# Recalibration of Zoetis HD50K for Angus Product

## Technical Summary

The HD50K for Angus product (HD50K) that is commercially available from Zoetis has been recalibrated with an improved product set to be launched in early March 2015.

This fact sheet provides technical details regarding the new HD50K product and the associated modifications that will be made to the incorporation of HD50K genomic predictions into Angus BREEDPLAN.

### Understanding the New Zoetis HD50K for Angus Product

The HD50K product assesses the genetic makeup of black Angus cattle at more than 50,000 locations across the animal's genome (known as SNPs or single nucleotide polymorphisms) to provide a genomic prediction of an animal's genetic merit.

The new version of the HD50K product calculates genomic predictions for 22 traits, including:

| | |
|---|---|
| Calving Ease Direct | Carcase Weight |
| Calving Ease Daughters | Eye Muscle Area |
| Birth Weight | Rib Fat |
| Gestation Length | Rump Fat |
| Weaning Weight | Retail Beef Yield |
| Yearling Weight | Intramuscular Fat |
| Final Weight | NFI (Feedlot) |
| Mature Cow Weight | NFI (Post Weaning) |
| Milk | Dry Matter Intake |
| Scrotal Size | Feedlot Daily Gain |
| Days to Calving | Tenderness |

By comparison to previous versions of the HD50K product:

- The equations used to calculate the genomic predictions for all existing traits have been recalibrated.
- Genomic predictions have been calculated for an additional 6 traits, being rump fat, retail beef yield, 600-day weight, gestation length, days to calving and net feed intake (post weaning).

### Incorporation of Zoetis HD50K for Angus Product within Angus BREEDPLAN

As with previous versions, the new HD50K genomic predictions are best utilised by incorporation into Angus BREEDPLAN, whereby an estimate of an animal's breeding value can be calculated by combining the genomic prediction with any pedigree and performance information that has been collected on the animal and its relatives.

To facilitate the incorporation of the new HD50K genomic predictions into Angus BREEDPLAN, the Animal Genetics and Breeding Unit (AGBU) in Armidale has undertaken research to determine the appropriate emphasis that should be placed on the genomic information in the calculation of the BREEDPLAN EBVs.

The research examined the relationship (or genetic correlation) between the genomic prediction for 2,820 animals and the performance (or phenotypic) information that has been recorded with BREEDPLAN for each respective trait.

To ensure the results were not biased, any performance information for animals that were utilised by Zoetis when developing the genomic predictions, plus the performance for their contemporaries, their progeny's performance, and the performance of their progeny's contemporaries was removed from the research analysis.

## Traits to be Incorporated into Angus BREEDPLAN

Based on the results of the research and the subsequent recommendations provided by AGBU, genomic predictions for 14 traits will be incorporated into Angus BREEDPLAN from the March 2015 analysis onwards, including:

| | |
|---|---|
| Calving Ease Direct | Milk |
| Birth Weight | Scrotal Size |
| Gestation Length | Carcase Weight |
| Weaning Weight | Eye Muscle Area |
| Yearling Weight | Rib Fat |
| Final Weight | Rump Fat |
| Mature Cow Weight | Intramuscular Fat |

Genomic predictions were previously incorporated into Angus BREEDPLAN for 12 traits.

For traits that will not be incorporated into BREEDPLAN, there was either an insufficient relationship between the genomic prediction and the available performance information, considerable variation in the relationship between the genomic prediction and the available performance information, and/or insufficient performance information available on which to examine the relationship with the genomic prediction.

## Emphasis Given to Zoetis HD50K for Angus Genomic Predictions When Incorporating in BREEDPLAN

The emphasis given to the HD50K genomic predictions within Angus BREEDPLAN can be described as the accuracy of the EBV that would be generated if the EBV was calculated from only the genomic prediction (ie. there was no other information recorded with BREEDPLAN).

