



# Trade off between genetic gain and inbreeding

in the Australian dairy herd

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# Genomic Selection

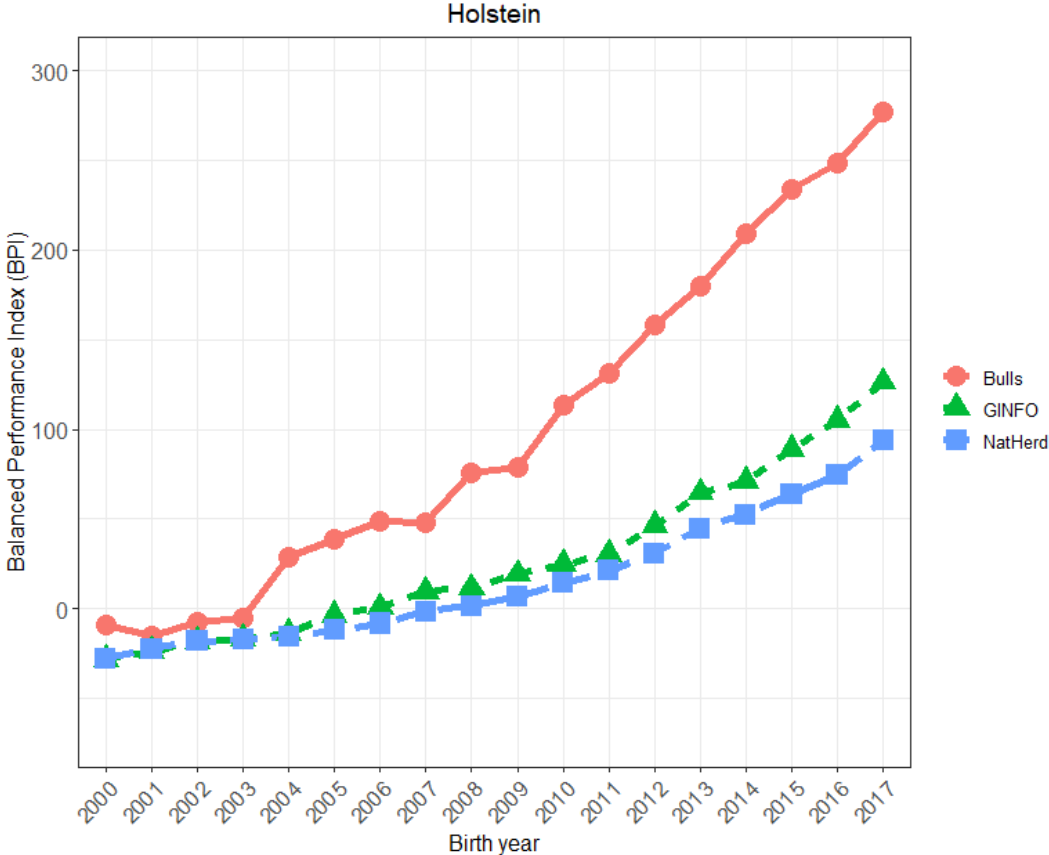
Introduced



- Decrease in the generation interval
- Increase in genetic gain
- Better able to select for low heritability traits
- Select for new traits
  - feed saved, mastitis resistance, heat tolerance etc.
- Increase in inbreeding

