Trends in dairy herd genetic, production and reproductive performance and impact on farm profit

Richard Shephard & Bill Malcolm

13/02/2019

Introduction

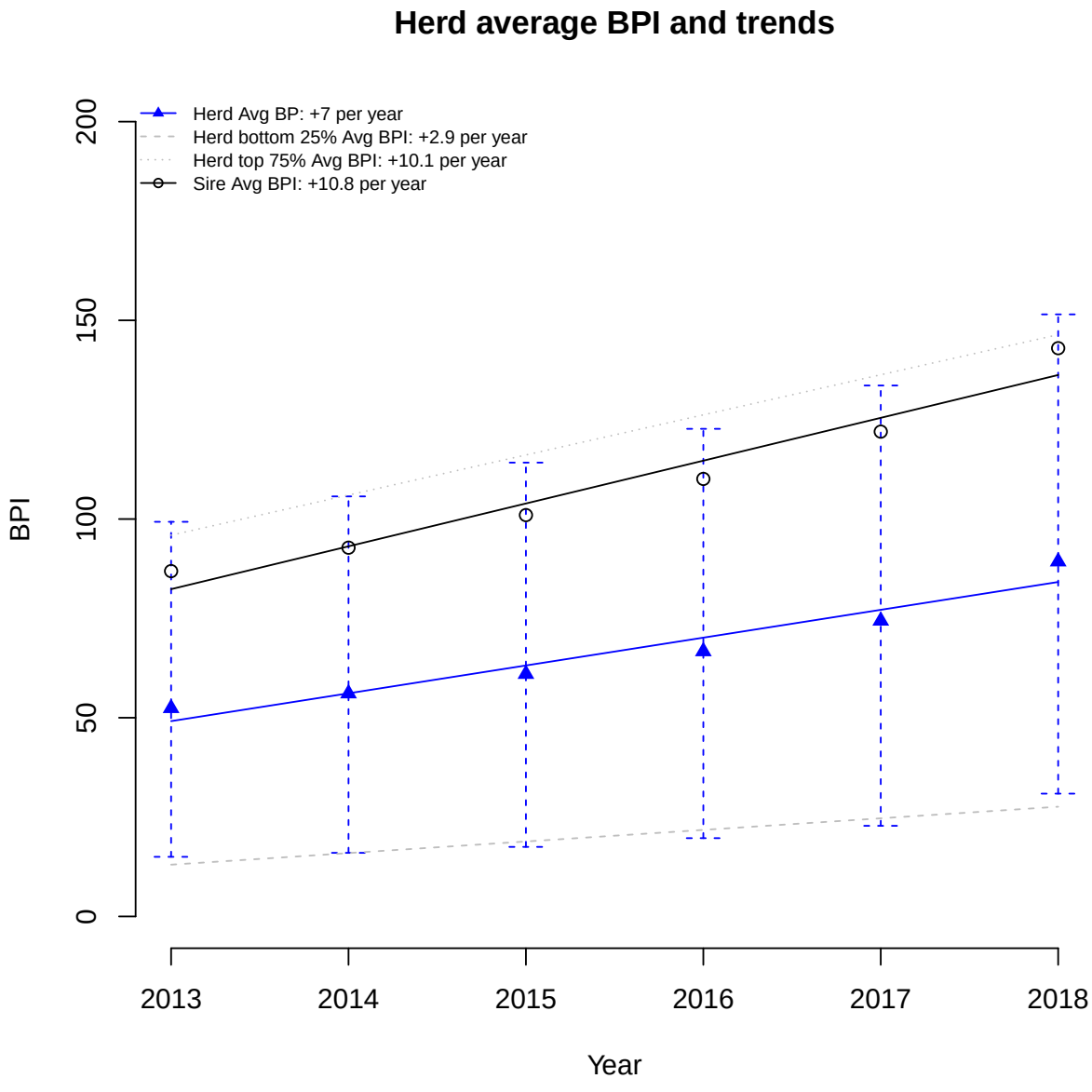
- Industry is using multi-trait genetic indices to identify superior animals
- The Balanced Production Index (BPI) is developed as a profit-based index (+1 BPI unit represents +$1)
- A wide range in BPI of 78–120 units is proposed to provide a range in annual cow contribution to profit of $150–235 per cow between top and bottom BPI quartile cows within herds.
- Industry promotes investment in genetics based on these findings.
- Dairy farm profitability has been variable/absent in recent years suggesting these cow-level predictions of difference in profit performance do not scale up to herd-level profit responses

