Does phenotype still matter in today's dairy A.I. scene?

Phenotype: *the observable characteristics of an organism; the physical expression of genes.*

Is body conformation and structure still relevant in today's dairy A.I. industry? I would venture a guess that the majority of dairymen would answer with a resounding 'yes'. Their experience tells them that cows with certain conformation traits and structural qualities will generally perform better than their inferior herd-mates in the same environment.

The past decade in the A.I. industry has seen a definite trend away from the study and observation of phenotype and towards a focus on genomic markers and index rankings. This is exemplified in multiple areas, firstly in the decreasing level of importance put on the actual conformation of bulls. Many studs either don't include photos of the bulls or print them the size of a postage stamp on a page filled with numbers and graphs. At least one breed association has stopped classifying bulls altogether. The elite sales feature cattle in "absentia" since the value is apparently found entirely in the animal's genomic rankings instead of its actual physique.

While the Holstein breed has made remarkable gains in some areas, those gains are overshadowed by extreme traits and dysfunctional conformation.

In short, a cow's genomic superiority is useless if she herself has major physical flaws and structural imbalance. Single-trait selection, whether health traits, production, or even type, udder, and F&L indexes will at some point result in an animal whose physical makeup hinders its functionality in the real world. Fixation on extreme linear traits will get you exactly that.

Instead of becoming obsolete, phenotype-based mating programs such as aAa® are becoming more popular due to the results of a sire population which has been careening from ditch to ditch during the last 50 years or so.

Take for example, feet & legs. It wasn't even 20 years ago, when sickle rear legs and low foot angle were a weakness in the Holstein breed. It was a rare bull who could straighten the leg while still keeping
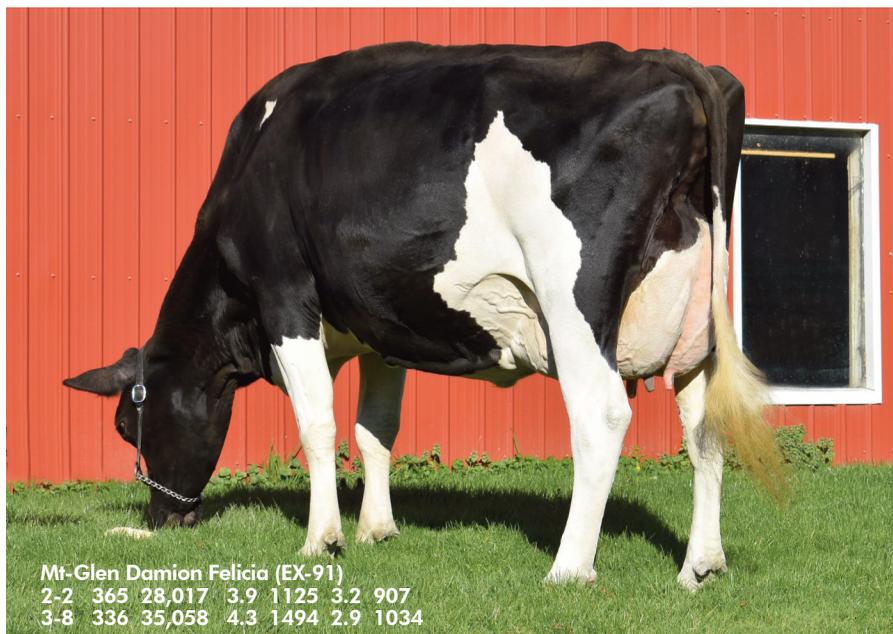
Mt-Glen Damion Felicia (EX-91)
2-2	365	28,017	3.9	1125	3.2	907
3-8	336	35,058	4.3	1494	2.9	1034

This cow, bred by Dean Jackson of Mt-Glen Farms in PA, is an example of a breeding style which is guided primarily by a focus on balanced, functional conformation. Notice her incredible blend of qualities and nearly perfect physical bovine structure.

a clean hock and wide, functional rump. Today, after a decade or more of selecting for straighter legs and high foot angle, the pendulum has swung in the opposite direction. Many cattle suffer from extremely posty rear legs with very little flex or shock absorption in the hocks. Likewise, generations of selection for high foot-angle results in an excessively steep foot angle which interferes with the cushioning effect of the pastern and causes undue stress on the joints.

Much genetic progress has been made in raising the rear udder, strengthening the central ligament to sustain higher production and centering the teats for ease of machine milking and less teat injury. Today, that progress is once-again threatened by the industry's fixation on extreme linear traits results in an extreme high rear udder that disconnects with the fore udder (rear tilt) and teats that have become too close and short for proper milkout.

Since the linear system used to correlate stature with good udders and type traits, many cattle today are too tall. They lack width of chest and must compensate by turning out their front feet which makes the toes wear unevenly. Geneticists heard the complaints from farmers who, while trying to select for udder and type traits, were inadvertently breeding taller, narrower cattle. The answer was injecting a negative correlation between stature and the type traits into the TPI formula. Yes, you guessed it...that will produce an opposite extreme which will need addressed in about 10 years.

While geneticists frequently unveil

new traits such as retained placenta, milk fever, ketosis, etc. which all have heritability rates between .6% and 3.1%, much higher heritable phenotypic traits such as thurl position get very little attention. It doesn't matter whether a bull is #1 in the breed for "x,y z", if his thurl position is pushed too far back, he will likely pass that fault on to his thousands of daughters making it difficult for them to ever realize the genetic potential that the farmers are promised.

Thurl position is another example of a highly heritable physical trait that has major relevance to a cow's functionality. A thurl which is back from the center of the pelvic structure (between hips and pins) causes multiple issues. First, it thrusts the pins upward, causing reproductive issues. A rearward thurl position also shifts more weight to the loin, which was not designed to carry the extra weight. Furthermore, a cow with a rearward thurl position will find it difficult to walk with her rear legs directly under her.

It's as simple as this. Dairymen today still milk a physical cow with a head, four legs and an udder, in an ever-changing physical environment. As one astute cowman told me: "Milk production, in its most basic definition, is feed put through a physique."

Yes, your cow is a physical creature, with physical function and heritable physical traits. Believe it or not,

it's the same with bulls. I guarantee you that if you walked through any bull facility, you would pick out bulls that exhibit desirable physical traits, and you would likewise strike off the bulls from your list that exhibit faulty physical traits. Just like you would walking through a barn of cows, picking out the ones you would like to bring into your herd.

The idea that a bull's physique and appearance have no value or indicator to his success as a sire is laughable. Think about human families. Some children resemble their father, some cater to their mother's side. In a family of six children, each is a unique blend, but to a stranger's eye it's easy to notice the inherited physical traits of both dad and mom in each individual child. You can tell "where they belong", based on their resemblance to their parents. Like begets like.

Phenotype still matters. It matters a lot. Unfortunately in today's world, it can be difficult to see your A.I. service sires in person, or even just a large, high-quality, undoctored photo of him.

As difficult as it may be, I strongly encourage you to try and get a good idea of a bull's physique before you use him in your herd. Does he look like the male version of the type of cows you strive to breed? How are his feet & legs? Does he have any width in the front end? Does he have a deep springing rib cage? Is he high in the pins or level rumped? The list could go on . . .

Any cattle-breeder, regardless of their breeding goals and management style, will profit from a mating philosophy that balances index traits and genetic rankings with a focus on maintaining a balanced, functional physique.

About the author: Jared G. Martin is a founding partner of Triple-Hil Sires, Smithsburg, Md.