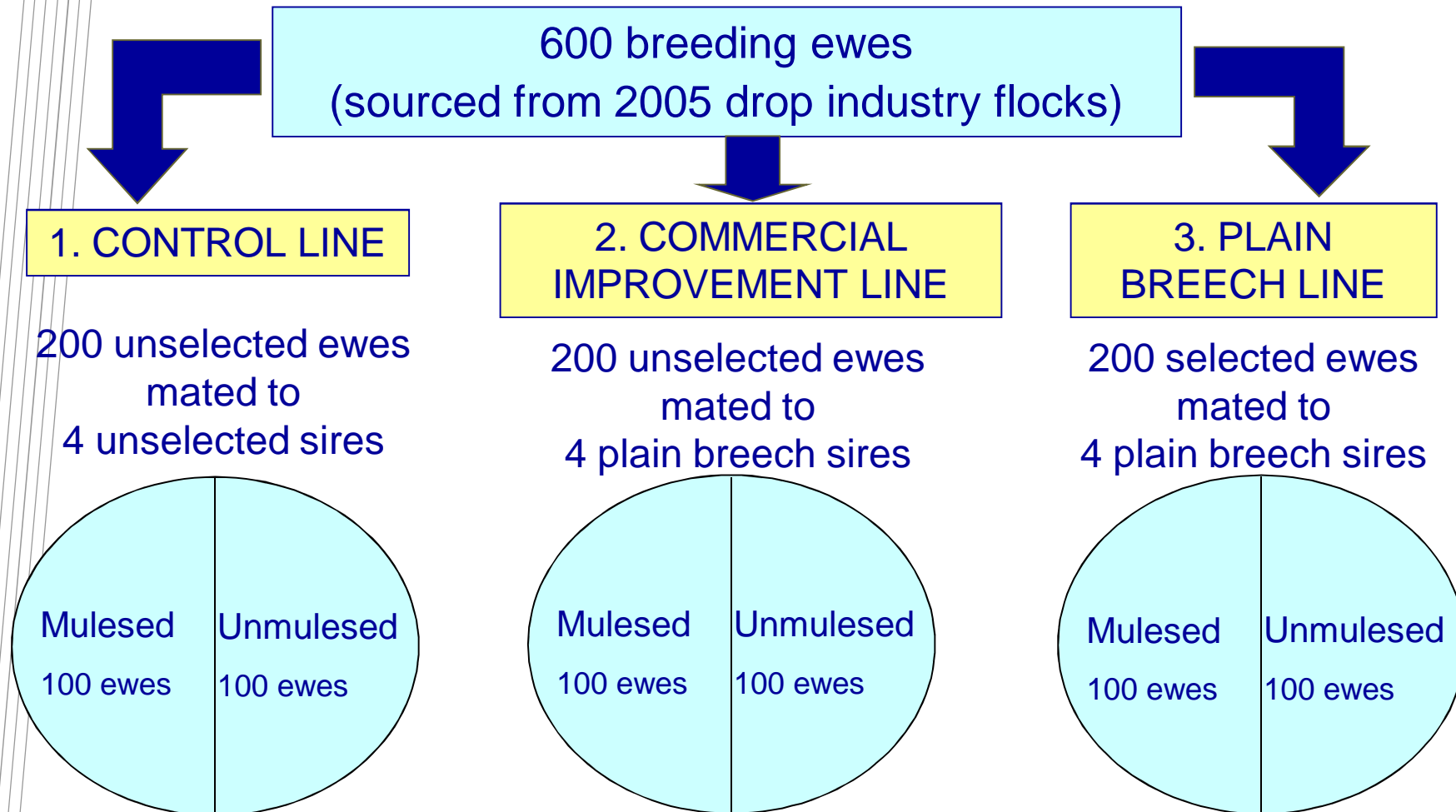


WA weaners (bioclipped)

Objectives and Design

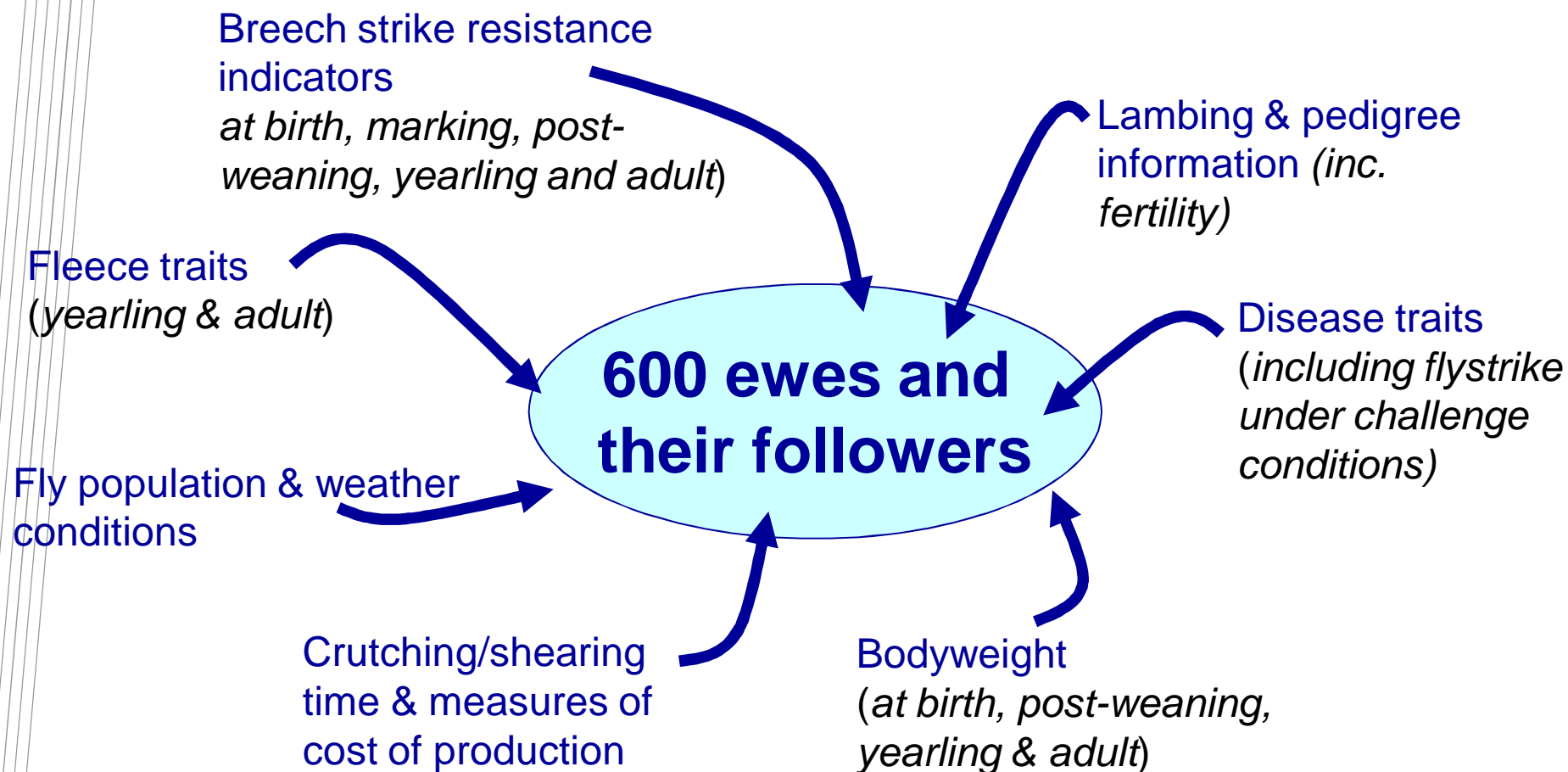
1. Develop industry best practice guidelines for including breech strike resistance in Merino breeding programs
2. Evaluate the effect of selection using traits thought to indicate resistance to breech strike
3. Estimate heritability of indicator traits, correlations between breech strike and indicator traits, and between indicator traits and production traits – enabling prediction of **response to selection**

