

CLARIFIDE® PLUS WELLNESS TRAITS OFFER INSIGHT TO PROFITABLE DAIRY WELLNESS OUTCOMES



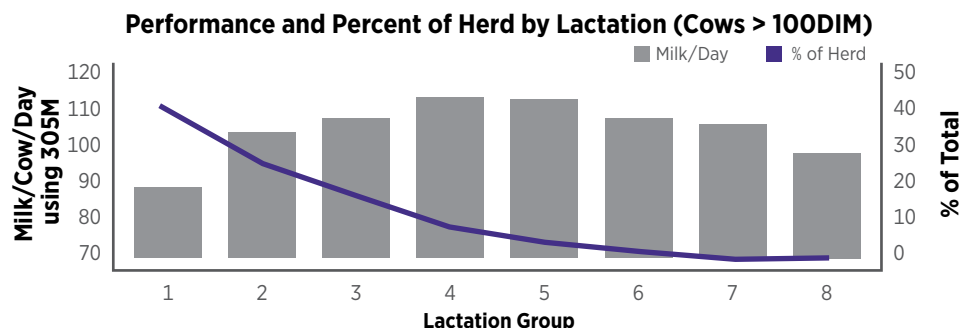
Genomic testing with CLARIFIDE® Plus from Zoetis offers insight to help dairy producers build healthier, more productive and profitable herds. CLARIFIDE Plus arms producers with an effective tool for genetic selection of wellness traits to more proactively and confidently make breeding, mating and replacement heifer selection decisions on young calves and heifers. This, in turn, leads to generating greater and faster herd progress more economically than female selection or sire selection alone.

Zoetis has over 60 years of involvement in animal health and is looked upon by many as experts in this field. Reliable genomic information from CLARIFIDE Plus is an extension of this leadership and, when combined with the diverse portfolio of products and services from Zoetis, can help dairy producers achieve their desired herd health and profitability outcomes and improve overall Dairy Wellness.

STRIVING FOR LONGEVITY-DRIVEN PROFIT

Adverse health events have a significant impact on herd health, longevity and saleable milk, thus genetic selection is a key to improvement.

- **MORE MILK** – herds achieve higher milk production per cow per day from 3rd+ lactation cows (Figure 1), in fact approximately 20 to 25% more than first lactation cows
- **MORE SALEABLE MILK** – reducing milk lost or discarded due to illnesses leads to more milk to sell
- **MORE INVISIBLE-LIKE COWS** – cows that are healthy and breed back fast thus their lower maintenance is invisible to producers, costing much less, living longer and requiring less labor



NOT ALL TRAITS ARE THE SAME

Using genomically enhanced genetic evaluations can effectively predict future health performance when based on reliable data.

WHY PRODUCERS CAN RELY ON CLARIFIDE PLUS

1. **RELEVANT** – Economically impactful traits derived from U.S. commercial herds
2. **ACCURATE** – Measured by solid Reliability, where every point counts towards faster genetic progress (a reflection of heritability, data editing, millions of records and a cutting-edge genetic evaluation methodology)
3. **PROVEN** – Transparent, peer-reviewed evaluation methods, demonstrated effective in external field trials

DAIRY WELLNESS MAKES A DIFFERENCE™

RELEVANT

How to assess

ARE THE TRAITS MEANINGFUL?

- Are the traits economically important?
- Do the traits enhance genetic predictions of economic loss or gain?

CLARIFIDE Plus Wellness Traits

YES

- ✓ Dairy cattle disease is expensive; approximately \$150 to \$500 in losses per disease case.¹
- ✓ Direct selection for wellness traits increases speed of progress and more accurately predicts risk of disease than measures like PL, etc.

ARE DATA AND PREDICTIONS RELEVANT TO MY DAIRY?

- Do data originate from common U.S.-based pedigrees sourced from large commercial herds?
- Are there millions of records?

YES

- ✓ Wellness Trait data is derived from similar pedigree-based country and production systems (U.S. commercial dairies).
- ✓ Yes. See Table 1.

DOES AN ASSOCIATED, SINGLE INDEX INCLUDE APPROPRIATE TRAITS TO RANK ANIMALS FOR MAXIMUM ECONOMIC PROFITABILITY?

YES

- ✓ Wellness traits are weighted appropriately within DWP\$[®] with other economically important traits. ***This allows for greater and faster genetic progress!*** Animals re-rank with DWP\$ versus common indexes (NM\$, TPI[®]) to provide an option to maximize profitability.