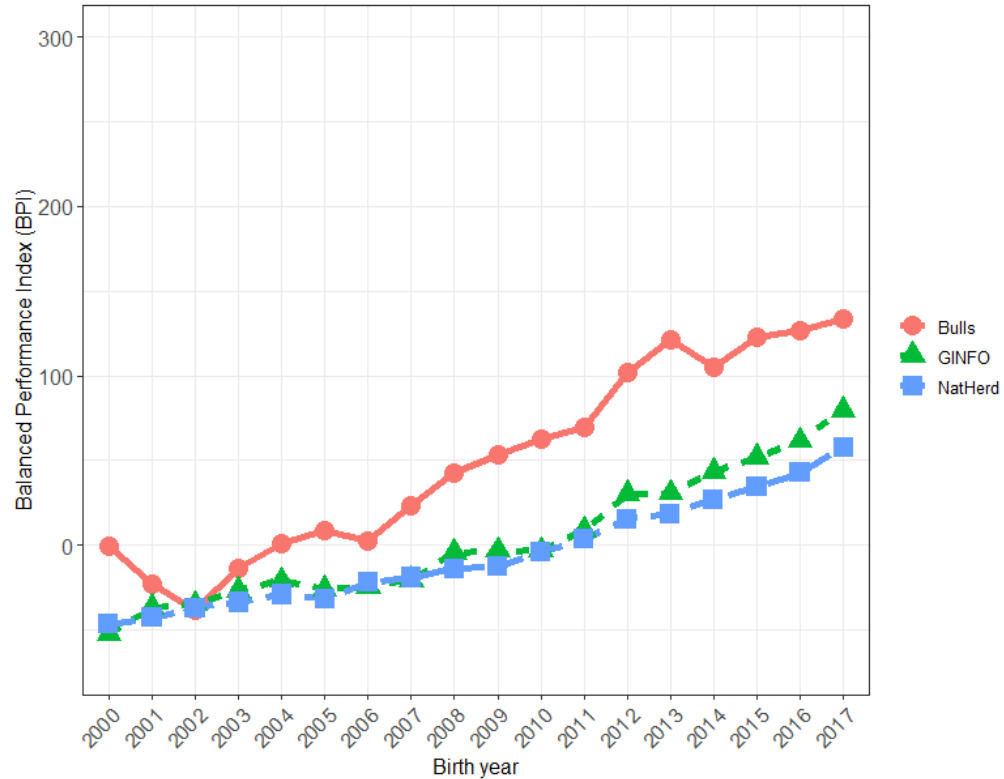
**What impact has GS had on the Australian Population??** RIA