Analysis

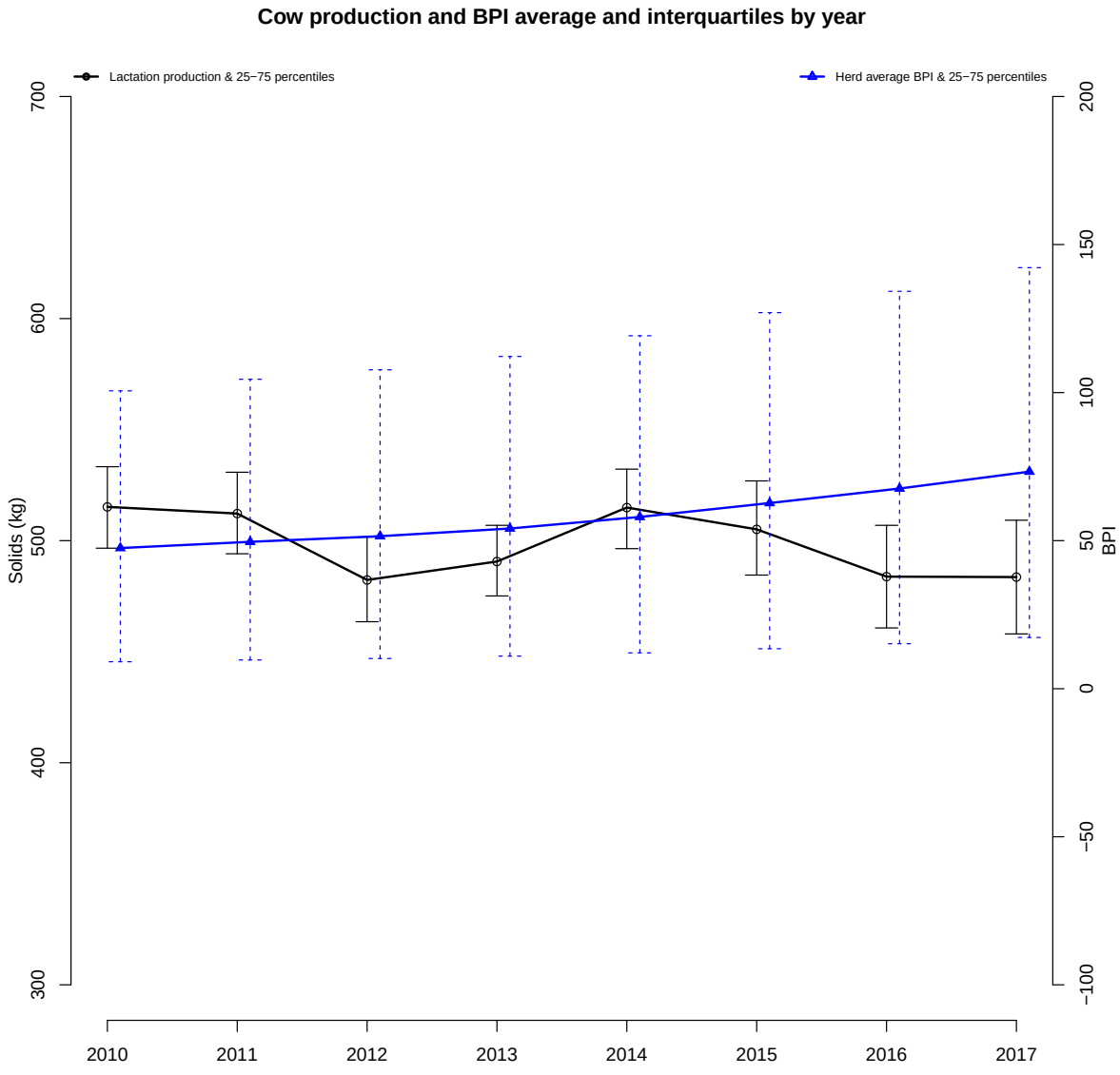
Activities:

- Examined herd recording data to determine trends in cow and herd genetic merit, production and reproduction
- Modelled impact of genetic selection on herd genetic merit trends and within-herd genetic distribution
- Explored impact of genetic change on whole-farm profit using bioeconomic modelling validated against herd recording data

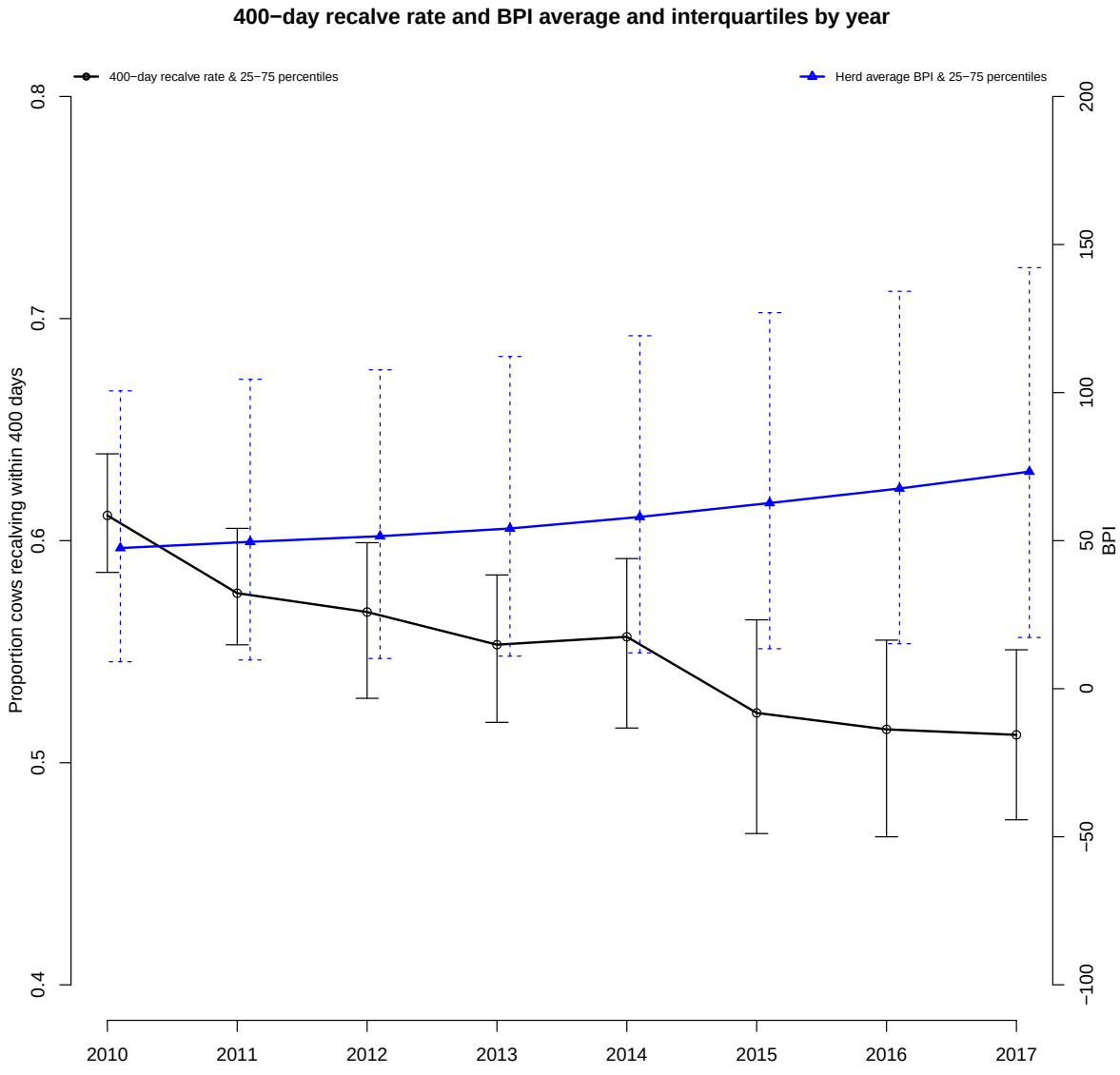
BPI and AI sire trends



BPI and production trends



BPI and herd reproduction trends

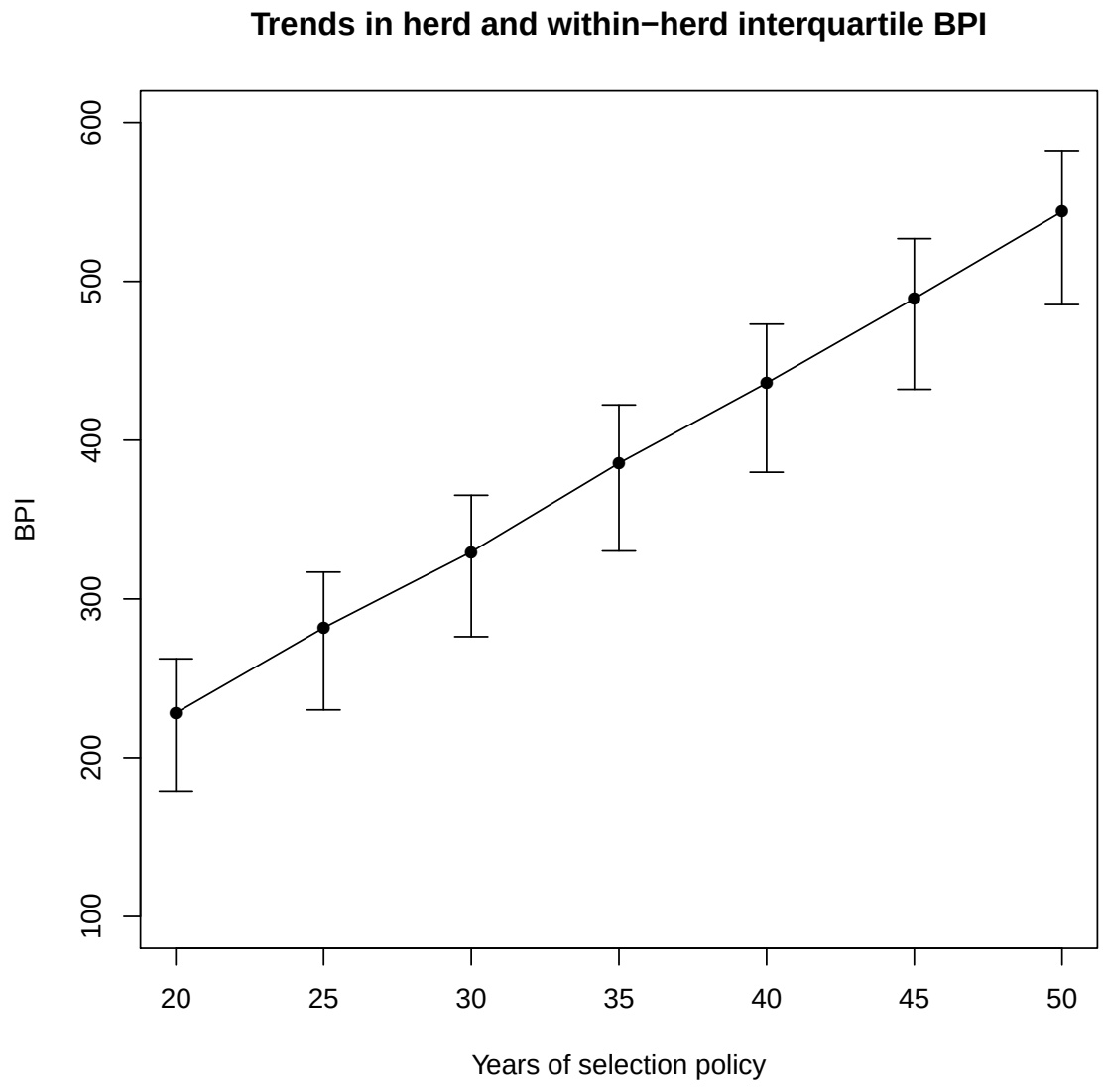


BPI and herd physical changes

- BPI has increased by around 7 units per year
- Cow lactation production has decreased
- Cow reproductive performance (as measured by 400-day re-calving rate) has declined

for the whole herd and for top and bottom cow BPI quartiles

BPI range within herd over time



BPI trends

- There is an increasing trend of ~9–10 units per year.
  Within-herd range of cow BPI slowly increases from around 70 towards 100 over many years
- This implies estimated differences in cow contribution to profit between top and bottom cow BPI quartiles (as calculated using input costs and output prices) will remain consistently wide within a herd.
- This questions the value of any within-herd difference in profit as a guide to future farm profit or of how much should be invested in cow genetics next year

