

Updated BPI, HWI, November 2020

Technote 26

HIGHLIGHTS

- The Balanced Performance Index (BPI) and Health Weighted Index (HWI) were updated in November 2020 to better reflect industry needs.
- This affected animal rankings.

Updated BPI, HWI

The Australian dairy industry's breeding indices were updated from November 2020. These refinements reflect the industry's evolving breeding priorities which were reviewed in 2019/20. The key refinements are listed below (refer appendix for trait weightings in the updated indices).

Balanced Performance Index (BPI)

- updated with current economic values for fat, protein, feed and labour.
- greater emphasis on health traits and less emphasis on production traits, compared with 2019 BPI.
- Jersey BPI excludes Feed Saved, reflecting differences between breed objectives and differences in the evaluation of the Feed Saved ABV.

Health Weighted Index (HWI)

- updated with current values for fat, protein, feed and labour.
- double weighting on Daughter Fertility.
- modelled on a strictly seasonal calving system.

Type Weighted Index (TWI)

- replaced by Good Bulls Guide tables that rank bulls by Overall Type and Mammary System.

The base (used to compare animals)

- unchanged but with a breed purity filter added so it is a truer reflection of the breed.

Note: In the BPI feed saved remains at half of its full economic value, reflecting industry priorities expressed through the review process including surveys.

Expected impact

BPI

The BPI balances the economic contribution of production health and fertility, type, workability and feed efficiency. However, the updated BPI applies greater emphasis to health by adding in survival and mastitis resistance, (e.g. previous relative emphasis of 10% on Somatic Cell Count (SCC) increases to 14% joint emphasis on SCC and mastitis resistance that has been added to the index).

This affected animal rankings: raising ranking of animals with superior survival and/or mastitis resistance ABVs (they still need good production ABVs to reach top ranking).

Jerseys: The updated Jersey BPI has some breed-specific differences. Higher rankings are expected for animals with superior survival and/or mastitis resistance ABVs, with associated greater gains in survival, SCC and mastitis resistance, fertility, and most type traits. However, because the Jersey BPI does not penalise low feed efficiency, it will also allow animals with high live weight ABV (low feed efficiency) to rank highly if they have good production and health and fertility.

HWI

The updated HWI puts greatest emphasis on health and fertility, with production secondary. This increased emphasis affected animal rankings: raising those with superior Fertility ABVs and reducing the influence of production ABVs.

Response to selection

A good way to compare the impact of the BPI and HWI is to look at the response to selection using an index over time. Response to selection is breed specific because of differences in the range of ABVs for traits and their heritability as well as the correlations between traits. Responses to selection are shown in bar charts over the page.

BPI: Compared with the previous BPI, selection with the updated BPI is predicted to make greater gains in survival, SCC and mastitis resistance, fertility and most type traits, and better control feed efficiency loss. These gains in non-production traits come at the expense of slower improvement in production traits.

