

HIGHLIGHTS

- In all feeding systems, the daughters of high index (BPI, HWI or TWI) sires **produce more milk solids** than daughters of low index sires.
- In all feeding systems, the daughters of high index (BPI, HWI and TWI) sires **last as long or longer** than daughters of low index sires. However the effects of sire index vary by index and feeding system:
 - ▲ The HWI has larger effects on longevity than BPI or TWI.
 - ▲ Low bail: daughters of high BPI and HWI sires last longer than daughters of low index sires.
 - ▲ Mod-high bail, PMR and hybrid: daughters of high index (BPI, HWI and TWI) sires last longer.
 - ▲ TMR: daughters of high HWI sires last longer.
- Regardless of feeding system, herd managers should select high index sires whose ABVs are aligned with the breeding objectives for their herd.

The study

The 2016 Feeding the Genes study investigated interactions between sire genetics and feeding systems on:

- milk solids production; and
- the cow's chance of lasting in the herd.

It also looked for interactions between sire genetics and overall herd production level. Both Holstein and Jersey cows were studied.

These interactions were studied using data from 505 commercial Australian dairy herds with a wide range of feeding systems. Data from 240,000 lactations and almost 118,000 cows were used.

This study builds upon the 2011 Feeding the Genes study which used the Australian Profit Ranking (APR) index as the measure of genetics. In 2015, the APR was replaced by three new breeding indices, Balanced Performance Index (BPI), Health Weighted Index (HWI) and Type Weighted Index (TWI) that better reflect the profit drivers and breeding preferences of Australian farmers. The new indices have been analysed in this study. Milk production was based on 305-day lactation figures and longevity was measured as the percentage of cows that re-calved by 20 months.

The study also investigated effects of both sire BPI and Australian Breeding Value (ABV) for daughter fertility on cow reproductive performance using 74 herds with high quality reproductive data. Those findings are reported in a separate Results preview.

Dairy's five feeding systems

Feeding systems on Australian dairy farms fall into five categories:

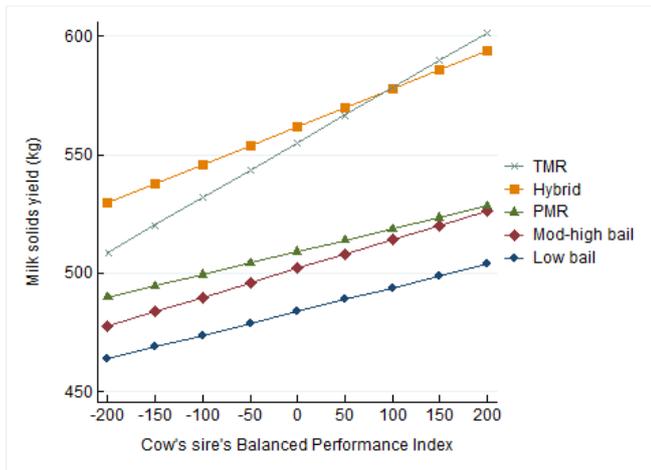
1. **Low bail**
Grazed pasture + other forages + up to 1.0t grain or concentrates fed in the bail.
2. **Moderate-high bail**
Grazed pasture + other forages + more than 1.0t grain or concentrate fed in the bail.
3. **Partial mixed ration (PMR)**
Pasture grazed for most or all of the year + mixed ration fed on feed pad with or without grain or concentrates fed in the bail.
4. **Hybrid**
Pasture grazed for less than nine months per year + mixed ration fed on feed pad with or without grain or concentrates fed in the bail.
5. **Total mixed ration (TMR)**
Cows fed total mixed ratio; zero grazing

Genetics, feeding and production

Herd managers do not need to feed high levels of supplements to benefit from selecting high BPI sires.

The results show that in all feeding systems, the daughters of higher BPI sires produce more milk solids than daughters of lower BPI sires. However the scale of response to using high BPI sires varies between feeding systems. The table over the page shows the benefits are greater in herds using more intensive feeding systems (hybrid and TMR).

| Impact of sire BPI on milk solids yields. | | |
|---|---|--------|
| | Kg milk solids/cow/305d lactation for every 50 unit increase in sire BPI. | |
| | Holstein | Jersey |
| Low bail | 5.0 | 4.3 |
| Mod-high bail | 6.1 | 5.9 |
| PMR | 4.8 | 6.0 |
| Hybrid | 8.0 | n/a |
| TMR | 11.6 | n/a |

