

Finding new traits to improve cow genetic merit for fertility

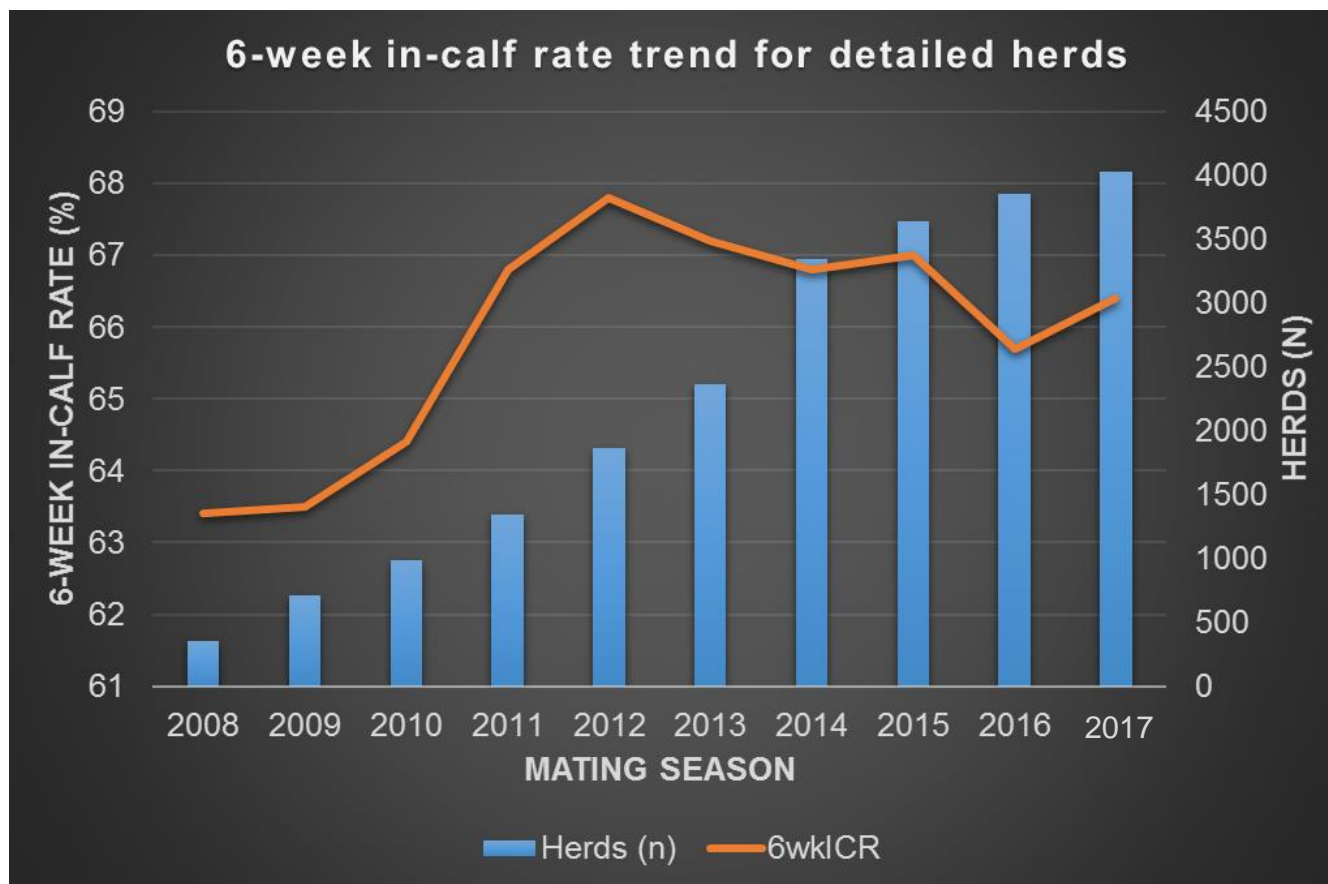
Chris Burke, Susanne Meier & Claire Phyn