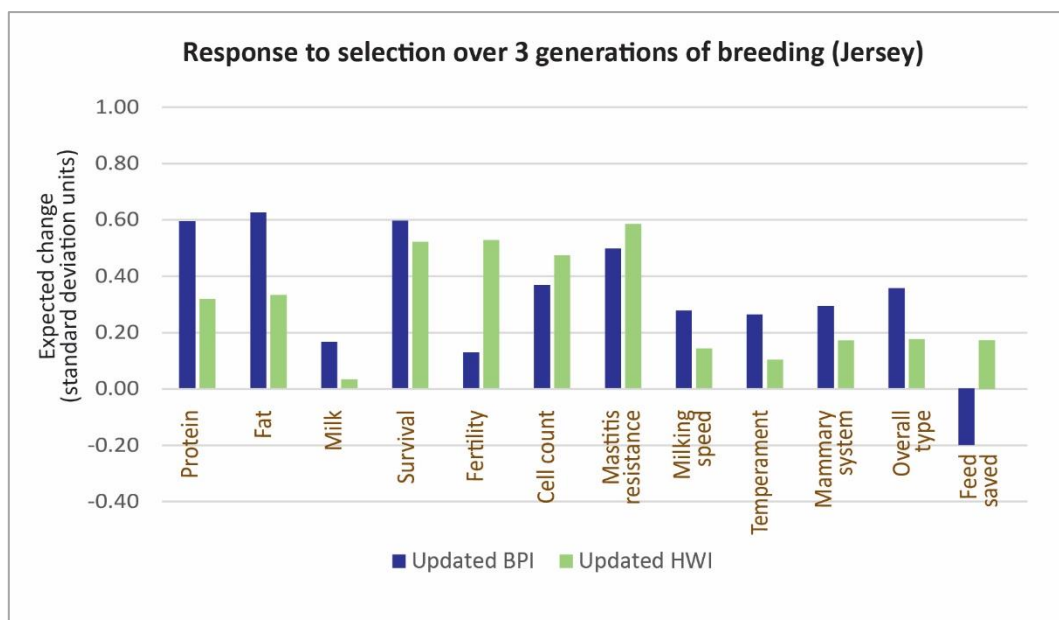
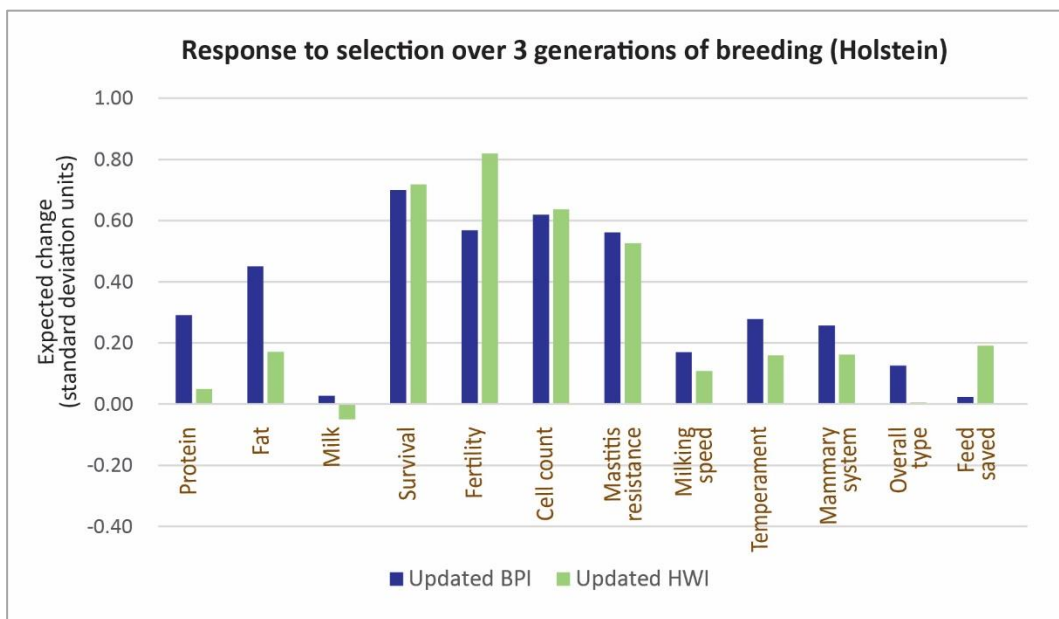
HWI: Compared with the previous HWI, selection with the updated HWI in all breeds is predicted to have higher gains than the BPI in survival, fertility, mastitis resistance, feed efficiency, and some type traits, with trade-offs of reduced gains in protein and fat. Milking speed and temperament are also predicted to have reduced gains. Live weight is predicted to reduce more with the updated HWI.

