October 2013

Australia's genomic information nucleus (Ginfo)

Jennie Pryce

Genomic information nucleus (Ginfo)

Intro….

Outline

DFCRC research to improve fertility using genetics

1. New fertility ABV
2. More data
3. Ginfo

Multi-trait fertility model

Launched in April 2013

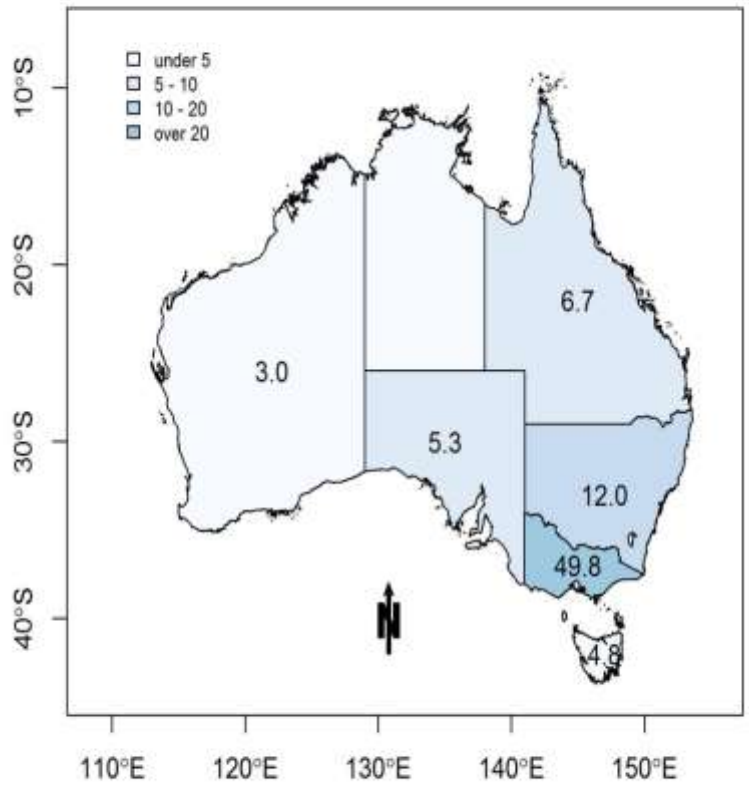
Bulls born since 2000:
Fertility breeding values

Breed	Number	Reliability OLD	Reliability NEW	Change
Holstein	2421	61.9	68.3	6.5
Jersey	498	62.4	70.0	7.6

Number of bulls with publishable proofs

	Holstein		Jersey	
	Old ABV	New ABV	Old ABV	New ABV
Domestic	3,711	7,038	746	1,350
Interbull	0	55,362	0	2,466
Total	3,711	62,400	746	3,816

Percentage of herds that have insemination data that qualifies for fertility breeding values



Action

- Project underway to increase the amount of fertility data that is captured
- Increase of 18% cows with fertility data that qualifies for ABV calculation in the same period for data extracted in August 2012 and March 2013
  - Increased awareness milk recording companies
  - Actively going out and getting the data

Potential impact of extra data
Fertility breeding values

Breed	Number	Reliability NEW	Reliability + 10% extra data	Reliability + 20% extra data
Holstein	2421	68.3	72	75
Jersey	498	70.0	74	77

Benefits larger for bulls with lower numbers of daughters

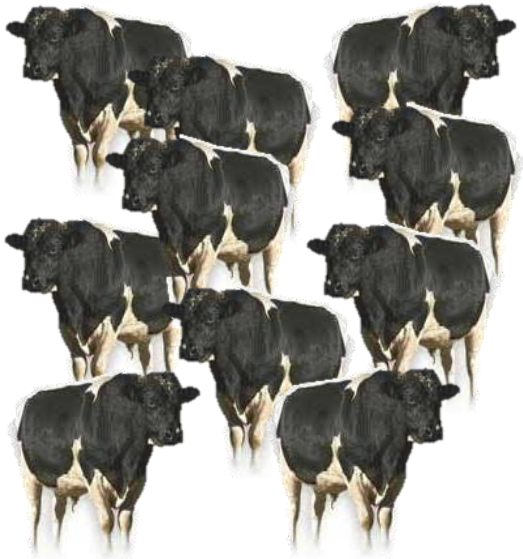
Genomic information nucleus (Ginfo)

