

DATA FUELS

GENETIC IMPROVEMENT



Genomics are the Foundation of the Business Model at Luck-E Holsteins

Rapid genetic progress enables the Engel family to consistently produce top quality, globally recognized Holsteins

“Fifteen years ago, we still had the same breeding goals that we do now. We’ve made so much more progress at such an accelerated rate since genomics came out, because we can pick our donors early and with so much accuracy. That’s something we couldn’t do before genomic information was available.”

Dennis and Beth Engel bought their first registered Holstein as a wedding gift to each other in 1968 and were early adopters of embryo transfer, the focus on building a high type herd. Their sons Joe and Matt are continuing the family tradition at Luck-E Holsteins near Hampshire, Illinois. They embrace the most technology-forward reproduction techniques and utilize the data made available to them through their DHI, Dairy Records Processing Center, breed associations, genomic testing, and the National Cooperator Database.

Farm slogan: “Real Cows Competing in Real Conditions”

When a high type show cow comes to mind, there may be a disconnect between this kind of cow and a commercial cow built to put milk in the bulk tank and hold up over the years. Dennis told Joe and Matt while they were growing up that if they pampered the cows too much, akin to putting them in a glass house, then the cows would have to be sold to other farms where the high maintenance could continue. While it's hard to place a dollar value on high type cows living in a commercial environment, it's what Luck-E Holsteins has become known for over the decades.

“The main objective in our breeding program is to have a cow that is wide from her muzzle through her chest all the way back to her rump, so she can have a wide rear udder that can produce a lot of milk and an ideal stature — a cow like Luck-E Advent Asia. She's the cow that really put Luck-E Holsteins on the map globally,” said Joe. “That cow could go into any management system in any country in the world or go to the showing and do well.”

Consistent efforts to eliminate the bottom performers and double the top genetics from their herd led the Engel family to be recognized as Holstein Association USA's 2025 Elite Breeder!

Joe and Matt Engel, Illinois

- ▶ 120 cows
- ▶ Registered Holsteins and a few Ayrshires
- ▶ Embryo/animal sales to 20+ countries

Participation in the integrated system:

- ▶ Milk testing 9 times per year through Dairy Herd Information (DHI)
- ▶ Milk and health records processed through a Dairy Records Processing Center
- ▶ Genomic testing all animals at birth
- ▶ Classifying four times annually through Holstein Association USA
 - Average cow classified 1.1 times per year
 - Important marketing focus: 2-year-olds classified as soon as possible after freshening

Hear more from Joe ▶



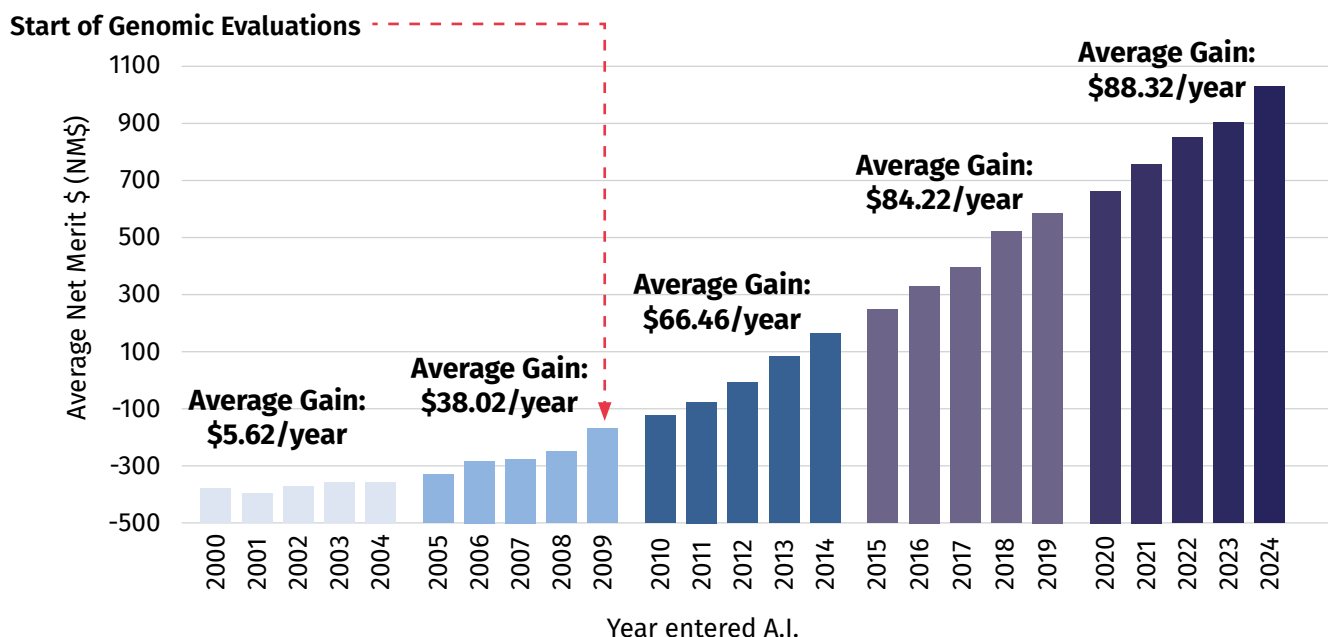
“Genetic progress for our herd is being able to breed cows that are better every generation while maintaining great components and increasing other health traits in that animal to make her more valuable in the market,” said Joe.