From the March 2015 Angus BREEDPLAN analysis onwards, the accuracy of the EBV that would be generated for each trait from the genomic prediction alone is as shown in Table 1. For comparison purposes, the accuracy of the EBV generated from the previous HD50K product is also provided.

**Table 1 : Accuracy of BREEDPLAN EBV Calculated from Genomic Prediction Alone**

| Trait | HD50K (New) | HD50K (Previous) |
|---|---|---|
| Calving Ease Direct | 41 % | 30 % |
| Birth Weight | 46 % | 38 % |
| Gestation Length | 56 % | n/a |
| 200 Day Growth | 43 % | 38 % |
| 400 Day Weight | 50 % | 41 % |
| 600 Day Weight | 56 % | n/a |
| Mature Cow Weight | 59 % | 29 % |
| Milk | 47 % | 40 % |
| Scrotal Size | 62 % | 41 % |
| Carcase Weight | 42 % | 36 % |
| Eye Muscle Area | 33 % | 37 % |
| Rib Fat | 42 % | 42 % |
| Rump Fat | 35 % | n/a |
| Intramuscular Fat | 27 % | 20 % |

*The incorporation of HD50K genomic predictions provides the most additional accuracy to the BREEDPLAN EBV for animals whose existing EBV is of low accuracy.*

## Additional Accuracy Provided by Inclusion of Zoetis HD50K for Angus in BREEDPLAN

Table 1 provides the accuracy of the BREEDPLAN EBV that would be generated from the genomic prediction alone. In practice, the HD50K genomic prediction is incorporated with the pedigree and performance information recorded with BREEDPLAN, with the additional accuracy provided by the incorporation of the genomic prediction differing subject to the accuracy of the animal's existing EBV.

The additional accuracy provided by the incorporation of the HD50K genomic predictions at differing levels of existing EBV accuracy from the March 2015 Angus BREEDPLAN analysis onwards is outlined in Table 2.

The most additional accuracy is provided in situations where an animal's existing EBV has low accuracy, such as:

- When an animal is very young
- For traits that are hard to measure, or traits that can not be measured prior to an animal entering the breeding herd
- For traits that have a low heritability
- In situations where collecting effective performance information is problematic, such as in small herds, or when an animal has been removed from its contemporary group.

The incorporation of HD50K genomic predictions will add minimal accuracy to the EBVs for animals whose existing EBV has high accuracy.

## Further Modifications to Angus BREEDPLAN

In addition to changes to the traits for which HD50K genomic predictions are incorporated into Angus BREEDPLAN, and changes to the emphasis given to the HD50K genomic predictions, the following modifications have been made:

- The genomic predictions for all animals previously tested with the HD50K product (approx. 8,500 animals) have been recalculated by Zoetis and will be included in the March 2015 Angus BREEDPLAN analysis.
- The analytical process by which genomic predictions are incorporated in the Angus BREEDPLAN analysis has been simplified to ensure that it is appropriate for the genomic information that is now available, and to cater for the future inclusion of genomic predictions from multiple service providers.

  Specifically, the genomic prediction for a trait will now only be incorporated into the calculation of the respective BREEDPLAN EBV for that trait. Previously, the genomic prediction for a trait was also incorporated into the calculation of the BREEDPLAN EBV for correlated (or related) traits.

## Changes to Angus BREEDPLAN EBVs

Resulting from the recalibration of the Zoetis HD50K product and associated modifications to BREEDPLAN, changes to the EBVs of animals for which genomic predictions are incorporated are expected in the March 2015 Angus BREEDPLAN analysis.