Ginfo

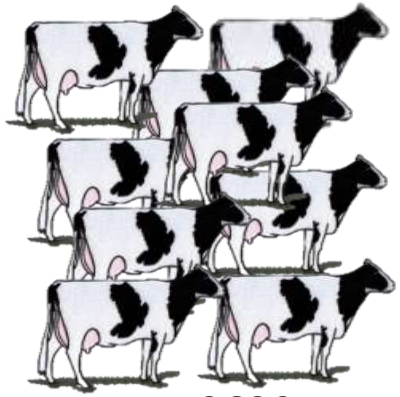
Herds contributing most data to ABVs

Genetic diversity

Holsteins and Jerseys



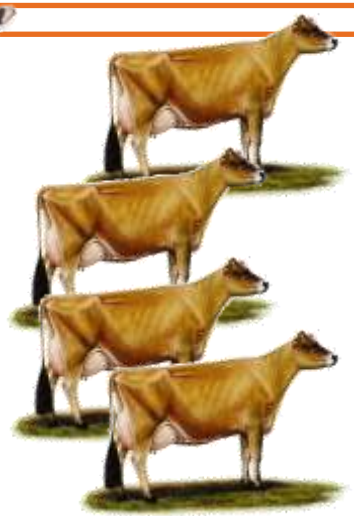
3719 bulls with
Australian daughters



9630 cows
deliberately selected

10,000 cow

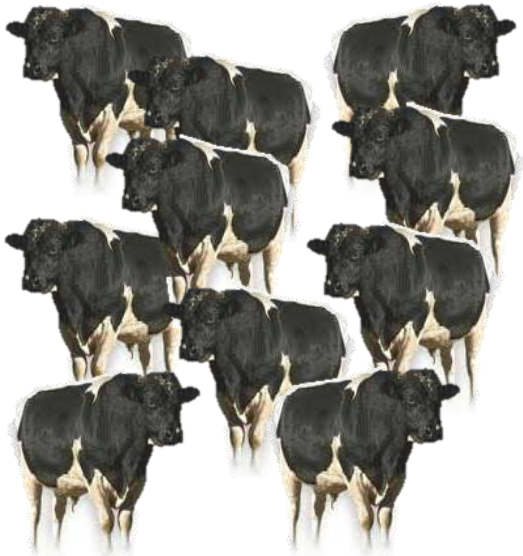
1017 bulls with
Australian daughters



JERNOMICS

4249 cows
deliberately selected

Australian National DNA Reference population



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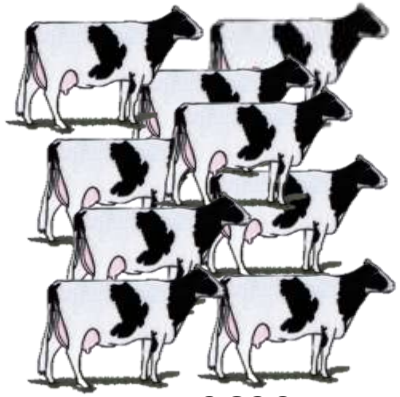

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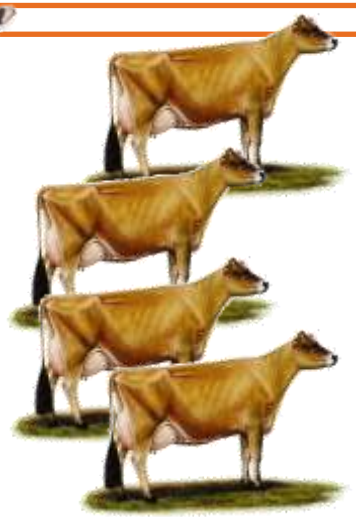

JERNOMICS

4249 cows
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Ginfo

Genomic information nucleus

- 10,000 Holstein genomes and Jernomics captured 1 time-point, *Ginfo* is designed to be on-going
- Work with herds with great data, rather than cows with great data
- The reference population needs updating, predictions of genomic breeding values deteriorate as the reference population differentiates from the general population
- Scoring system to identify cows with excellent records