# Balanced Performance index



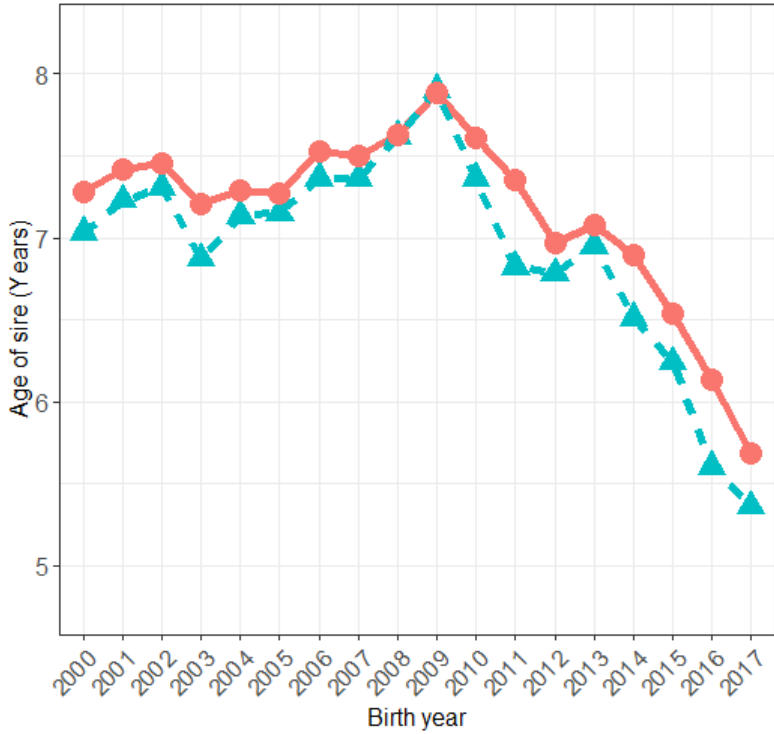
# Jerseys

## Doubled rate of genetic gain in cows

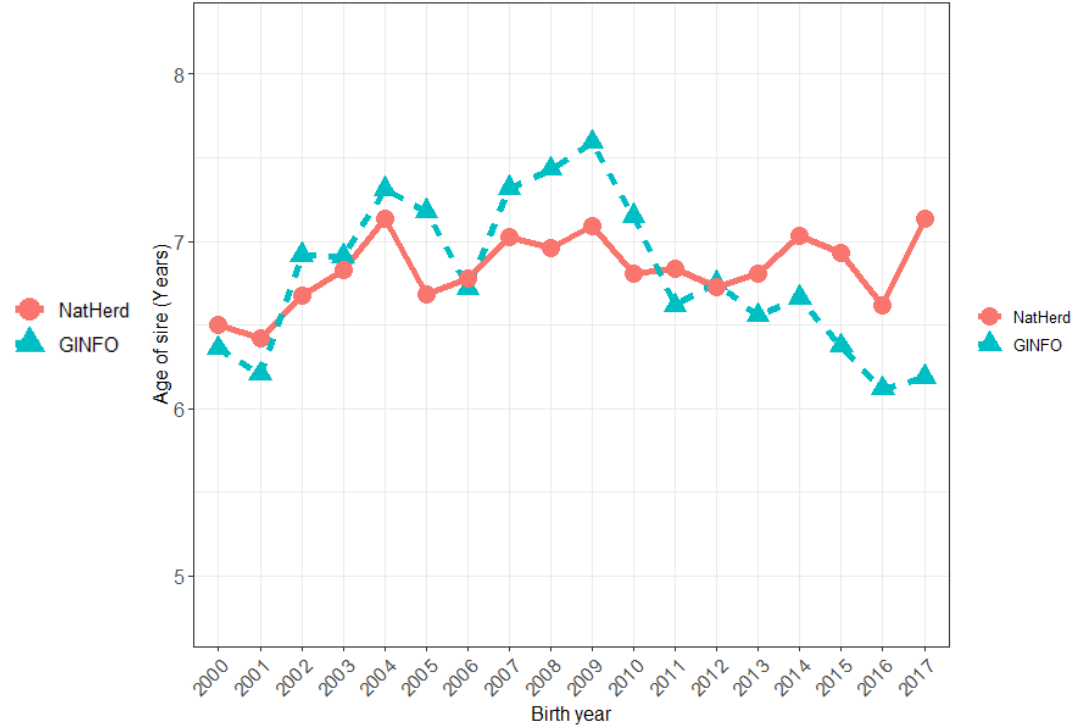


# Generation Interval – Age of sires

Holstein



Jersey



## Inbreeding

*“... mating of related individuals and is defined as the probability that two alleles at any locus are identical by descent”*