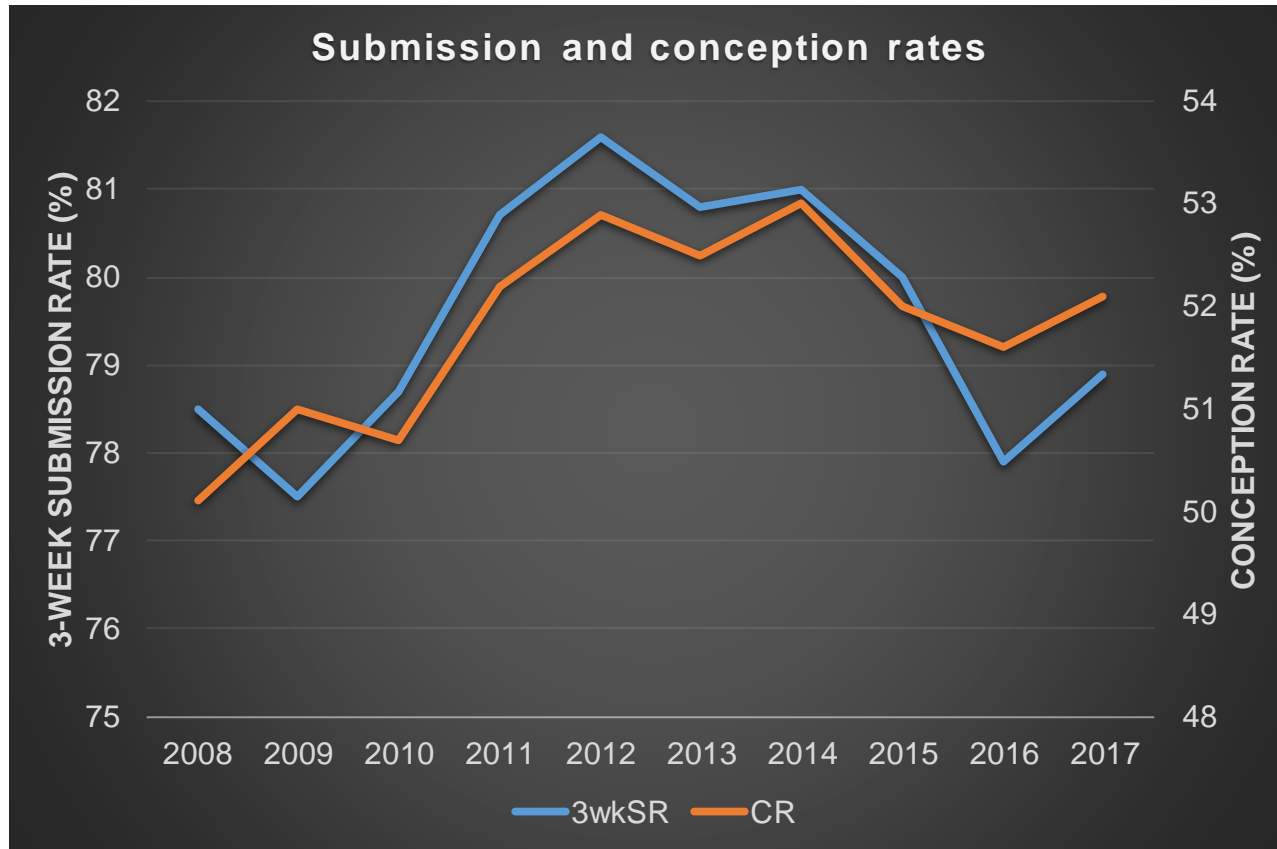
NDDT Conference, 3 April 2019, Whangarei



The “take homes”

1. The Fertility BV works; but,
2. Faster genetic gain is possible, if it was more accurate
3. New measures are being tested to achieve greater accuracy in the Fertility BV





The “Fertility Research” herd

- Contract mating for +5 vs. -5 Fertility BV, but balanced for other traits
- 640 heifer calves collected (\approx 9 d old)
- 550 heifers reared
- 481 1st lactation cows
- 345 2nd lactation cows