Ginfo ambassadors

Con Glennen

Patrick Glass

DairyFutures CRC

DairyFutures CRC

Contact
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Further Information

Brochure: Collecting tail hair

Youtube video: Tail hair collection for genotyping

Department of Environment and Primary Industries

Australian Dairy Herd Improvement Scheme

Holstein Australia

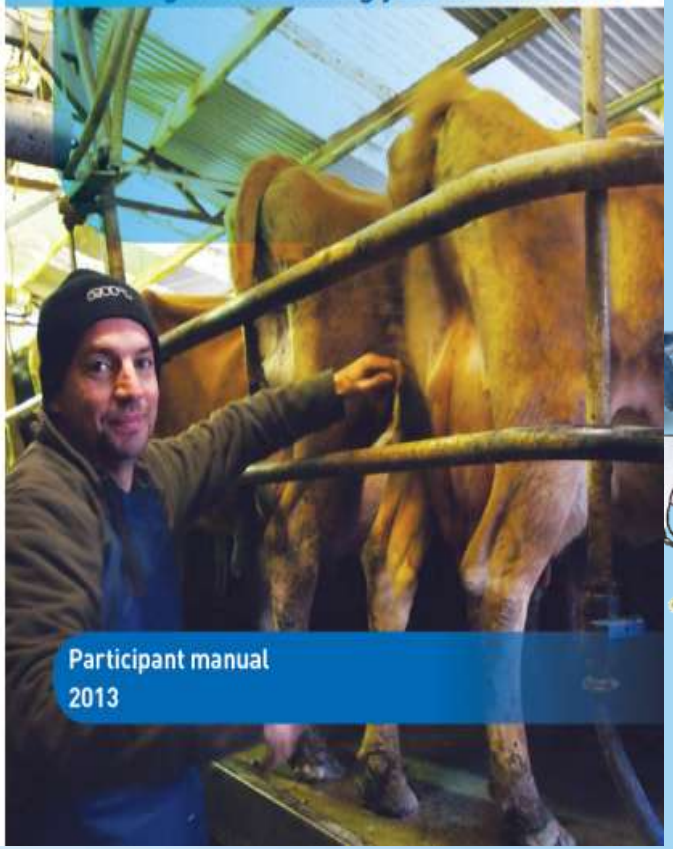
Dairy Australia
Your Levy at Work

www.dairyfuturescrc.com.au

DairyFutures CRC

Ginfo

Better genomics using your herd records