TABLE 1: NUMBER OF RECORDS UTILIZED IN CLARIFIDE PLUS (THROUGH JUNE 2017)

Record Type	# of Records ²
Mastitis	4,667,100
Lameness	3,471,541
Metritis	3,585,289
Retained Placenta	4,170,209
Displaced Abomasum	3,444,833
Ketosis	2,313,557
Genotypes	341,997

ACCURATE

How to assess

ARE RELIABILITY (REL) MEASURES REPORTED?

CLARIFIDE Plus Wellness Traits

YES

- ✓ All genomic tested animals receive Reliability measurements for all traits.

ARE REL MEASUREMENTS STRONG, COMPARABLE TO OTHER TRAITS?

YES

- ✓ Higher is better for same traits! Genomic REL for young animals are best in class, partially resulting from strong heritabilities on complex traits (Table 2). In addition, millions of records properly edited for consistency within herd and cutting-edge methodologies also contribute to strong Reliabilities on young calves. Reliabilities are similar to Heifer Conception Rate and Daughter Stillbirth traits from the Council on Dairy Cattle Breeding (CDCB).



TABLE 2: RELIABILITY (REL) AND HERITABILITY FOR WELLNESS TRAITS. RELIABILITY MEASURED ON YOUNG GENOMIC-TESTED FEMALES (JAN. 2017).³

Trait	REL (%) on young females	Heritability
Mastitis	51.9	0.069
Lameness	51.5	0.063
Metritis	50.5	0.059
Retained Placenta	50.8	0.073
Displaced Abomasum	50.2	0.081
Ketosis	50.7	0.059

PROVEN

How to assess

ARE METHODOLOGIES:

- Transparent and science based?
- Based on cutting edge methods for genetic analysis?

CLARIFIDE Plus Wellness Traits

YES

- ✓ Methodologies are published in the peer-reviewed *Journal of Dairy Science* (Jan. 2017).³
- ✓ Single step is utilized — the preferred methodology in genetic evaluations.⁴

HAS THE DATA BEEN PROVEN EFFECTIVE IN EXTERNAL U.S. HERD POPULATIONS?

YES

- ✓ The Wellness Trait Field Study effectively demonstrates the proven association of health events with CLARIFIDE Plus genetic predictions (see results next page).⁵

WELLNESS TRAIT FIELD STUDY RESULTS⁵

CLARIFIDE Plus Wellness Traits are relevant, accurate and proven. They've been shown to effectively provide insight for genetic selection of health outcomes to better manage disease prevalence and improve herd profitability.

- Selection based on the Wellness Traits has been shown to reduce incidence of health issues including mastitis, lameness, metritis, retained placenta, displaced abomasum and ketosis.
- Using genomically enhanced genetic evaluations can effectively predict future health performance, presenting compelling opportunities for dairy producers to manage disease incidence and improve profitability.
- The impressive results from this peer-reviewed field study are relevant to today's dairy producers, accurate, transparent and scientifically proven on unrelated cattle.

STUDY OBJECTIVE: To demonstrate the effectiveness of wellness trait predictions in commercial Holstein herds that are outside of the CLARIFIDE Plus evaluation database.

STUDY SET-UP: A population of 2,875 female Holsteins (66% springing heifers, 33% first lactation dry cows) were sampled prior to calving from eleven herds (average 260 animals per herd). The herds were geographically distributed across the United States and are not part of the genetic evaluation system. For more information, see the Wellness Trait Field Study Technical Bulletin.



GRAPHS BELOW COMPARE WORST 25% OF ANIMALS WITHIN EACH HERD FOR RESPECTIVE GENETIC TRAITS AS COMPARED TO BEST 25%, INCLUDING % DIFFERENCE AND THE ESTIMATED ECONOMIC DIFFERENCE.⁵