Maximizing each animal's value

The Engels use their genomic data, DHI data, and information from classifying to influence their decisions and correct any issues that pop up along the way. Every aspect of Luck-E's breeding program is designed to maximize value. If a heifer's or cow's genomic test shows she is not an ideal embryo donor, then in most cases she will be a recipient, maximizing genetic progress.

When making mating decisions, type and udder composite are non-negotiables. Then Joe and Matt decide on secondary traits that add value to each animal, such as red carrier, polled, A2A2, high components, or increased fertility. Their goal is to have the best and most valuable cow in each stall to provide the return on investment they need to keep their business thriving – measuring genetics per stall versus milk per stall.

GENOMIC MERIT OF MARKETED HOLSTEIN BULLS



“Before genomics, we couldn't accurately find our donors until after they calved the first time, and maybe even in subsequent lactations,” he said. “Now we're identifying that animal in the first month of life. Genomics has helped us eliminate that lower end of the herd so we have significantly more high-quality animals to sell.”

A herd built by genomic selection

Genomic selection has been the most impactful change to dairy cattle breeding since the introduction of artificial insemination in the 1930s. The shift from male-driven mating decisions to a more balanced selection based on desired male and female traits has been a great opportunity for genetic advancement. Joe appreciates the ability to look at genomic test results on the female side and make embryo donor decisions while those females are still calves. This has shortened their generation interval tremendously.



“You can't just look at PTAT genomic type alone. You have to consider your linear traits and know how bloodlines cross with one another;” Joe said.

When looking down a line of cows at Luck-E Holsteins, the uniformity is a sight to behold. Even someone unfamiliar with dairy cows might notice how similar the cows look. Joe believes genomic selection is the reason they have been able to improve their consistency so much from animal to animal. Given the time and effort put into the decisions that will yield the most marketable animals for their operation, having more consistency across the animals that sell best is an important part of their income generation.

Genetic Change: Driven by Four Factors

Genomic selection has resulted in a shortened generation interval, improved selection accuracy, and increased selection intensity for males and females as parents of the next generation.

When farms submit their data to the national database, they fuel genetic improvement for generations to come.