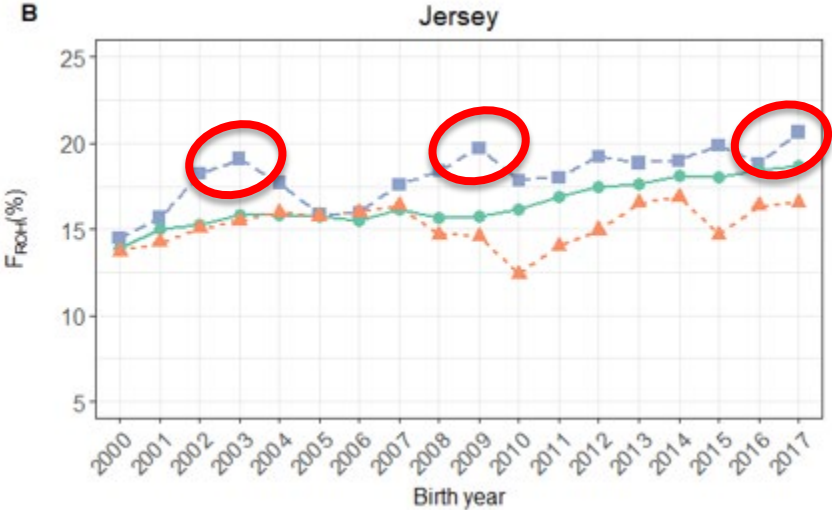
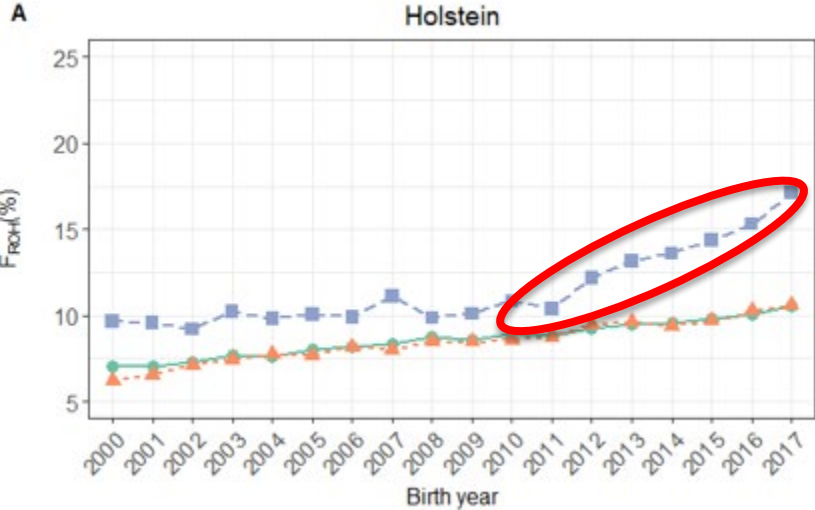
- Unavoidable in populations of limited size
- Measured through pedigree or genomics
- Long-term impacts
  - Decreased ability to adapt to change
  - Decreased response to selection
- Short-term impacts
  - Inbreeding depression on farm

## Why do we care?

Example – GINFO Holstein cows

- Protein ABV increased 4.4kg
- Genomic inbreeding increased 1.15%
- 1% increase in inbreeding = 0.63 kg loss in protein
- Net gain = 3.60 kg
  
- Worse in traits affecting survival and fertility

# Inbreeding is escalating





# Inbreeding in Australia is worse than overseas



0.18 - 0.55% increase per year



# Focusing on the top bulls will increase inbreeding



Rank	Bull ID	BPI \$	Bull Name
1	0200JE00183	<b>339</b>	SUNSET CANYON DAVID
2	CRDIVIDEND	<b>286</b>	SUNSET CANYON DIVIDEND - ET
3	7J1038	<b>275</b>	ALL LYNNS LOUIE VALENTINO
4	CRDIVINE	<b>266</b>	SUNSET CANYON DIVINE - ET
5	29JE3830	<b>266</b>	SUNSET CANYON DAZZLER-ET

Sire: All Lynns Louie Valentino-ET

Dam: Pearlmont Impuls Daffy EX-90%

MGS: ISDK Q Impuls

MGD: Pearlmont Paramount Daffodil EX-91%

Sire: All Lynns Louie Valentino-ET

Dam: Pearlmont Restore Dixie-ET EX-90%

MGS: Schultz Dudley Restore

MGD: Pearlmont Impuls Daffy EX-90%

MGGD: Pearlmont Paramount Daffodil EX-91%

Sire: Hawarden Impuls Premier

Dam: Pearlmont Restore Dixie-ET EX-90%

MGS: Schultz Dudley Restore

MGD: Pearlmont Impuls Daffy EX-90%

MGGD: Pearlmont Paramount Daffodil EX-91%

## Focusing on polled will increase inbreeding

- Example of diversity when selecting for high BPI polled bulls

## Where are we now?

- Doubled the rate of genetic gain for BPI under genomic selection in cows
- Inbreeding has increased considerably
  - Increasing concern in Holsteins
  - Selecting for specialist traits makes it worse
- Australia is lagging behind
- Currently not really doing anything about it

Thank you farmers that  
supply high quality data