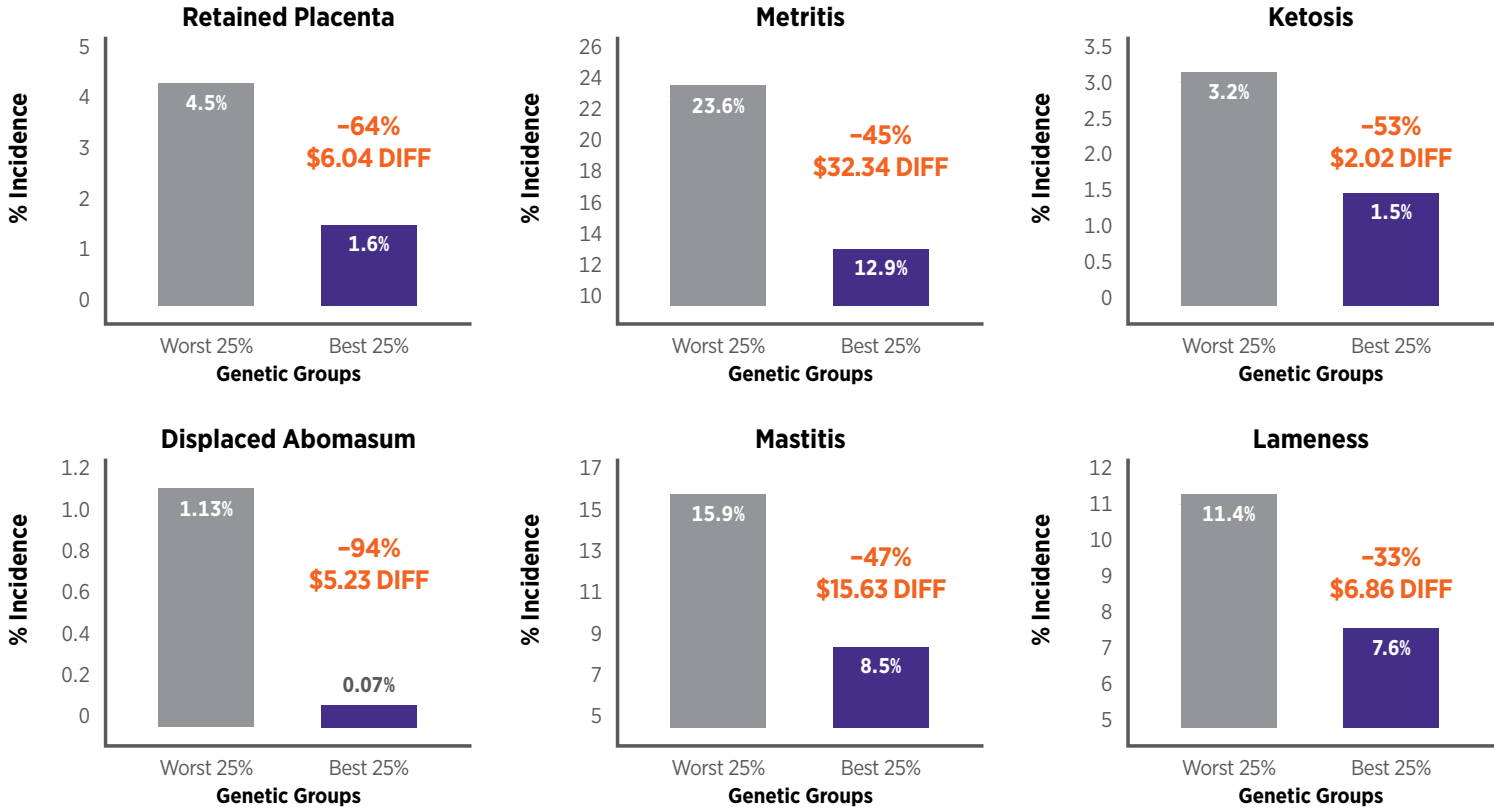


TABLE 3: ODDS RATIOS

Trait	Odds Ratio (Worst 25% vs Best 25%)
RP	2.9
MET	2.1
KET	2.2
DA	17.1
MAST	2.0
LAME	1.6

Odds ratios indicate cows in the Worst 25% were at least 1.6 times more likely to experience a health event compared to the Best 25% genetically in each herd.⁵

CLARIFIDE Plus Wellness Traits effectively provide insight for genetic selection in young calves and heifers to better manage disease incidence and improve herd profitability.

To learn how CLARIFIDE Plus can help you achieve a healthier, more trouble-free herd, contact your Zoetis representative today or visit clarifideplus.com.

1. Zoetis Six Trait Fact Sheet. 2016. Copy on file.
 2. Data on file, July 2017, Zoetis, Inc.
 3. Vukasinovic N, et al. Development of genetic and genomic evaluation for wellness traits in US Holstein cows. *J Dairy Sci* 2017;100:428-438.
 4. Misztal I, Legarra A, Aguilar I. Computing procedures for genetic evaluation including phenotypic, full pedigree, and genomic information. *J of Dairy Sci* 2009;92:4648-4655.
 5. McNeel AK, Reiter B, Weigel D, Osterstock J, DiCroce F (2017). Validation of genetic predictions for wellness traits in US Holstein cows. *J Dairy Sci*. <https://doi.org/10.3168/jds.2016-12323>