Breeding program design



Link sires across sites & years

What gets measured and recorded

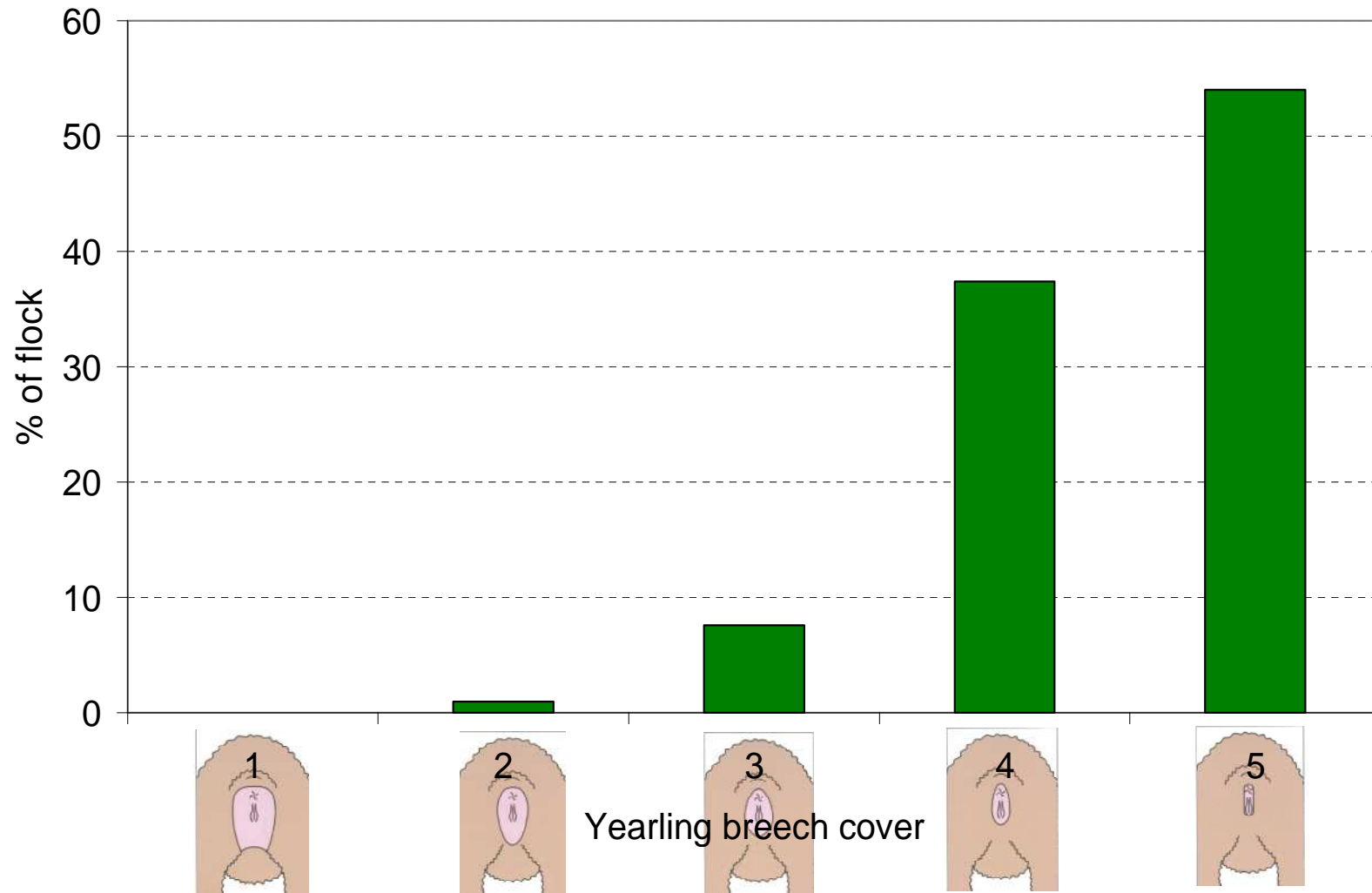


Response to selection – how long is it going to take?

