New Trait – Cow Livability Now Available

More tools continue to be developed for improvement of breed's health and longevity

It is an exciting time in the age of Holstein breeding. Our cow has been renowned for generations because of her outstanding milk and component production, and sound functional udders and feet and legs. Over the past several years, emphasis has shifted towards improving the fertility, health and longevity of the Holstein cow, and breeders have responded – there is a clear relationship between new traits being developed, and subsequent improvement in that trait, showing that when breeders are given a tool, they use it!

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Productive Life was one of the early health traits, introduced in 1994, followed in the early 2000's by traits like Somatic Cell Score and Daughter Pregnancy Rate. In more recent years came evaluations for both Heifer and Cow Conception rate to help explain the fertility of our animals more specifically, as well as the dairy wellness traits available with the CLARIFIDE Plus® genomic test, which provide genomic predictions for six of the major ailments that plague U.S. dairy cows. New breeding tools continue to be developed to strive for improvement in the health and durability of the next generation of cows.

According to a Council on Dairy Cattle Breeding (CDCB) report, cow mortality rate (animals dying on the farm) averages 7% each lactation. With the lifespan of a dairy cow in the U.S. averaging 2.8 lactations, that equates to approximately 20% of cows in the milking herd over the course of their life. CDCB staff estimates that lost disposable income from current U.S. cows that will die on the farm is approximately $2 billion – improving that statistic by even a small margin could result in an increase in profitability for dairy producers who make it a priority. Aside from any financial incentive – no dairyman enjoys losing cows; the opportunity to breed trouble-free, long-lived cows is an important goal held by the majority of breeders.

Researchers at USDA's Animal Genomics and Improvement Laboratory (AGIL) and CDCB have developed a new trait to help producers breed for cows which are less likely to die on the farm – aptly named Cow Livability (LIV). PTA LIV predicts a cow's transmitting ability to remain alive while in the milking herd, and was first introduced to the industry in August 2016, with more wide publication in December 2016. It can be thought of as one component to help explain PTA Productive Life – which is defined as transmitting ability for how long a cow is expected to remain in the milking herd before dying or being culled.

PTA LIV is expressed as a probability value of a lactation not ending in death or on-farm euthanasia. For example – in an average herd where 80% of the cows do not die on the farm, a bull with a PTA LIV of +3.8, means that you would expect 83.8% of his daughters to remain alive until it is time for them to leave the farm, contrasted with a bull with a PTA LIV of -1.3, for which you would expect 78.7% of his daughters to leave the farm alive.

Despite the low heritability of Cow Livability (1.3%), the trait has a high reliability since termination codes have been recorded by DHIA for decades; codes for over 32 million cows are included in the national database and are subsequently able to be used to calculate these genetic evaluations. Young genomic animals will have an average reliability of 56% for cow livability as opposed to 70% for more heritable trait, Productive Life (8% heritability).

Other traits which provide a measure of the healthiness of an animal are favorably correlated with PTA for Cow

Livability, the strongest being Productive Life at +0.75. Other traits, like Somatic Cell Score (-0.32 correlation) indicate better udder health, and Fertility Index (+0.52) indicates that animals that are healthy enough to breed back early also tend not to die on the farm. The current TPI® also has a strong favorable relationship with Cow Livability of +0.46.

Overall, Final Score has slightly favorable correlation with Cow Livability, primarily coming from positive associations with better udders and feet & legs. An animal with solid conformation is more durable and less likely to get into trouble. HAUSA's updated Body Size Composite (introduced in August 2016), which is more closely aligned with a cow's mature body weight, has an almost neutral relationship of -0.04. It is worth noting that the previous version of the Body Size Composite (measuring the frame or volume of the cow – phased out in August 2016) was negatively associated with Cow Livability. Bigger cows have a higher likelihood of injuring themselves in today's modern dairy facilities; unfortunately, sometimes, they don't just get injured, they go down for the count and die on the farm. Another trait with a strong negative association with Cow Livability is Dairy Form. Cows that convert too much energy into milk put themselves in jeopardy. We've seen it before with a negative association with fertility and now, here again, with cow livability.

Cow livability has not yet been incorporated into the major industry selection indexes such as TPI and Net Merit to give breeders time to become familiar with this new trait, but stay tuned for potential updates later this year as various committees and groups meet and discuss this topic more.

Breeders can expect that as more emphasis is placed on research for health, fitness and survivability traits, more tools like this will be developed in the future to help dairy producers in their pursuit to breed that long-lived, high producing and ultimately – most profitable – Holstein cow.