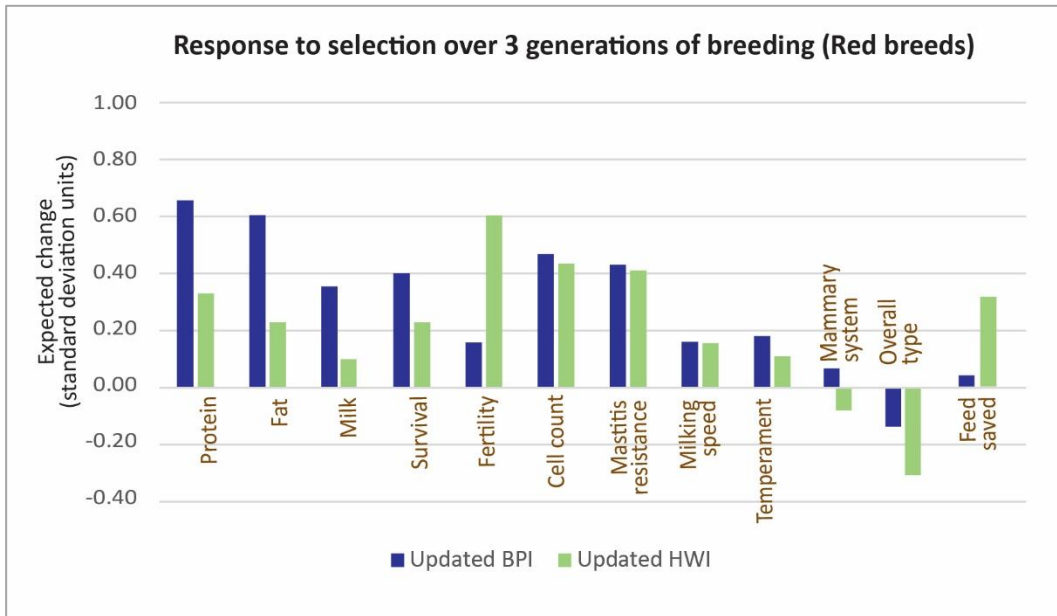
Breed differences in response to selection

In Holsteins, milk volume is predicted to decrease, while in Jerseys and Red Breeds milk volume is predicted to increase but at a much-reduced rate.

Red Breed responses to the updated BPI are predicted to be similar to Holstein responses with some differences due to breed differences in trait correlations, notably that fertility gains are reduced while feed efficiency is predicted to improve

The Jersey BPI is predicted to double the gain in milk volume compared with other breeds. This is due to the removal of the penalty on liveweight (through Feed Saved) which has positive genetic correlations with production traits. Similar gains in protein and fat are predicted, with trade-off of less feed efficiency. Live weight is also predicted to





Milk payment trends

Fat : protein

Fat, protein, feed and labour values have been updated based on a five-year historic prices. As farmgate returns for protein yield have been historically stronger compared to fat yield, indices reflect this.

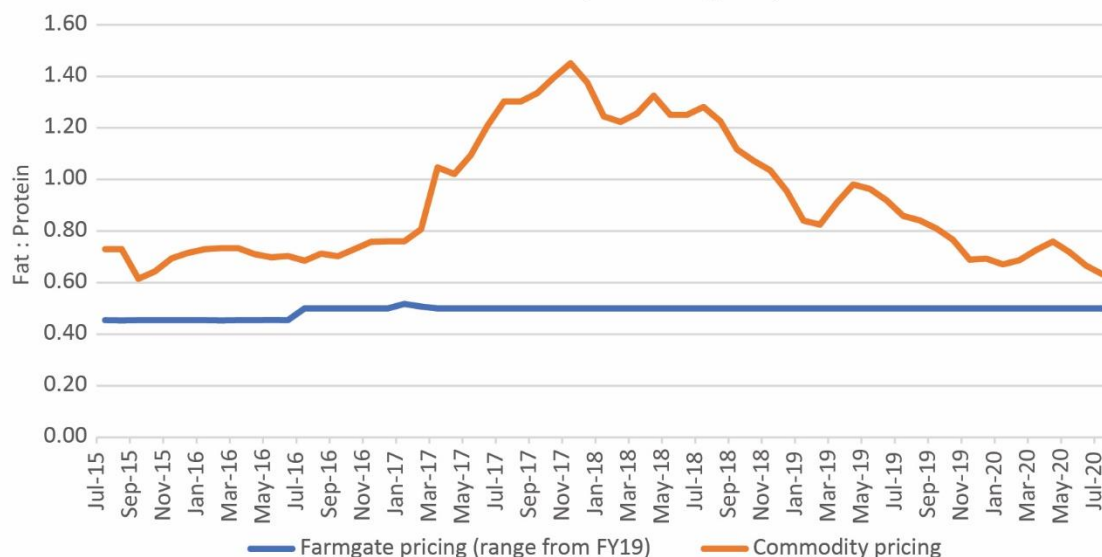
Dairy Australia data shows a stable fat : protein price ratio paid to Australian farmers over the past four years, as shown in the graph (blue line). The ratio of 0.5 is lower compared to the commodity price ratio (orange line) that has moved between 0.7 and 1.7 during the same period. There is little evidence of the national shift in farmgate price ratio to justify an increase in the price ratio applied to the index model.