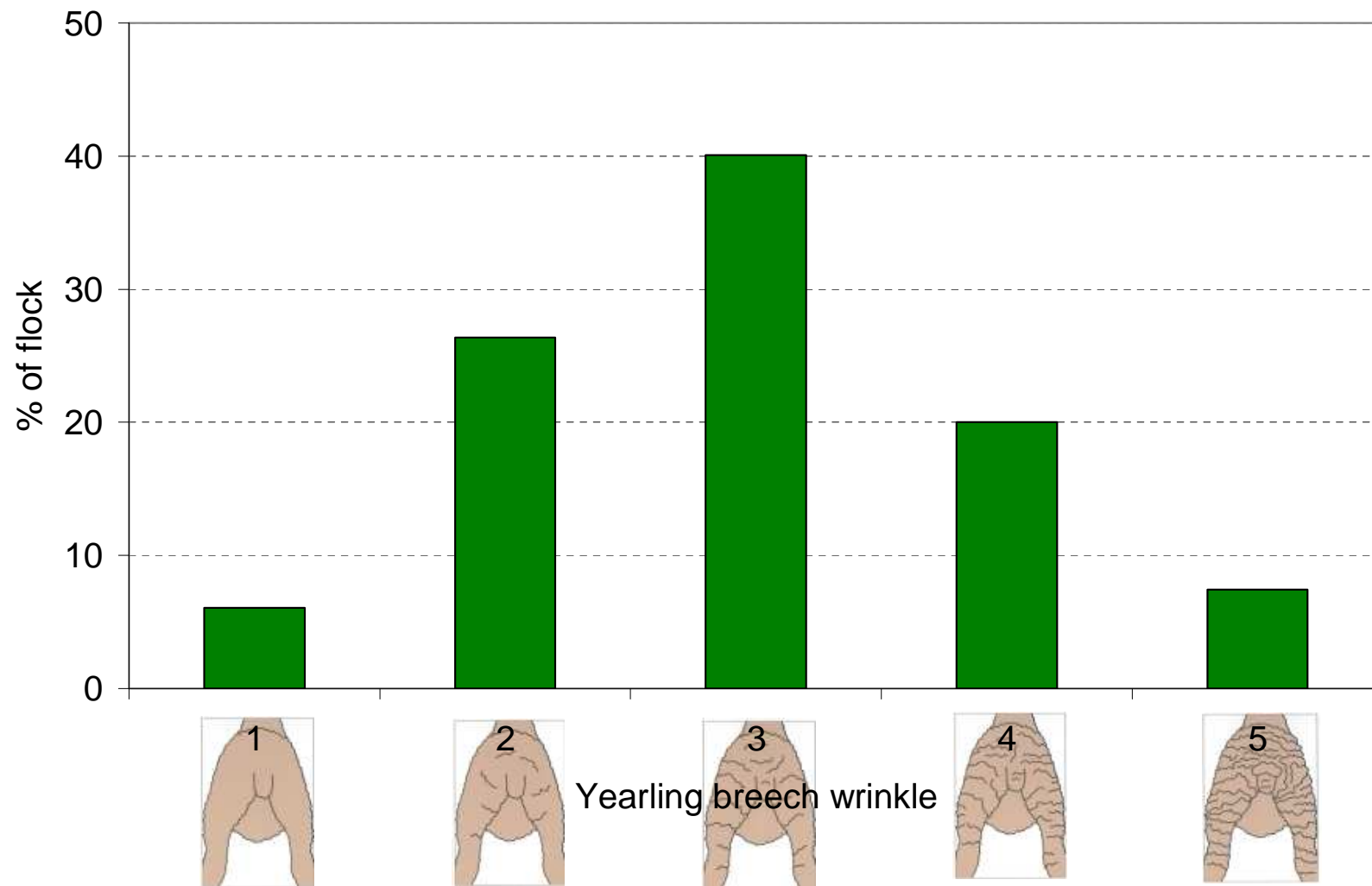
Is dependent upon:

- Correlations among traits
- Heritability
- How many traits in the breeding objective
- Relative 'weighting' on those traits
- Selection intensity
- Generation interval
- Use (or not) of outside genetics

Breech cover — distribution in unselected, unmulesed population



Breech wrinkle – distribution in unselected, unmulesed population



Factors affecting breech traits

- Property-of-origin/year
- Selection line
- Mulesed/not
- Genetic group (wool type)

} Specific to experimental design

- Birth and rearing type
 - animals born and reared single are more wrinkly (approx $\frac{1}{2}$ score) than those born and reared multiple
- Dam age
 - animals born to adult ewes more wrinkly (approx $\frac{1}{4}$ score) than those born to maidens

- Sex
- Operator
- Body weight and/or cannonbone length – body size

Candidate traits

Trait	Variable	Heritable	Correlated with breech strike
Breech wrinkle	✓✓✓	✓✓✓	✓✓✓
Breech cover	✓✓	✓✓	✓
Crutch cover	✓	✓✓✓	✓
Dags	✓✓	✓	✓✓✓
Urine stain	✓✓	✓✓	✓

Better in WA flock

Indicator trait differences between selection lines

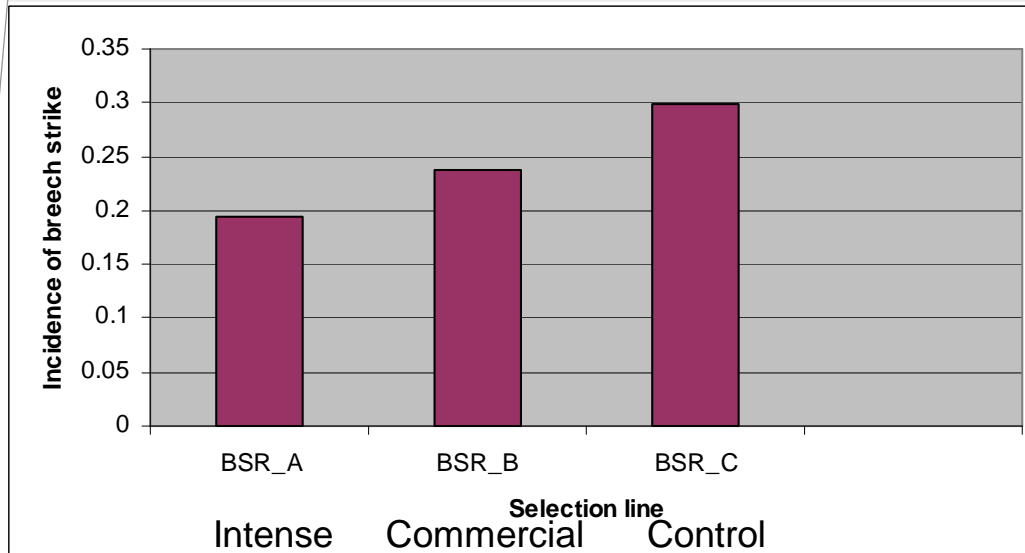
Incidence of significant difference between Selected and Control

Trait	NSW	WA
Breech wrinkle	✓	✓
Dags	✓	✓
Breech cover	✓	✓
Urine stain	✓	✓
Wool colour	x	✓
Breech strike	✓ #	✓ #

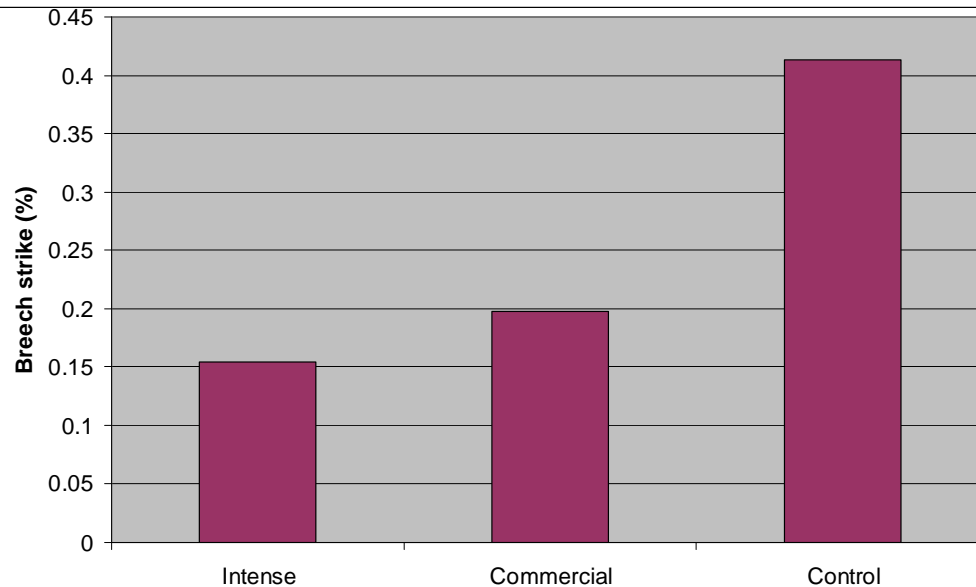
Not in every sheep class or every year – dependent upon sheep age, sex, physiological state, climate, fly challenge etc.