1	2	3	4
Accuracy of Selection	Selection Intensity	Genetic Variation	Generation Interval
Precision, or reliability, with which genetic merit is estimated	Level of superiority of parents of the next generation	Relative differences among animals as controlled by genetic factors	Average age of parents when their offspring are born
<i>Genomic evaluations are considerably more reliable than Parent Average</i>	<i>More males and females can be screened efficiently through genotyping to identify elite animals</i>	<i>Individual traits can be selected for or against based on desired outcomes</i>	<i>Genomic-tested young sires are available for A.I. at 1 year of age vs. 4-to-5 years old for progeny-tested bulls</i>

Data-driven decisions

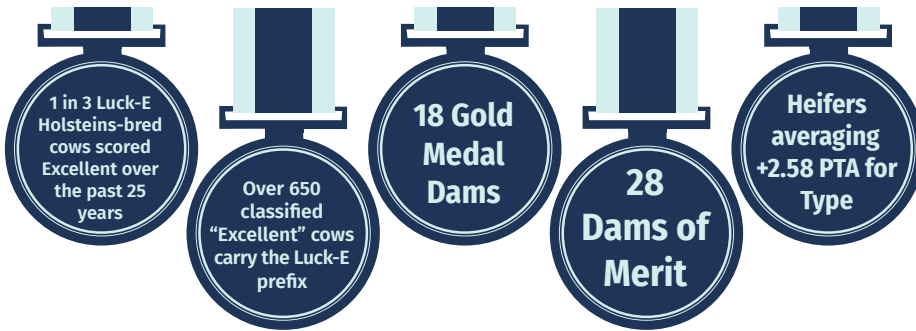
When their DHI data returns to the farm, Joe and Matt use this information in two different ways. Somatic cell count (SCC) data is used to make cowside management decisions. Milk fat and protein are treated as genetic indicators that become part of their marketing efforts. A cow's status in the herd may change if her milk fat and/or protein are not high enough for several tests, as this is an important part of selecting the next generation.

Classifying has been an integral part of the farm's selection process from the very beginning. With Dennis and Beth both coming from beef operations, classifying was a great education for them and a necessity as they built a high type herd. The need for phenotypic data is just as important as ever given how quickly generations turn over. Linear scoring from classifying allows for adjustments as genetic drift takes place. Joe remembers posty legs and issues with teat length and placement that popped up in the early 2000s. Without the information from classifiers, it would have been hard to make the right mating decisions to move away from those undesirable traits. This kind of data is needed today to verify what is expected from genomic test results.



When Joe thinks about genomics, he appreciates how fast things move. "We can start IVF at a younger age to make genetic progress significantly faster and that allows us to be able to get genetics from that animal for future generations before we market her."

Impressive Achievements



Looking at pictures of their best cows from 10 years ago, Joe marvels at how quickly genetics have changed. When planning a mating, he and Matt ask each other, "What is the worst possible outcome here?" They are always trying to eliminate their bottom end since it costs just as much to raise a poor performer as a good one.

As Joe and Matt have replicated their process for other dairy breeds, they have found that data quantity makes a big difference when it comes to decision-making ease and confidence. This is why Joe encourages other producers across all dairy breeds to become involved in submitting their own data to the National Cooperator Database.



"Because our herd and others share data into the national database, the genetic evaluations in the U.S. really are the most trusted, accurate, and consistent genetic evaluations in the world."

The Collaboration that Drives Data into the National Database

Genetic improvement is driven by the partnership of U.S. dairy producers and 60-plus organizations that collect and transmit certified animal data into the National Cooperator Database.

This database – with millions of cow records – is the engine that powers genetic improvement. Stewarded by the Council on Dairy Cattle Breeding (CDCB), the national database delivers male and female genetic evaluations, independent research to support new traits, national benchmarking, and accurate animal data to milk and breed better cows.

Owners and managers at 10,000 herds of all types and sizes across the U.S. contribute performance (phenotypic) and genotypic data on individual animals into this database. Millions of individual animal records – from milk components and fertility to conformation scores and health events – are transmitted and aggregated in the national database each year.

Like an engine, all parts of the system are essential:

- ▶ U.S. dairy producers
- ▶ Dairy records processing centers
- ▶ National Association of Animal Breeders
- ▶ Dairy records providers
- ▶ Breed associations
- ▶ Genomic nominators and genotyping labs

When farms submit their data to the national database, they fuel genetic improvement for generations to come.



From left to right: Matt, Dennis, Beth, and Joe Engel



It all starts at the farm.

[LEARN MORE](#) about how herd data fuels genetic evaluations.