

Farm Update

The record onslaught of rain has continued here in Western Oregon with 15" in January, 18" in February, and 13" so far in March. Needless to say mud has been a massive issue. Fortunately it looks like the weather will finally be improving in the next few days and the cows will be out on pasture. All the cows (except for 3), have calved with offspring out of many different bulls. Check the Whispering Hills Farm website later this spring for updates on sale Shorthorns. We have had 70% heifer calves the last 2 years, so we will have several excellent brood cows for sale this year once they are confirmed rebred. After much preparation our latest Shorthorn endeavor, shorthornselectsemen.com, is up and running. Long term the goal with Shorthorn Select Semen is to make semen available from the offspring of many of the great classic Shorthorn bulls.

Shorthorn Bulletin Update

I am grateful to all of our subscribers for their continuing support of The Shorthorn Bulletin including subscribers in other countries. Given the interest, The Shorthorn Bulletin will now be published bi-monthly. My list of topics to feature in the Bulletin continues to grow so the change to a bi-monthly format seemed like a natural evolution. Occasionally I may substitute with a reprint of an old, historical article that seems pertinent to Shorthorn breeders today. An additional feature, now available on the The Shorthorn Bulletin website, is a gallery of old photos highlighting Shorthorns, especially famous old bulls. Additional photos will be periodically added so that it will ultimately be a resource for anyone interested in Shorthorn history. I want to thank my good friend Wally Klose (Diamond K Shorthorns, Twin Bridges, Montana) for providing me with access to many older issues of Shorthorn World.

Bi-Monthly Topic: Gene Editing And Its Potential Effect On The Cattle Industry

With the recent advances in gene editing technology I believe it will have monumental implications for the whole cattle industry, shaking its very foundation. Fundamentally it is about natural selection versus designer cattle versus "cookie cutter" cattle. I will briefly review the technology itself, how it might be used in the cattle industry, and ultimately how it could potentially affect everyone involved in the cattle industry.

The basics of gene editing have been around for some time (1980's) but recent developments have propelled it to the forefront of modifying genomes. There is no need to delve into the complex biochemistry of gene editing to achieve an elemental understanding of how it works and why it has massive implications for changing the genetic makeup of any living entity.

There are two terms that are important in understanding gene editing. CRISPR (clustered regularly interspaced short palindrome repeats) is a compilation of DNA sequences that specify

where to split the genome. It can be used to target specific genes. Cas (CRISPR-associated protein) is employed to literally cut the genome at the specified site. Various snipping agents can work but Cas9 has more specificity enabling scientists to efficiently remove and precisely replace genes, essentially opening Pandora's box. With this technology any individual's genetic makeup can be altered. Simply put, gene editing is a cut and paste technology allowing the removal of an undesirable gene and replacement with a desirable gene. A prime example is the replacement of the horned gene by the polled gene in modern Holsteins.

Given all the concern about GEOs (genetically engineered organisms) does gene editing produce a GEO when it is utilized? Technically speaking no. GEOs are altered by interspecies transfers while CRISPR-Cas9 is an intraspecies transfer. In the Holstein example a cattle gene is replaced with a different cattle gene not a mouse gene.

For most of history natural selection has been the only option when trying to improve the genetics of cattle. EPDs are just a refinement of the selection process. Even enhanced genomic testing is just a continuation of the evaluation process but with more data. There is actually no real alteration of the individual/calf.

In designer cattle, gene editing can be used to make alterations in specific genes such as the horned/polled gene, or as was done recently in China, replacing a susceptible tuberculosis gene in cattle with a resistant tuberculosis gene. The possibilities are endless as the discovery of new genes in cattle facilitates manipulation by CRISPR-Cas9 gene editing. Ultimately a cattle producer may have a gene editing app on a smart phone so that bull semen can be ordered which will have the characteristics that would produce offspring that would make the most money under specific feeding/environmental conditions. There are many companies moving in this direction with Acceligen, based in St. Paul, Minnesota, as just one example. A prodigious amount of research in this area is being done in China.

It is important to note how gene patents will likely work. An example could be the marbling gene complex. Once a company isolates the optimum marbling gene and patents it for gene editing, that company may license its usage/insertion in designer cattle.

How does this get us to "cookie cutter cattle"? Economics. Buyers of finished cattle will want specific types of cattle to fit their end consumer be it a high end restaurant chain, fast food chain, or a certain family demographic. Once the genetic makeup of the "ideal steer" has been designed it is likely that cloning technology will just replicate that steer ad infinitum. As an example there is a Chinese company planning to clone 2 million cattle over the next 3-5 years. Two million. To be trite, "the hand writing is on the wall".

Where does this potentially leave all the players in the cattle industry? Under a cloud. The scenario I see is one where individual breeds, breed associations, and seed stock producers are marginalized. We are already starting to see it in the beef industry, as more and more cow-calf operators are moving to artificial insemination. The result is too many bulls looking for a home. One should not underestimate the rapidity with which CRISPR-Cas9 gene editing will alter the landscape because patents will be obtained on specific genes which have the most economic impact. Whoever owns the genes, just like whoever owns the data, will control the cattle industry. No one will care about breeds or breed associations because we are talking composite gene specific cattle with each line of cloned cattle "idealized" for a specific end - market i.e. grass fed versus feedlot finish, parasite resistance, etc. All those EPDs will be

supplanted by specific gene replacement with no guess work or bell shaped curve results. Because the “cookie cutter cattle” model is likely to be the new paradigm in the cattle industry the current EPD/enhanced genetic testing standard will probably be left on a dusty trail out west.

The only caveat that I see in this outcome is a regulatory one that may be propelled by consumer backlash. Whether that happens may depend on how gene editing is ultimately viewed by humans. Economics may trump any real objections though, especially in countries like China.

The “carrot” I see in the future is for the niche producer of “special” cattle. Shorthorns will certainly fill a role as a niche breed because of their versatility, positive maternal traits, eye appeal, and temperament. No other breed of cattle can match Shorthorn’s natural attributes. Native “Heritage” Dual Purpose Shorthorns are the embodiment of what real Shorthorns “bring to the table”. Because there are always consumers who want something different/special, and are willing to pay for it, quality Native Shorthorns will always have good salability. Obviously that is why companies like Gucci are successful. The futuristic cattle model/paradigm I have presented still leaves opportunity for the visionary breeder who is not afraid to walk away from “cookie cutter” cattle, trust their judgement, and seek new marketing venues.

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