2015



2016/17



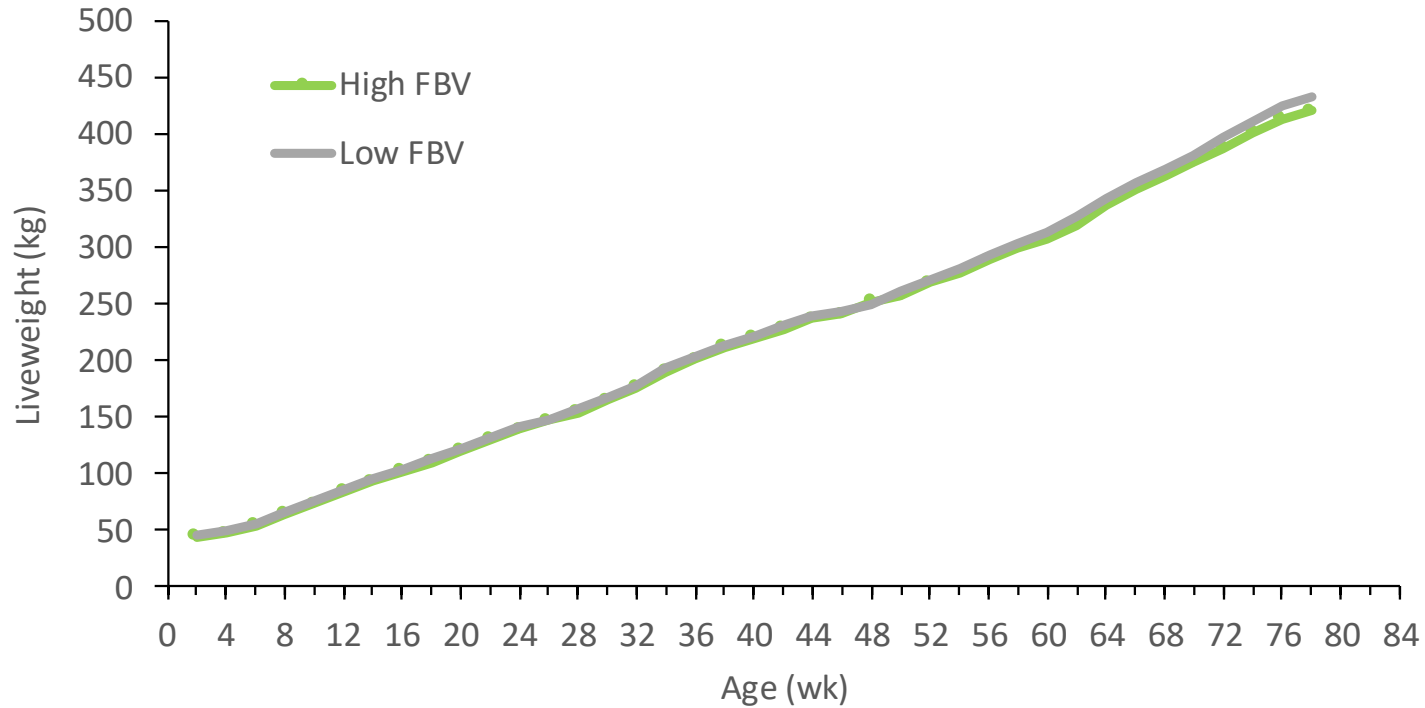
2017/18 - 19

Early measures

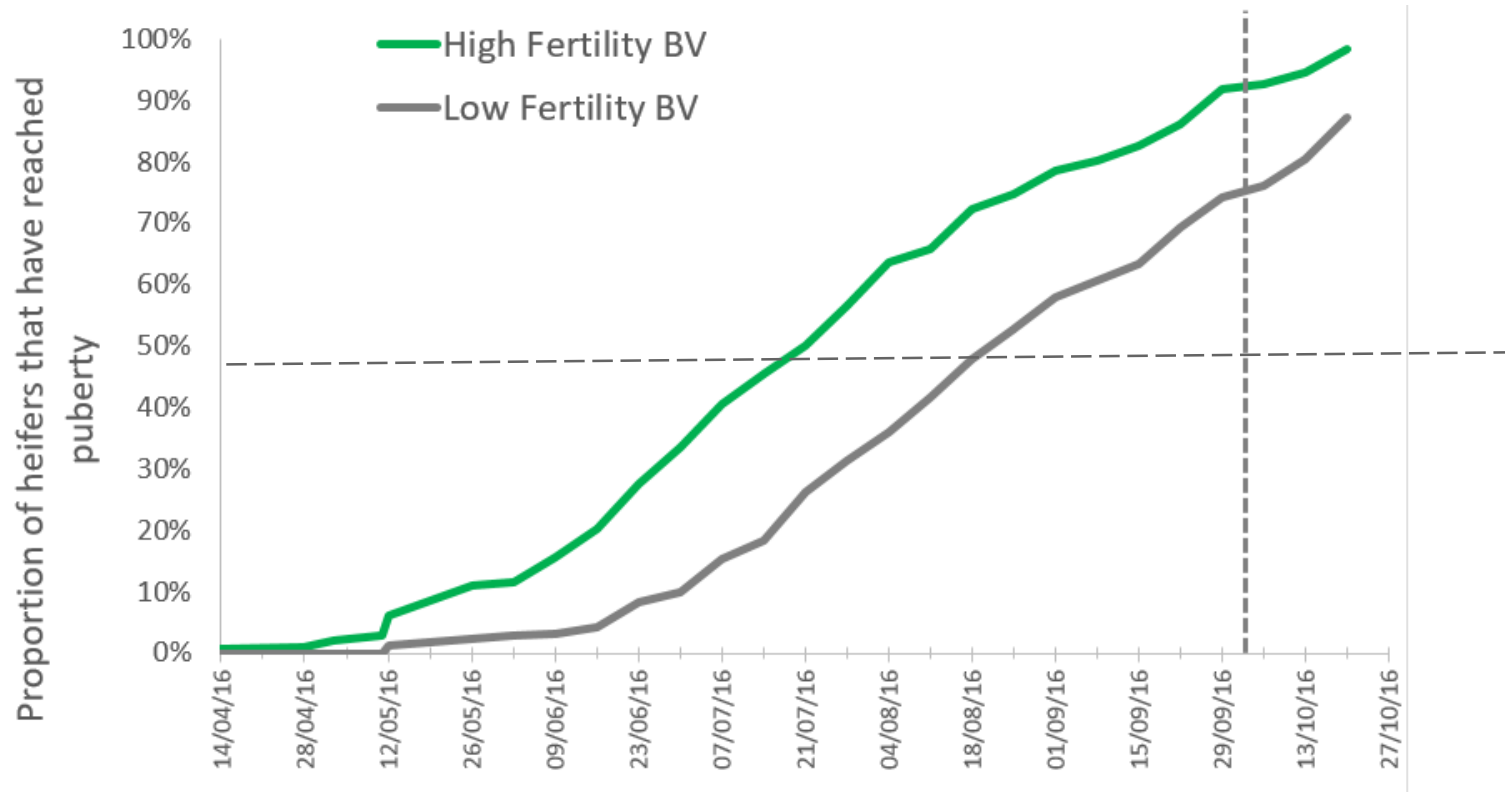


What did we find?

Liveweight



Puberty



Puberty measures

Trait	High FBV (275)	Low FBV (249)
Age at puberty	358 d	379 d
LWT at puberty	271 kg	296 kg
Percentage mature LWT	51%	55%

21 DAYS SOONER **25** KGs LIGHTER

Heifer pregnancy



Heifer pregnancy

Reproductive outcomes	High FBV	Low FBV
3-wk in-calf rate	72%	63%
6-wk in-calf rate	90%	81%
Not-in-calf rate (14 wk mating)	2.2% (n=6)	6.4% (n=17)

+9%

6-week in
calf rate

What does this mean



Accelerate genetic gain

- Puberty is predictive of genetic fertility
- Heifer pregnancy is predictive of genetic fertility

21 DAYS SOONER **25** KGs LIGHTER
+9% 6-WEEK IN CALF RATE

1st Lactation: Submission rates

Measures (raw means) no intervention	High FBV (257)	Low FBV (224)	Diff
3-wk submission rate	87%	48%	39%
6-wk submission rate	95%	55%	40%



1st Lactation: in-calf rates

Measures <small>(raw means)</small>	High FBV (257)	Low FBV (224)	Diff
3-wk in-calf rate	55%	26%	29%
6-wk in-calf rate	67%	33%	34%
Not-in-calf rate (12 wks mating)	18%	42%	24%

What does this mean

- Two populations in Low Fertility BV group!!
 - Cycled (7 days later)
 - Did not cycle
- 'We' should have confidence in the Fertility BV
- Economics of reproduction:
 - 34% 6-week in-calf rate gap & 25% not-in-calf rate gap
 - Average size herd of 432 cows**

\$166,752



Anogenital distance (AGD)

- AGD is normally distributed, highly variable & moderately heritable