Incidence of breech strike in unmulesed sheep

Average over 4 years

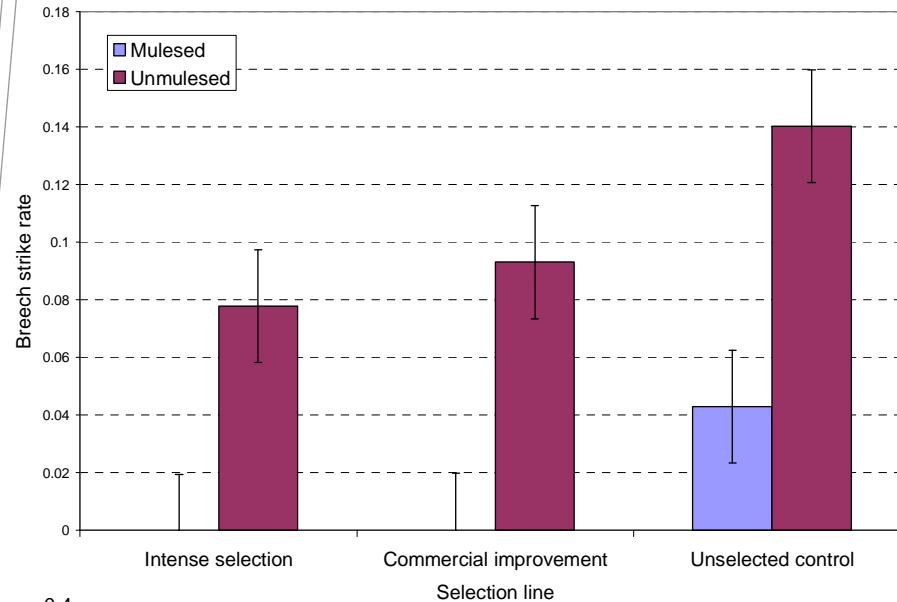


WA
Courtesy Johan Greeff, DAFWA

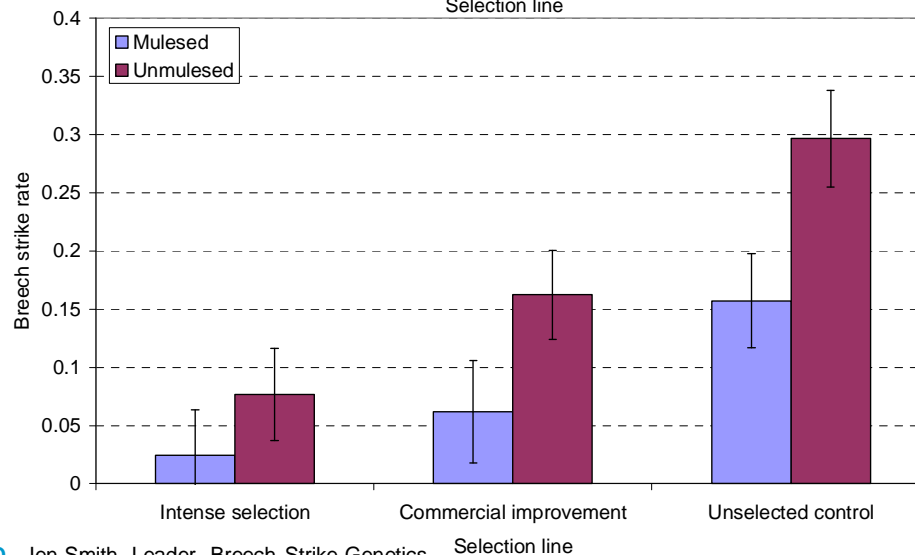


NSW

Flystrike rates in 2009-10, NSW



Breeding ewes, mixed age –
selection line and
mulesing effect



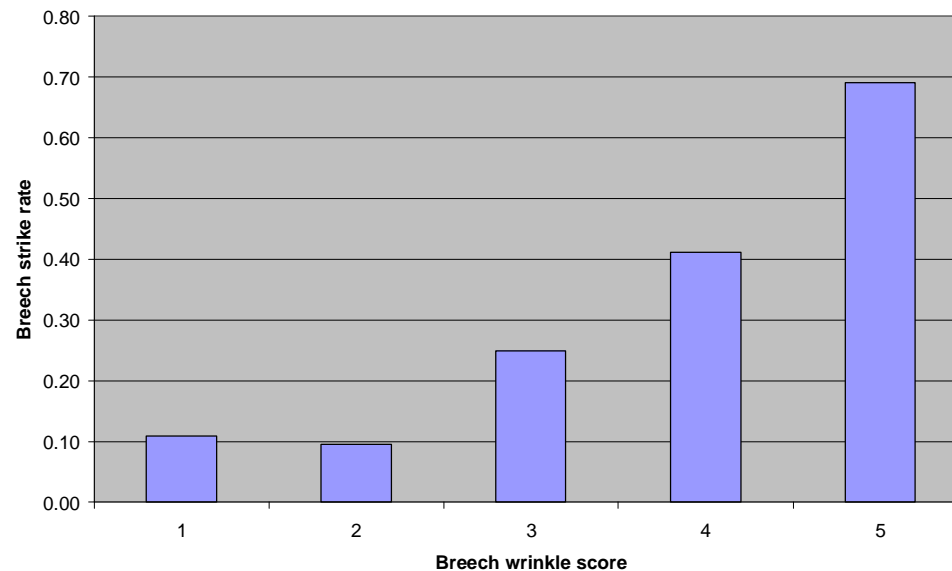
2nd generation weaners, mixed
sex - selection and mulesing
effect

