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DHI milk samples make health

When Stephen Babcock began experimenting with milk analysis in 1882, testing for butterfat content (and developing tests that discouraged farmers from watering or skimming their milk) was top of mind. It's probably safe to say that he didn't envision milk samples being used to test for diseases, such as bovine viral diarrhea (BVD), Johne's disease (*Mycobacterium paratuberculosis* [MAP]) or bovine leukemia virus (BLV). And, he probably didn't foresee milk sample test results being used as an evaluation tool to assess a dairy herd's breeding program or to evaluate dairy cow rations. Yet, yesterday's "science fiction" is today's milk diagnostic technology that helps dairy producers and their consultants manage their operations with a focus on profitability and animal well-being.

At the National Dairy Herd Information Association (DHIA) annual meeting held in March, attendees learned about the vast information that can be found in just a few ounces of milk. Featured speakers included Todd Byrem of Antel BioSystems Inc., Martina Kahila of Finnzymes Diagnostics, Nevena Djuranovic of IDEXX Laboratories Inc., and Nicolaas Smit of Safeguard Biosystems. Finnzymes' and Safeguard's technologies focus on using polymerase chain reaction (PCR), which amplifies DNA, to detect pathogens and microorganisms that infect the udder. Antel BioSystems' and IDEXX's tests focus on Enzyme-Linked ImmunoSorbent Assay (ELISA) to detect health risks.

To learn more about how these companies can help you find more value in your DHI milk sample, National DHIA sat down with these presenters. This issue, the first of two articles, will focus on milk ELISA testing. In July, the second article will feature PCR analysis of milk samples for udder pathogens.

Describe your company and its milk diagnostic services

AntelBio/Byrem: AntelBio is a producer-owned agricultural biotechnology company devoted to enhancement of the dairy industry through integration of animal health, genetic and biochemical information via development and implementation of a novel diagnostic platform. The company functions to provide impetus, innovation and leadership for the renovation of

traditional dairy management services into a universally integrated management system to optimize dairy herd performance through the assimilation of health, genetic, nutrition and reproductive information. With the belief that milk samples taken from cows by milk recording (DHI) organizations on periodic test dates are an underutilized resource for both dairy producers and recording organizations, AntelBio offers testing for BVD, leukosis, Johne's disease and progesterone analysis.

IDEXX/Djuranovic: A multinational corporation, IDEXX Laboratories Inc. provides proven and efficient diagnostic and water testing solutions, which support the profitability of the livestock, poultry, dairy and water microbiology testing industries around the world. IDEXX develops, manufactures and distributes products and services to the veterinary, food and water testing markets. The company's production animal segment provides diagnostic tests and related instrumentation that are used to detect diseases and monitor health status in production animals. IDEXX also provides products to dairy producers and processors that test milk for antibiotic residues, as well as products that detect melamine in milk.

How do you partner with DHI testing associations?

AntelBio/Byrem: Even though NorthStar DHI Services is our "sister organization," AntelBio provides ELISA testing via milk samples for many DHI members and their associations. Antibodies for Johne's are in milk and their detection via ELISA is a reliable diagnostic tool. The convenience of sample collection and the rapid turnover (results available in three to five days) of the ELISA assay offer an attractive mechanism to evaluate dairy herds for the presence of Johne's. Analysis by bulk milk ELISA and/or real-time PCR assay correlates closely with environmental fecal analysis. The Milk ELISA test's specificity is 99%, meaning that it correctly classifies non-diseased animals as a negative test – resulting in very few false positive test results.

Furthermore, milk samples obtained through milk recording associations provide an excellent platform for regular detection and management

testing easy

of leukosis and BVD. With sensitivity and specificity of assays greater than 95%, leukosis tests are extremely accurate. The antibody to leukosis infection is rapid, substantial, persistent and easily detected by ELISA in milk samples. Screening for leukosis is as simple as handing a DHI technician the list of animals to test.

Cows shed BVD virus in milk, so dairy producers can also use milk recording samples to screen for BVD, via milk samples submitted for DHI testing. Pooled milk samples, such as bulk tanks or groups, can be used to screen for BVD to reduce testing requirements and costs to find persistently infected (PI) cows. Research has shown 100% agreement between BVD milk ELISA and traditional analysis, indicating that viral shedding in milk is consistent and indicative of persistent BVD infection.

IDEXX/Djuranovic: In the dairy industry, DHI laboratories run IDEXX SNAP residue detection tests for milk and IDEXX Colilert rapid test for *E. coli*/coliform detection in water.

Recently, IDEXX received USDA approval for the IDEXX M. pt. Antibody Test to detect antibodies for MAP in serum, plasma and milk samples. Designed to help dairy and cattle producers manage the impact of MAP/Johne's disease, this assay has excellent sensitivity and specificity, minimizing the need for retesting and ensuring quick turnaround time for producers. The test can be run on milk and enables dairy producers to eliminate the cost of sample collection. Producers can simply add MAP testing to the samples they are already evaluating for milk quality.

Also, IDEXX manufactures other tests that can be run on milk samples, such as the BLV Ab, Neospora caninum Ab and BVD Virus Ag and Ab. Using milk samples to test for diseases yields significant time and cost sav-



ings, due to reduced animal handling, labor and collection supply expenses, and eliminating lab handling fees. For labs, these additional tests provide an opportunity to expand services and help dairy producers better manage cattle productivity and performance.

Why should dairy producers use milk samples for disease testing?

AntelBio/Byrem: Through DHI milk testing, milk samples are already being taken. So, there's no extra labor required. Compared to traditional blood testing programs for diseases such as Johne's disease, BVD and BLV, taking milk samples is far less costly, dangerous and time consuming. Milk testing to find diseases eliminates animal sorting and restraining, eliminates ear notching/blood draws and reduces individual sample testing. Milk ELISA detects the antibody response to MAP in fresh, frozen and DHI-preserved milk samples. Current disease diagnostic tests focus on detecting the organism or antibodies.

Allowing Johne's, BLV and/or BVD to attack a cow's immune system not only suppresses immune response to these diseases but also interferes with vaccination programs. For vaccination programs to be successful, immunized cattle must be healthy.

IDEXX/Djuranovic: By using the convenience of DHI milk sampling and analysis, veterinarians and producers have been able to implement successful testing strategies with absolutely no interference to their cows or daily farm operations. These cost-effective tests provide results that are accurate,

repeatable and verifiable. Don't waste resources restraining and sampling cows for disease testing when answers can be found in DHI milk samples.

A Wisconsin study concluded that regular ELISA testing, followed by control measures based on ELISA results, reduced infection rates from 10% to 3.5%. Johne's disease causes chronic debilitating enteritis in cattle and other ruminants. The infection lowers milk production, decreases fertility, causes poor feed conversion, shortens productive life and increases an animal's predisposition to other diseases. Johne's disease costs dairy producers up to \$250 per animal per year, and according to the National Animal Health Monitoring System, it is present in more than 68% of U.S. dairy herds.

Valuable info in DHI samples

Whether it's traditional milk components and SCC, the presence of Johne's antibodies, or *Streptococcus uberis* identification, DHI milk testing continues to provide valuable information that impacts treatment and/or culling decisions based on test results. With verified identification (a key component of DHI testing) and accurate results, business-minded dairy producers can make sure the right cow goes on the truck and the right cow remains in the herd.

DHI milk sample testing offers convenience, accuracy and value to dairy producers wanting to enhance herd productivity, cattle health, animal welfare, sustainability and profitability. Bottom line: milk is an excellent substrate for diagnostic testing and there is a wealth of information waiting to be extracted from DHI milk samples.