Participant manual
2013

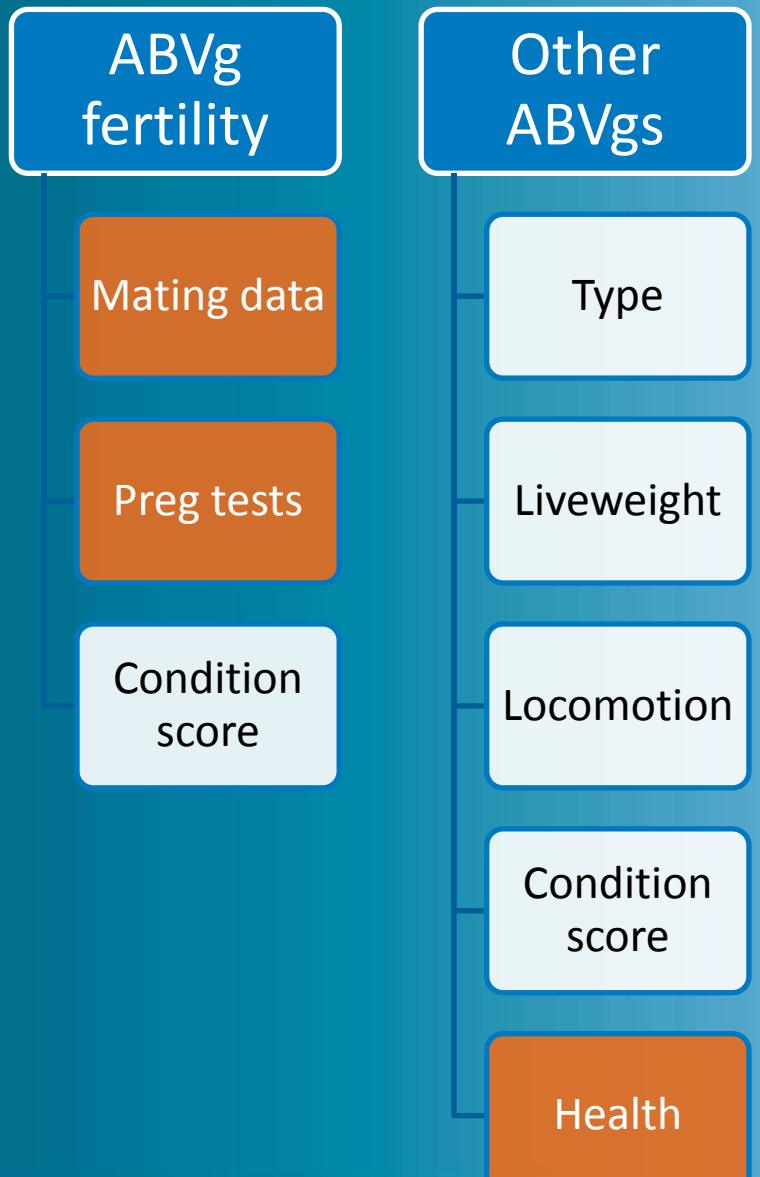
How Ginfo will contribute to ABVgs

Data

30,000+ cows

Great recorders of herd data

Extra phenotypes collected by Holstein Australia



Novel phenotypes (not part of current project)

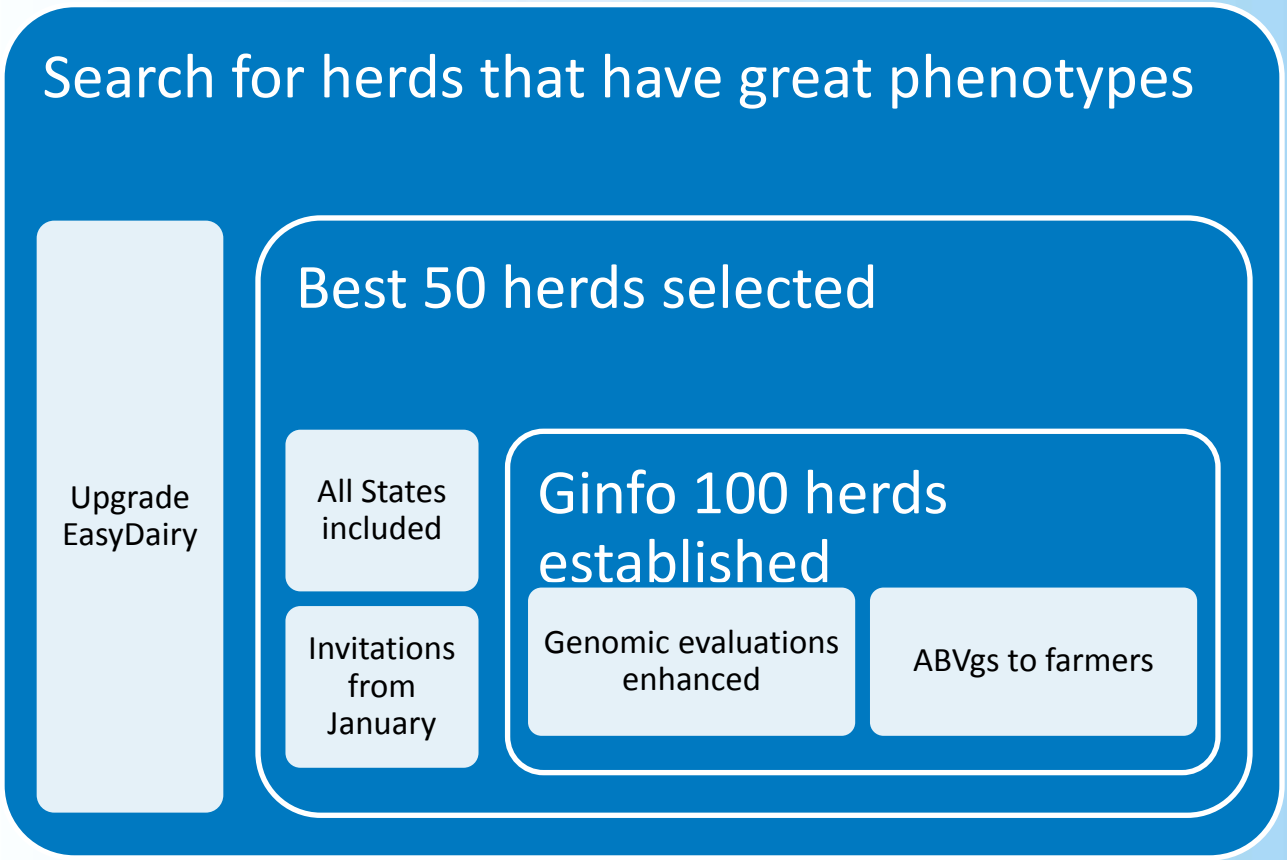
–Some possibilities…

- Pregnancy-testing using milk
- Most cows have preg-test results
- Pedometers or GPS monitors
- Fatty acids from blood (some herds) NEFAs etc
- MIR (mid-infrared technology)