Breech wrinkle at post-weaning



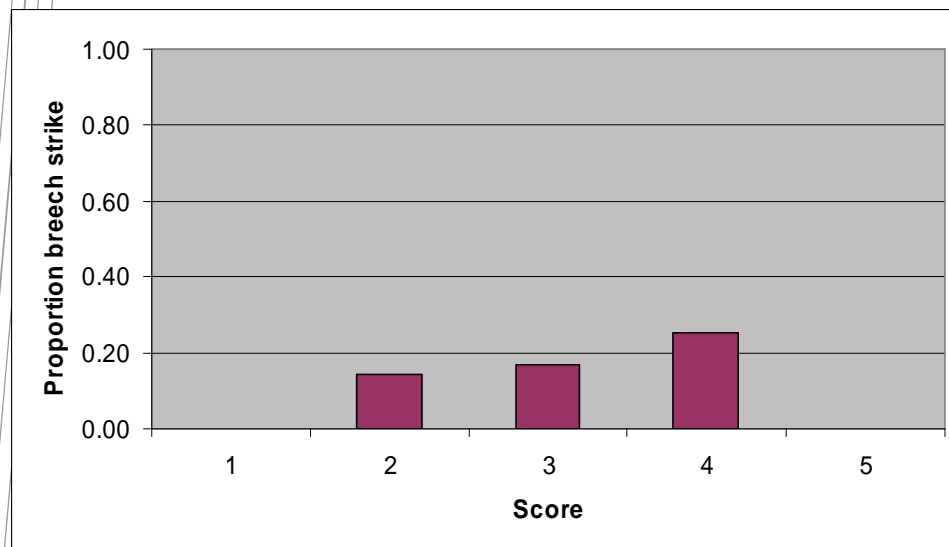
WA

Courtesy Johan Greeff, DAFWA



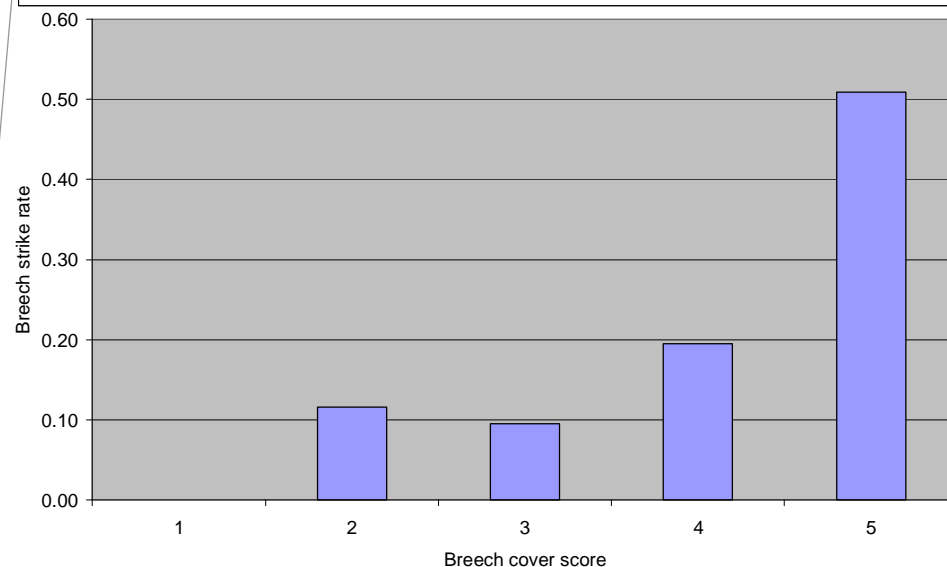
NSW

Breech cover



WA, weaning

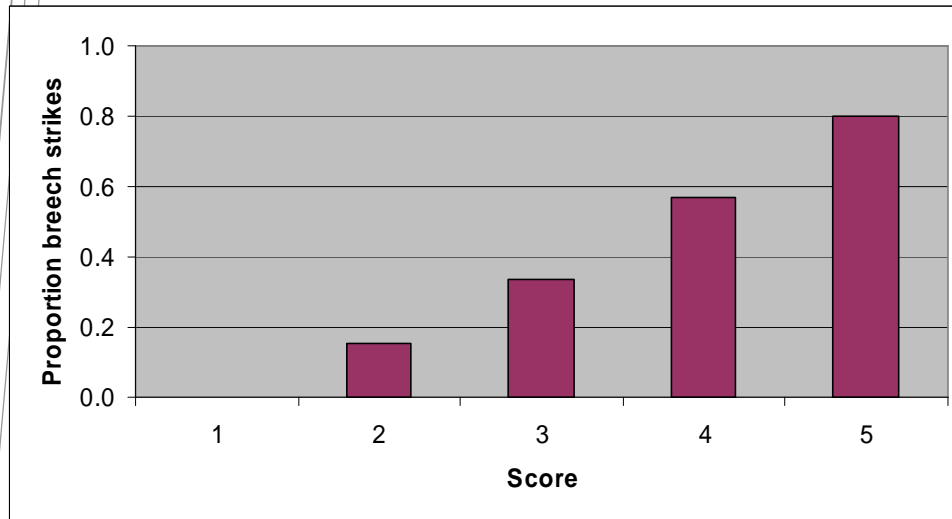
Courtesy Johan Greeff, DAFWA



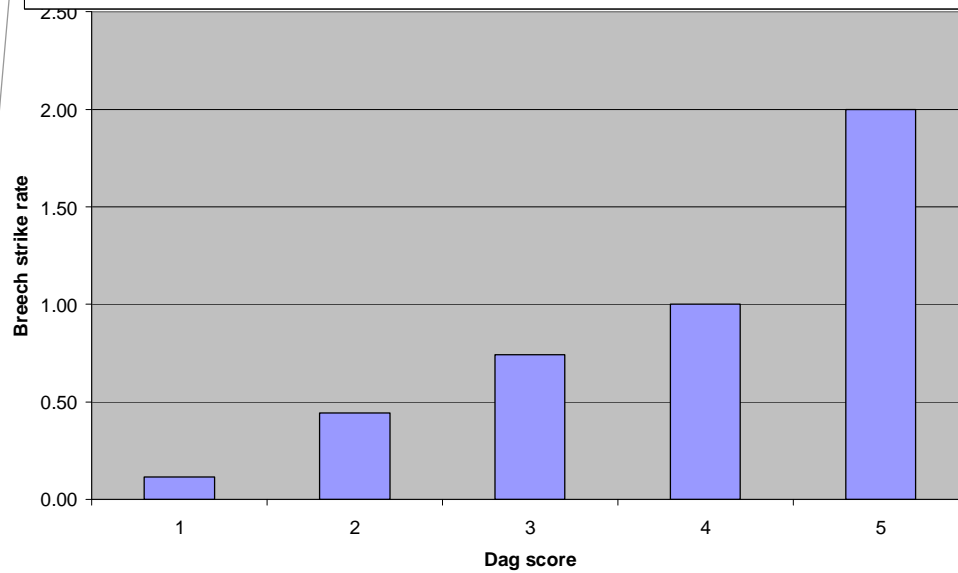
NSW, post-weaning

Note: $n=2$ for breech cover=1, $n\sim 500$ for breech cover ≥ 4 so this is not a good guide to the usefulness of breech cover