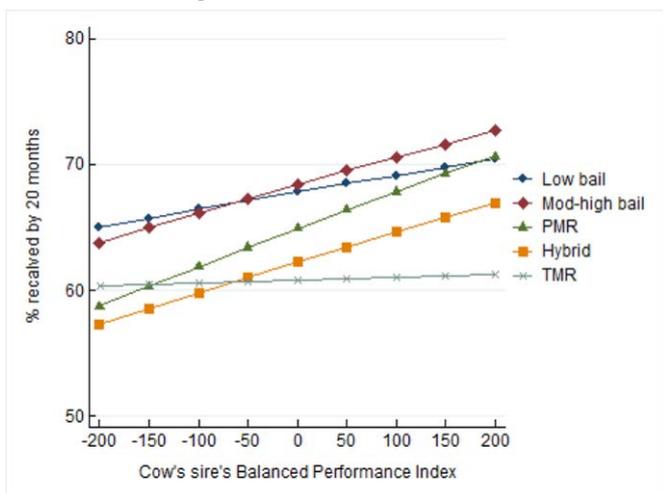


▲ 305d milk solids yields by cow's sire's Balanced Performance Index for lactations from Holstein cows by feeding system

Genetics, feeding and longevity

In pasture-based feeding systems (ie all systems other than TMR), the daughters of high BPI sires are *more* likely than other cows to last in the herd. In TMR herds, there is no marked effect of a cow's sire's BPI on her longevity in the herd; daughters of high BPI sires are *just* as likely as their herdmates to last in the herd.

These results are similar to the 2011 study and the difference with TMR herds warrants further investigation. This difference may be due to different culling priorities in TMR herds.



▲ Predicted percentages of cows that recalved by 20 months by cow's sire's Balanced Performance Index for lactations from Holstein cows by feeding system.

Breed differences

Overall, effects were similar for Holstein and Jersey cows in low bail, mod-high bail and PMR feeding systems. However, there were not enough Jersey cows in herds with hybrid or TMR feeding systems to investigate sire effects in these systems for Jerseys.

High or low production herds

Interactions with overall herd production level were also assessed. Results showed that positive effects of sire BPI on milk solids production are similar in high and low production herds. Daughters of high BPI sires are also more likely to re-calve by 20 months in both low production herds and high production non-TMR herds. The benefits of using high BPI sires on longevity are particularly large in high-producing, non-TMR herds.

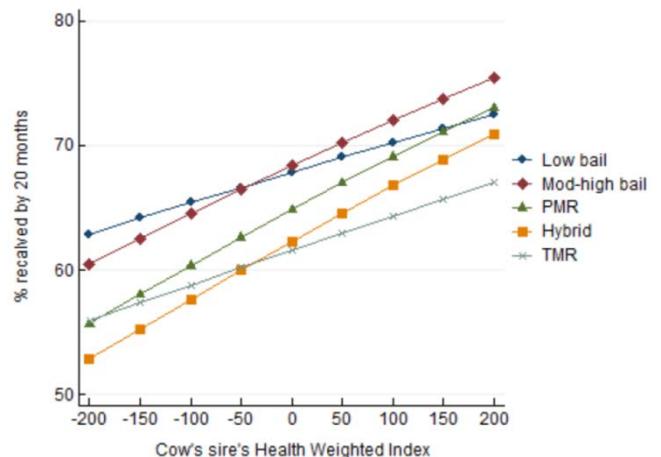
HWI and TWI

Overall, production effects were similar for sire BPI, HWI and TWI. By increasing genetic merit of sires using any of Australia's breeding indices, daughter milk solids yields increase.

However, the effects of HWI and TWI on the likelihood of re-calving by 20 months vary between feed systems.

In all feeding systems, daughters of high HWI sires are more likely to re-calve by 20 months, as are daughters of high TWI sires in intermediate input feeding systems (mod-high bail, PMR and hybrid). In low bail and TMR herds, daughters of high TWI sires are about as likely to re-calve by 20 months as daughters of low TWI sires.

Increases in a cow's sire's HWI influence longevity in the herd more than increases in sire BPI or TWI.



▲ Predicted percentages of cows that recalved by 20 months by cow's sire's Health Weighted Index for lactations from Holstein cows by feeding system.

What's next?

This research demonstrates the value of choosing high BPI, HWI and TWI sires in Australian dairy herds.

Farmers can easily find high BPI, HWI and TWI sires that meet their specific breeding objectives using the Good Bulls App. Herd recording farmers can monitor the impact of sire choices on their herd's genetic trends over time using the Genetic Progress Report.

Further demonstration-based research is underway on 27 genetic focus farms involved in the ImProving Herds project.

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More information

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Balanced Performance Index (BPI)

- Economic index
- Blends production, type and health traits for maximum profit
- In line with farmer preferences



Health Weighted Index (HWI)

- Fast track fertility, mastitis resistance and feed saved



Type Weighted Index (TWI)

- Fast track type

