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Zoetis Develops First Holstein Reference Genome

Game-changing genetic discovery to help target disease resistance, improve herd health and operational profitability

PARSIPPANY, N.J., Feb. 20, 2018 — Zoetis has developed the first complete Holstein *de novo* reference genome, giving geneticists the ability to map regions of the genome influencing a range of health and disease outcomes. This significant development will promote advancement of the dairy industry through healthier, more productive animals.

The genome was completed with several new technologies and three sequencing platforms to order the Holstein genome as accurately as possible. With this level of accuracy, scientists can more easily identify genes that advance herd health and productivity and, alternatively, those genes that impede the dairy industry's progression.

"Sequencing a genome is the most important step toward fully understanding it," said Sue DeNise, PhD, executive director, Zoetis Animal Genetics Global Research and Development. "In the future, discoveries made from the new Holstein reference genome will allow us to identify new targets for disease resistance and utilize natural selection processes to improve health and welfare of cattle," DeNise said. "It's like going from analog TV to high-definition TV. We'll have even better insight into which genes reside to help animals resist and withstand diseases, such as pneumonia and mastitis."

Until now, the dairy industry looked to the first reference genome assembled for cattle in 2009, which was derived from a beef cow named L1 Dominette 01449, a Hereford born in Montana.

While Dominette's genome assembly piloted the cattle genomics era, a single reference genome was not enough to demonstrate the full genetic differentiation of a species. Genetic makeup fundamentally differs from breed to breed due to genetic drift and selection due to breed divergence. Comparing a Hereford genetically with other breeds of cattle — such as Holsteins — was only the beginning.

Genome sequencing is often compared to decoding a software program. The process determines the order of DNA bases in a specific genome — the order of A's, C's, G's and T's that together make up an organism's DNA. Cattle have 30 pairs of chromosomes and about three billion bases to put into order. To facilitate a highly accurate sequence, a single Holstein bull was utilized from straws of semen available commercially. These samples from a single animal contain the entire DNA blueprint for an animal, providing unique insights into the Holstein breed.

"By generating a complete Holstein reference genome, we can better understand the genetic basis of dairy cattle phenotypes," said Mike Layfield, senior director, strategic marketing, Global Genetics at Zoetis. "Promoting the health and wellness of dairy cattle has long been a key aspect of the Zoetis portfolio. This development is a strong testament to the innovative spirit and industry dedication of those in Zoetis' genetics business."

This development comes at a time when dairy producers are focused on raising healthy cows to help maximize their productivity while improving efficiencies and sustainability. This new development could help optimize their investment in raising the right cattle for their operation. Producers can improve Dairy Wellness through genomic testing tools such as Clarifide® Plus, which offers producers detailed predictions for wellness traits and reliable assessments of genetic risk factors for diseases in Holstein cattle — including the two most costly diseases in dairy cattle, mastitis and lameness.[1]

Zoetis has a substantial portfolio devoted to the health and wellness of dairy cattle. This new genome sequence helps further Zoetis' innovative products and services that are supported by industry-leading expertise and research, providing dairy producers the reliable, dependable information needed to achieve operational and herd goals. Learn more about the Zoetis commitment to the continuum of care of dairy cattle by visiting Dairy Wellness and ClarifidePlus.com.

About Zoetis

Zoetis (NYSE: ZTS) is the leading animal health company, dedicated to supporting its customers and their businesses. Building on more than 60 years of experience in animal health, Zoetis discovers, develops, manufactures and markets veterinary vaccines and medicines, complemented by diagnostic products, genetic tests, biodevices and a range of services. Zoetis serves veterinarians, livestock producers and people who raise and care for farm and companion animals with sales of its products in more than 100 countries. In 2017, the company generated annual revenue of $5.3 billion with approximately 9,000 employees. For more information, visit www.zoetisUS.com.

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[1] Warnick LD, Janssen D, Guard CL, Grohm YT. The effect of lameness on milk production in dairy cows. *J Dairy Sci*. 2001;84(9):1988-1997.