Dag

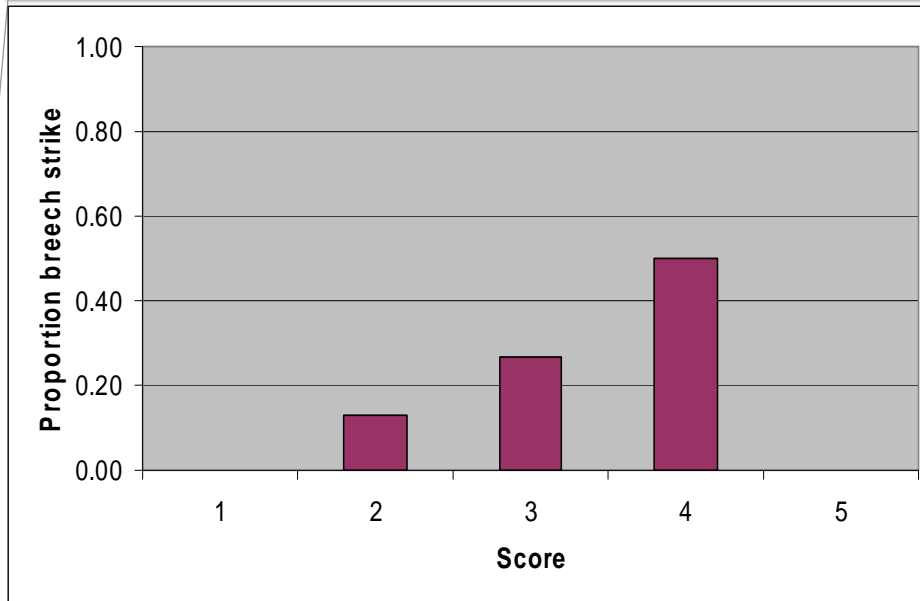


WA, weaning
Courtesy Johan Greeff, DAFWA



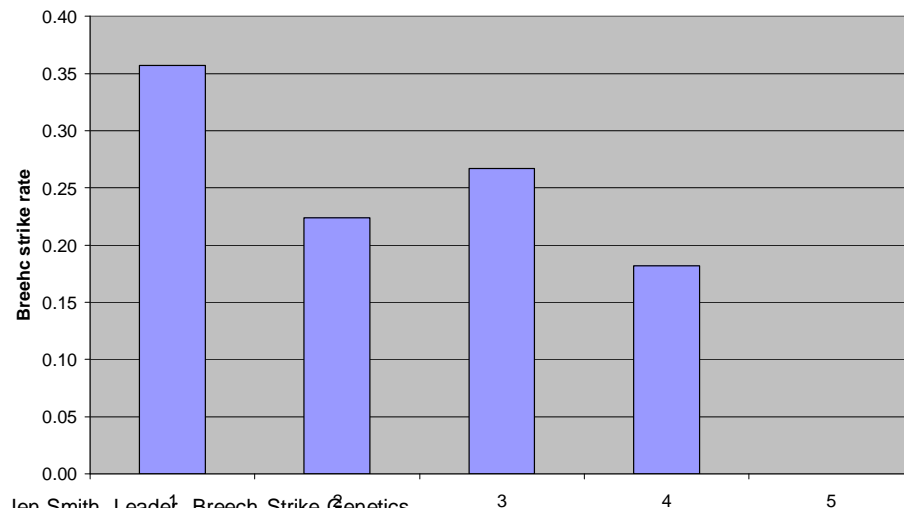
NSW, post-weaning
Note: only 3 animals with dag=5

Wool colour



WA, weaning

Courtesy Johan Greeff, DAFWA



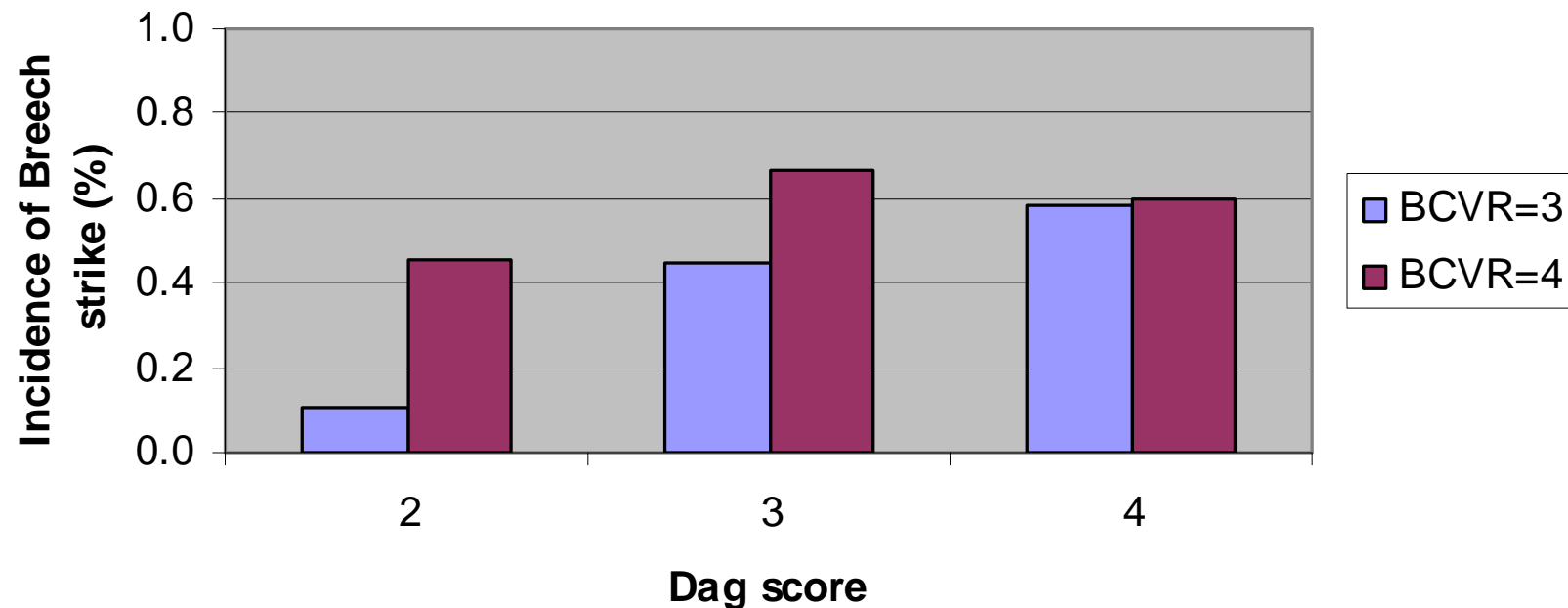
NSW, yearling

Note: I think white wool is not actually associated with higher flystrike rates - its just that sheep in the control line (which are more wrinkly etc) tend to have whiter wool