Milk litres

During the consultation period, new milk prices were published for FY20/21. Virtually all processors moved to a payment system that did not include a penalty for milk volume.

If this change in payment system continues in the medium term it may warrant adjustment to BPI/HWI. This will be reviewed with industry in 2021 after milk prices are announced, including consulting the milk processors about the potential change.

Fat : Protein commodity vs farmgate price ratios



Review

These updates are the outcome of a review of the National Breeding Objective undertaken in 2019/2020. The National Breeding Objective defines an agreed group of desirable traits providing direction for breeding dairy cows and bulls. It is expressed through the main dairy breeding indexes used by the Australian dairy industry. [Read more](#)

The chart below shows how the relative emphasis of Australia's index has evolved over time (for Holsteins).

Read more

[National Breeding Objective review outcomes](#)

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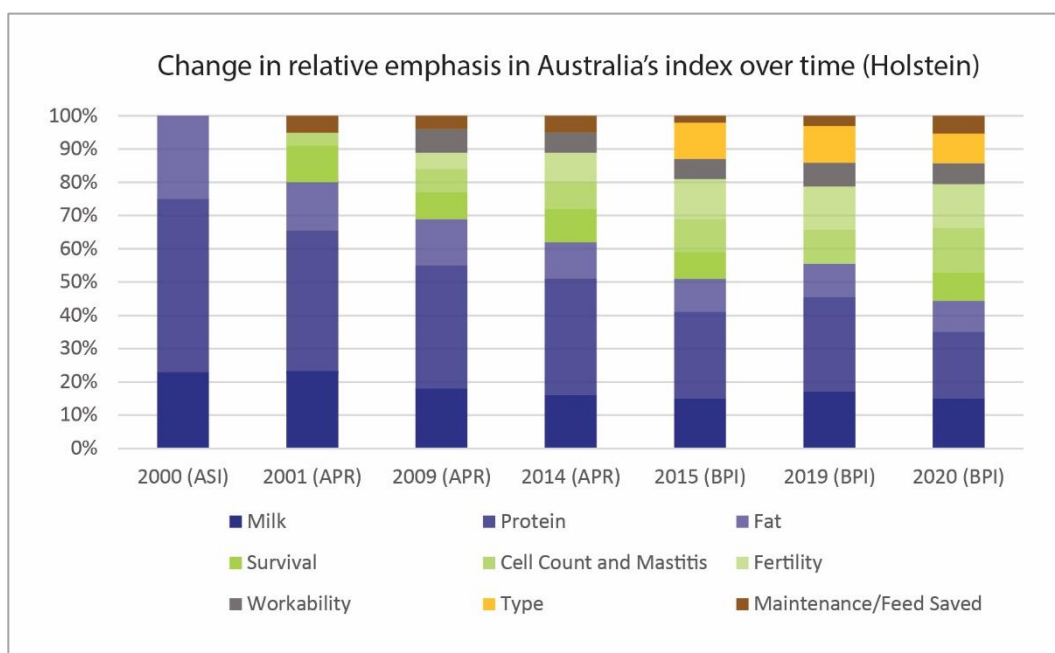
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Acknowledgement

DataGene is an initiative of Dairy Australia and the herd improvement industry. DairyBio provides the research pipeline to develop and maintain Australian Breeding Values.



Appendix: Trait weightings by breed

The BPI and HWI both account for the traits that affect a cow's lifetime contribution to the dairy business: production, health and fertility, feed saved, workability and type.

The difference between the BPI and HWI is the relative emphasis given to each trait. The HWI is weighted to fast-track genetic gain in fertility and health traits, with production secondary.

The relative emphasis given to traits in the BPI and HWI is consistent across breeds, with the exception of the Jersey BPI which excludes feed saved.

However, breed differences occur when the relative emphasis of traits is expressed as a percentage, for example in a pie chart. Expressing as a percentage accounts for the genetic variability (standard deviation) within the breed; for example, the Australian Holstein breed has more genetic variation for fertility than Jerseys and it is therefore easier to improve fertility in Holsteins. The pie charts show the relative emphasis of traits used for the BPI and HWI from November 2020