Bioeconomic modelling

Table 1: Whole-farm 10-year annuity of farm gross margin from modelling selection and culling strategies (herd size: 250 cows, projection: 10 years)

Calving pattern	Test scenario	Net dollars ($)	Delta dollars ($)	Delta (%)
Year round	No selection - Low culling	341,122	-	-
	No selection - Mod culling	341,751	629	0.2
	No selection - High culling	337,600	-3,522	-1
	selection - Low culling	343,820	2,698	0.8
	selection - Mod culling	344,394	3,272	1
	selection - High culling	340,317	-805	-0.2
Split Calve	No selection - Low culling	289,988	-	-
	No selection - Mod culling	288,519	-1,470	-0.5
	No selection - High culling	284,951	-5,037	-1.8
	selection - Low culling	291,858	1,870	0.6
	selection - Mod culling	291,212	1,224	0.4
	selection - High culling	286,964	-3,025	-1.1
Seasonal Calve	No selection - Low culling	348,461	-	-
	No selection - Mod culling	348,930	469	0.1
	No selection - High culling	348,740	279	0.1
	selection - Low culling	354,146	5,684	1.6
	selection - Mod culling	354,263	5,802	1.6
	selection - High culling	355,377	6,916	1.9

Average size of simulated herd: 250 cows

Bioeconomic modelling predicted

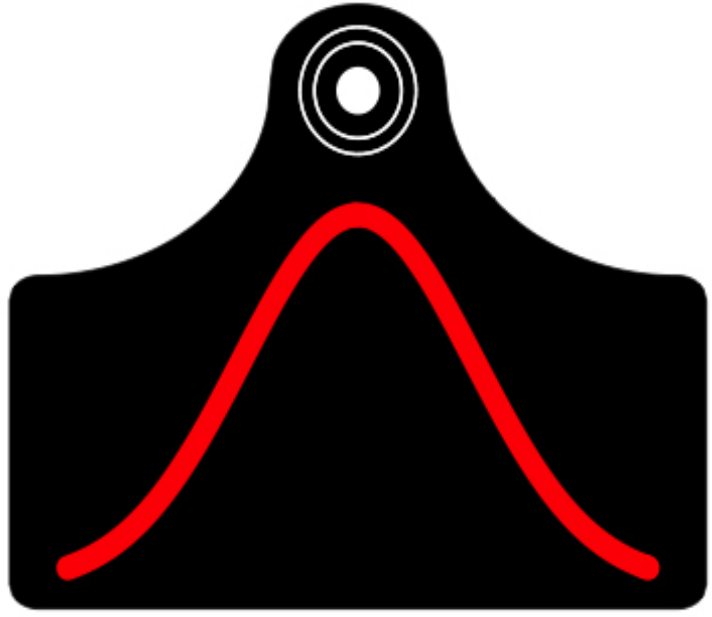
- Annual herd BSI response of 8 units per annum
- Increased lactation production of 1.7 kg solids and an increase in 400-day recalve rate of 0.5% per year
- Estimated average annual increase in farm gross margin for herds actively selecting for genetic improvement of $2,600 for a 250-cow herd

Rates of genetic gain reflect industry data rates of change. Suggests around $10 extra profit per cow per year for 8–10 unit increase in herd BPI per year. This represents a 0.6% increase in herd gross margin for an average annual 10-unit increase in BSI

Discussion

- Rates of herd gain in genetic merit as measured by BPI are modest
- Comparing estimates of difference in cow contribution to profit for top and bottom cow BPI quartiles does not predict future farm profitability; information is essentially inactionable
- Farm profit responses attributable to genetic merit change are modest
- Investment into cow genetics needs to be compared to profit responses from other farm investments.
- The most rational approach is to focus on improving the most limiting factor on the farm. Sometimes this can be herd genetics.

Thank-you



HERD HEALTH

www.herdhealth.com.au

AARES paper and presentation available from the Downloads page