**Table 2 : Additional Accuracy of BREEDPLAN EBV When HD50K Genomic Prediction Is Incorporated**

| Trait | Initial EBV Accuracy | | | |
|---|---|---|---|---|
| | 20 % | 40 % | 60 % | 80 % |
| Calving Ease Direct | +24 % | +13 % | +6 % | +2 % |
| Birth Weight | +29 % | +16 % | +7 % | +2 % |
| Gestation Length | +38 % | +23 % | +11 % | +3 % |
| 200 Day Growth | +26 % | +14 % | +6 % | +2 % |
| 400 Day Weight | +32 % | +19 % | +9 % | +2 % |
| 600 Day Weight | +38 % | +23 % | +11 % | +3 % |
| Mature Cow Weight | +40 % | +25 % | +12 % | +4 % |
| Milk | +30 % | +17 % | +8 % | +2 % |
| Scrotal Size | +43 % | +27 % | +14 % | +4 % |
| Carcase Weight | +25 % | +14 % | +6 % | +2 % |
| Eye Muscle Area | +18 % | +9 % | +4 % | +1 % |
| Rib Fat | + 25% | + 14% | +6 % | +2 % |
| Rump Fat | +19 % | +10 % | +4 % | +1 % |
| Intramuscular Fat | +13 % | + 6 % | +3 % | +1 % |

* For example, if an animal had a 200 Day Growth EBV with an accuracy of 60%, incorporation of the HD50K genomic prediction would increase the accuracy of the EBV to 66%.

The magnitude of the change in EBVs will differ for each individual animal depending on the accuracy of the animal's existing EBV, the amount of change observed in the animal's genomic predictions, and the change in the emphasis that is used when blending each respective genomic prediction within the BREEDPLAN analysis.

Only the EBVs of the individual animal for which genomic predictions are included will change, not the EBVs for its relatives (eg. its parents or progeny).

The BREEDPLAN EBVs for animals without Zoetis HD50K genomic predictions will remain unaffected.

### Use of Zoetis HD50K for Red Angus, or Animals on Multibreed Register

Research has shown that the accuracy of a genomic prediction erodes considerably as the relationship between the animal being tested, and the animals on which the genomic prediction was developed decreases.

The Zoetis HD50K for Angus product has been developed using black Angus animals only, and accordingly, only black Angus animals should be considered for testing with the Zoetis HD50K genomic prediction.

The accuracy of the HD50K genomic predictions for Red Angus animals, or animals recorded on the Multibreed Register is unknown.

### Further Information

To further discuss the recalibration of the Zoetis HD50K for Angus product, please contact either Angus Australia's Breed Development & Innovation Manager, Carel Teseling on (02) 6773 4602 or via email carel@angusaustralia.com.au, or Angus Australia's Education, Extension & Youth Manager, Andrew Byrne on (02) 6773 4618 or via email andrew@angusaustralia.com.au.

Information is also available by contacting staff at Zoetis.

## Fast Facts

- An updated HD50K for Angus product (HD50K) is set to be launched by Zoetis in early March 2015.
- The genomic predictions for all animals previously tested with the HD50K product (approx. 8,500 animals) have been recalculated by Zoetis and will be updated within Angus BREEDPLAN.
- Modifications have been made to the manner in which the HD50K genomic predictions are included within the Angus BREEDPLAN analysis to accommodate the new HD50K product.

  Specifically, the traits for which HD50K genomic predictions are incorporated into BREEDPLAN, and the emphasis given to the HD50K genomic predictions within BREEDPLAN have been updated, based on research conducted by the Animal Genetics & Breeding Unit (AGBU) in Armidale.
- The updated HD50K genomic predictions and associated modifications to Angus BREEDPLAN will be implemented in the March 2015 Angus BREEDPLAN analysis.
- Changes to the EBVs of animals for which HD50K genomic predictions are incorporated are expected. The EBVs of animals without HD50K genomic predictions will remain unaffected.
- The magnitude of the change in EBVs will differ for each individual animal depending on the accuracy of the animal's existing EBV, the amount of change observed in the animal's HD50K genomic predictions, and the change in the emphasis that is used when blending each respective genomic prediction within the BREEDPLAN analysis.

~~~~~
~~~~~