Importance of dags and breechcover

Courtesy Johan Greeff, DAFWA

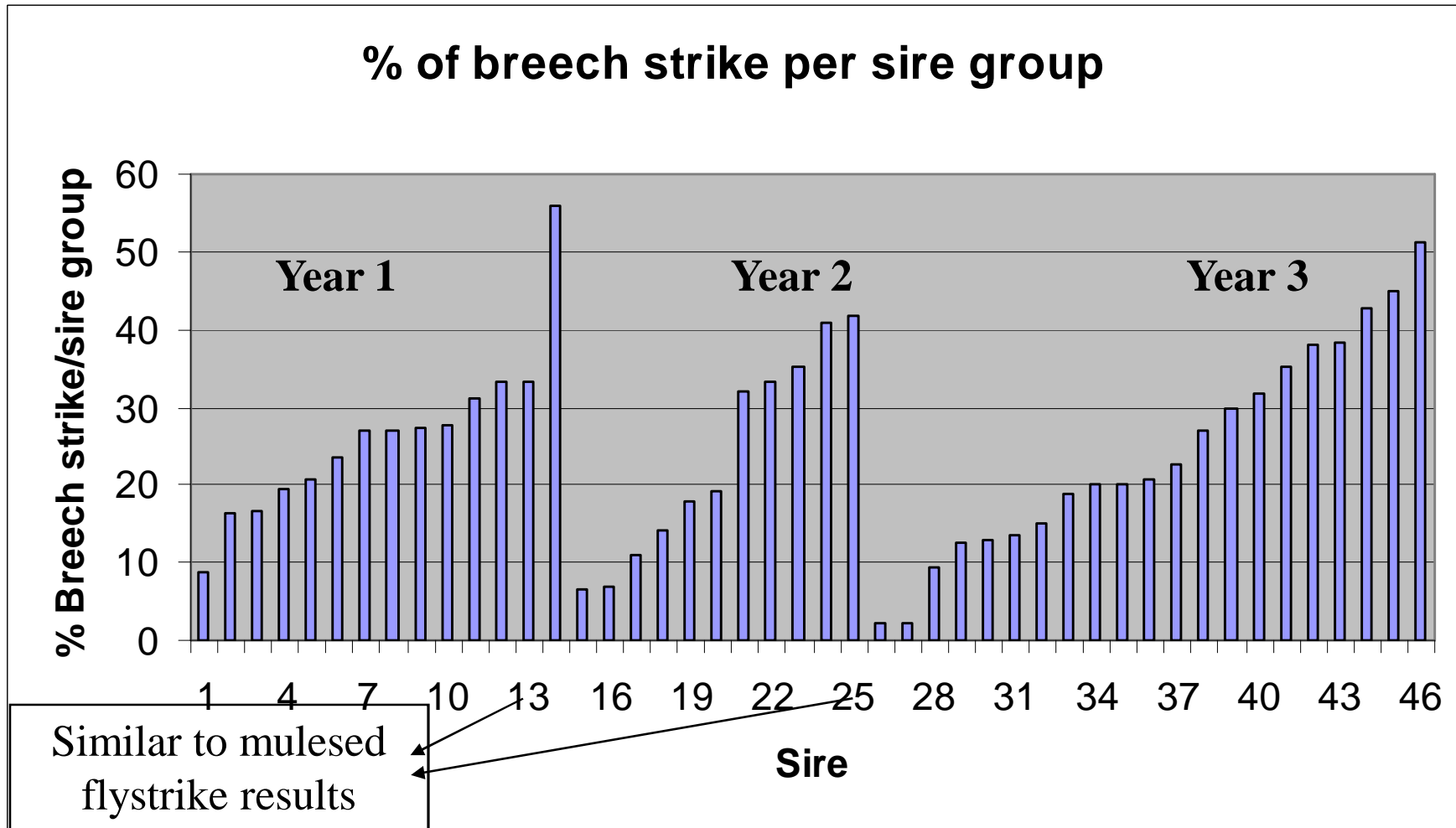
Incidence of breech strike within breech wrinkle score =2