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Characterization of anogenital distance and its relationship to fertility in lactating Holstein cows

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Canadian HF – association with cow fertility



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The relationship between anogenital distance and fertility, and genome-wide associations for anogenital distance in Irish Holstein-Friesian cows

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Irish HF – no association with cow fertility

2nd lactation: Submission rates

Measures <small>(raw means)</small> no intervention	High FBV (204)	Low FBV (121)	Diff
3-wk submission rate	87%	55%	32%
6-wk submission rate	93%	64%	29%



- The pattern is repeating?
- Not all the 'poor fertility' cows were lost last year!

2nd Lactation: in-calf rates

Measures <small>(raw means)</small>	High FBV (204)	Low FBV (121)	Diff
3-wk in-calf rate	49%	27%	22%
6-wk in-calf rate	74%	39%	35%
Not-in-calf rate (11 wks mating)	13%	44%	31%

What's next?

- Targeting the puberty & AGD traits
- Large data sets - scale-up to 5,000 heifers this Autumn
- Quality data – target herds with very high quality recording
- Accurate, safe, practical method, and affordable!

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Support

Ministry of Business,
Innovation and Employment
(MBIE) funding

DairyNZ Inc. funding

AgResearch

NZAEL

NS&C teams

- DairyNZ technicians
- DairyNZ farm staff
- Casual staff
- Animal Science



Farmers



Industry support

- LIC, CRV

Commercial entities

Technical experts

- National
- International