Ginfo – farmer benefits

- Free genotyping of lactating cows
- ABVgs for all cows
- Parentage verification
- Two year olds classified
- Reduced cost genotyping of heifers
  - Selection of replacements
- Advance on new reports (to be developed)
- Open days and information sharing

The next 50 Ginfo herds



Summary

ABVgs will have higher reliabilities because of Ginfo
Ginfo is part of the DFCRC strategy for continuous improvement of genomic predictions and fertility phenotypes for Australia
Ginfo will help to improve fertility through genetics

Acknowledgements

- Ginfo farmers
- Dairy Futures CRC
- DEPI
- ADHIS
- Holstein Australia
- Jersey Australia

- Matt Reynolds, Coralie Reich, Thuy Nguyen, Ben Hayes, Rohan Butler, Phil Bowman, Pete Williams, Mekonnen Haile-Mariam, Oscar Gonzalez-Recio

Questions?

In the age of the genotype…… SAC

PHENOTYPE IS KING!

Prof Mike Coffey (SRUC, Edinburgh)

Reliability of fertility with genomics

Group	Pre-genomics	Post-genomics	Change
Young sires	0.16	0.38	0.22
Progeny test	0.44	0.55	0.10
2nd crop	0.79	0.80	0.01

Slide title

Optional subhead

- Large scale
- 96% household penetration
- Value-adding ($4.6B – $11.5B)
- First level bullet text style with second level nested bullet
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  - second level bullet
  - second level bullet

Subhead

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Slide title

Genomics making a difference to fertility

A new genomic information nucleus (Ginfo) established

A new multi-trait fertility ABV has just been released

We are working towards getting more mating and pregnancy test data to get the most out of this model!

Slide title

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Subhead

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Slide title

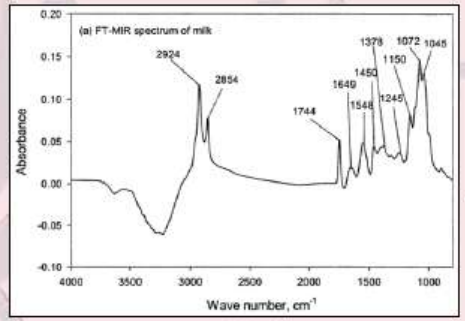
Nicolas Gengler (2013)

Use of MIR spectra

Milk recording

Mid infra-red spectrometry

MIR spectra



Calibration equations

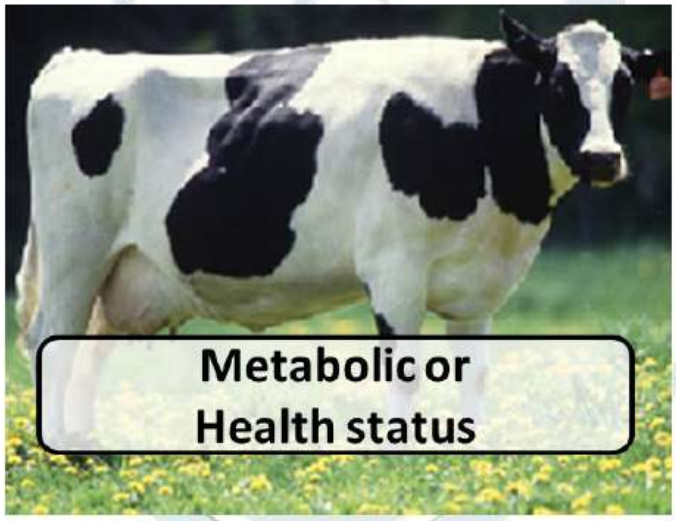
Milk components

Fat
Protein
Urea
...

Reference data

Nicolas Gengler (2013)

First predict milk composition ...
Then predict status of the cow



Reference data

Prediction equations

Milk components
Fat
Protein
Urea

+
Fatty acids
Minerals
Lactoferrin
....

Presenter's name

www.dairyfuturescrc.com.au