Breech strike rates by sire

WA, unmuled progeny

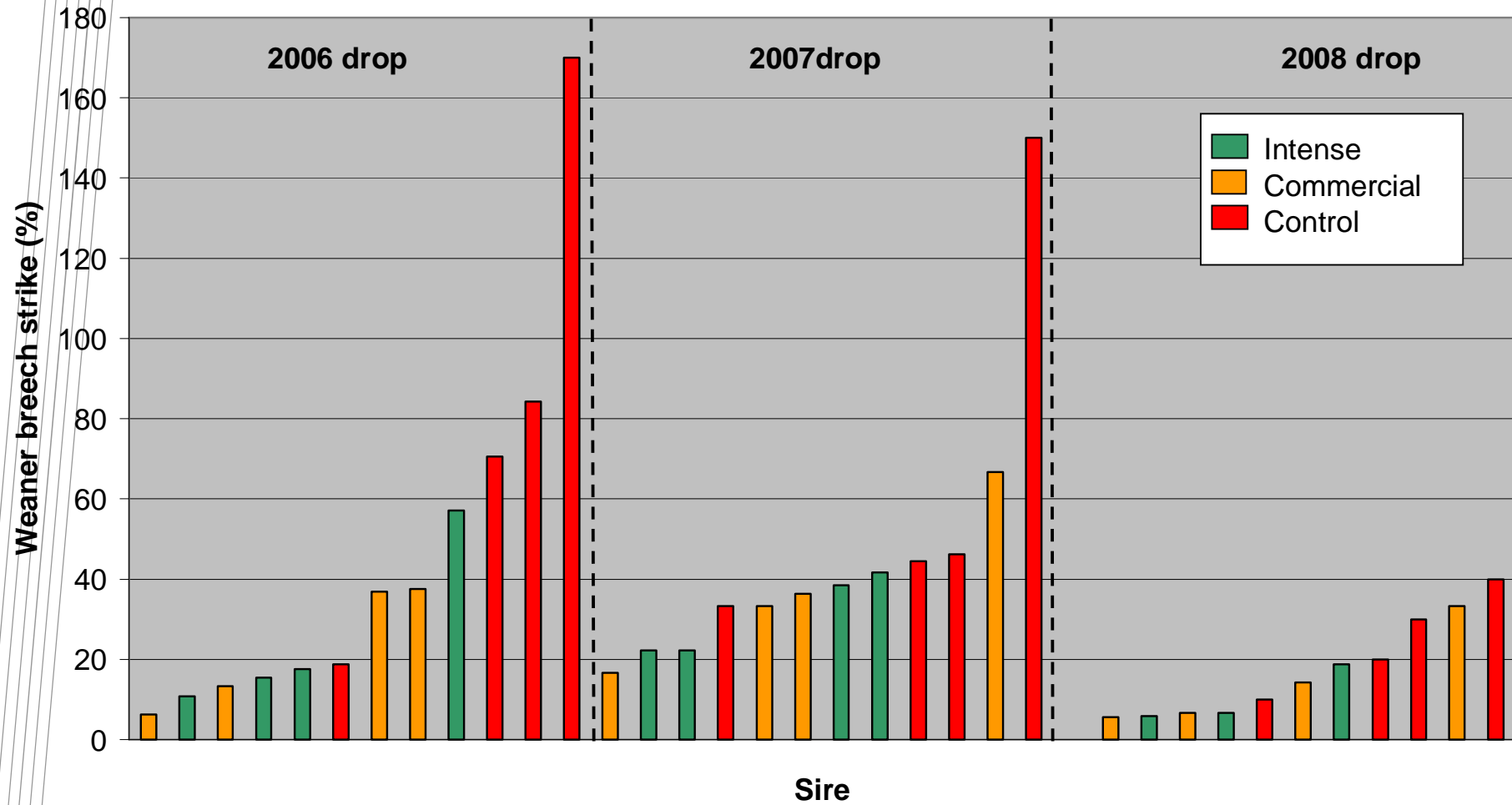
Courtesy Johan Greeff, DAFWA



Similar to muled
flystrike results

Weaner breech strike rates by sire

NSW, unmulesed progeny



Using breech traits

Independent cull on phenotype

↓ e.g. cull very wrinkly / daggy
Or, score whole flock and cull worst $x\%$

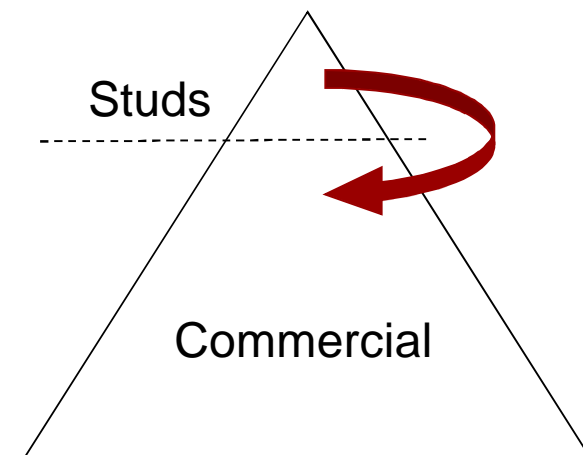
↓ *But, **birth-rearing type and dam age** effects will slow response
– good reason to use ASBV's*

Combine breech and production traits

↓ rank on fleece and wrinkle

ASBVs and multi-trait selection indices

more precise than culling on phenotype – takes account of pedigree and other factors that can affect breech traits (if recorded)



Take home message

1. This works, gains are cumulative and permanent
2. Rate of response will be different for every flock
3. For those starting out, look at wrinkles 1st
 - Faster early gains with wrinkles than breech cover
 - Score wrinkles in short wool
 - Defer scoring breech cover until older age
4. But, which trait(s) breeders focus on may depend on
 - Where you are (geographical location)
 - What sort of sheep you have (whether already plain/not)
 - Which sector of the wool market supplying to
5. Don't select on breech traits in isolation
 - There are some unfavourable relationships with some production traits
6. How individuals use the data might depend upon
 - stud or commercial wool producer

CSIRO Livestock Industries

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Thank you

Contact Us

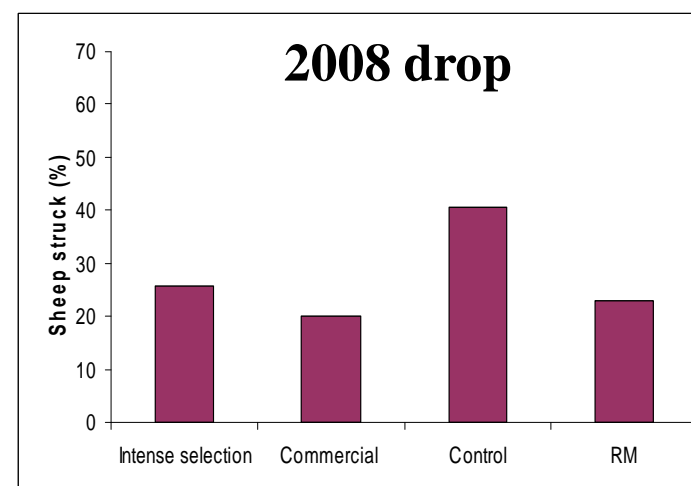
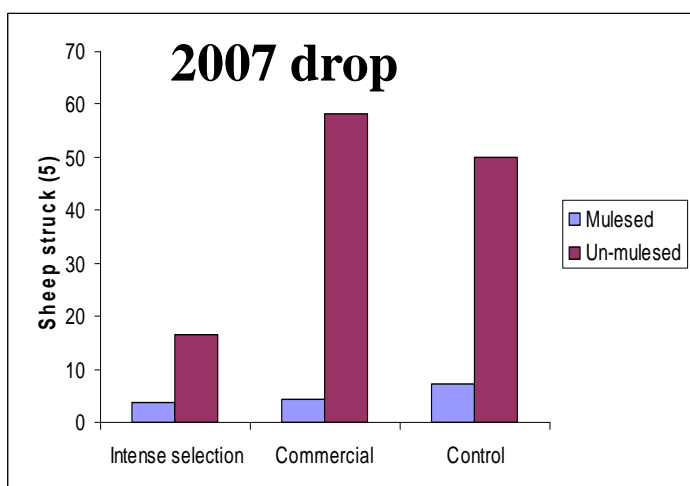
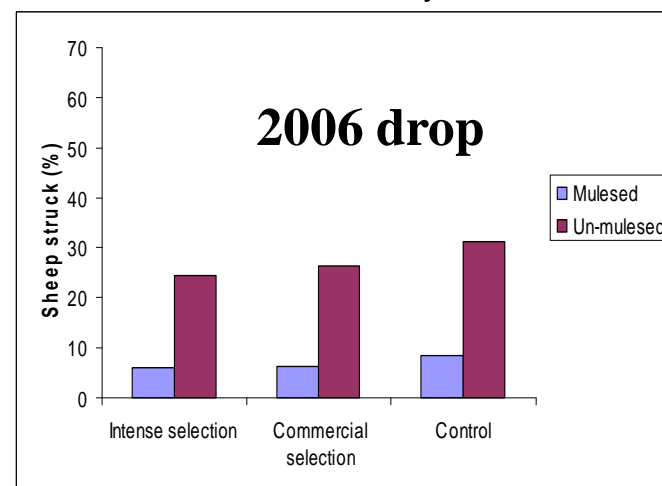
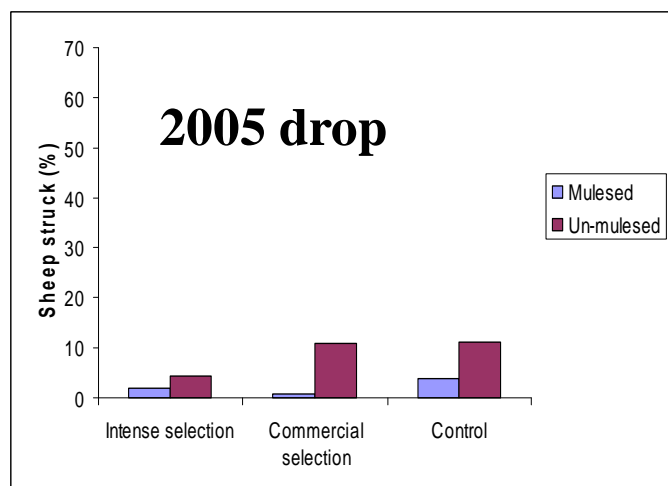
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Incidence of breech strike, Mt Barker

Courtesy Johan Greeff, DAFWA



Incidence of weaner breech strike, Armidale

