

VistaMilk Pioneers Failure of Passive Transfer (FPT) Detection Device

New test is capable of rapid detection of Immunoglobulin G (IgG) antibodies on-farm within the first 24 hours of life

20 July 2020 -- A research team from the VistaMilk SFI Research Centre, based at the Tyndall National Institute, has developed an economical point-of-care device to help combat Failure of Passive Transfer (FPT). FPT is a passive immunity dysfunction that predisposes calves to development of disease and increases the risk of calf mortality. The new test is capable of rapid detection of Immunoglobulin G (IgG) antibodies on-farm within the first 24 hours of life and provides informed decision support to farmers and veterinarians.

Passive immunity is the short-term immunity that results from the introduction of antibodies from mother to offspring. In humans, antibodies from the mother are passed to the foetus through the placenta in the last few months of pregnancy. These passive immunity antibodies include the “fighter” IgG antibodies vital in protecting infants in early days of development and growth.

Unfortunately, bovine antibodies cannot pass the placental barrier and are not transferred from the cow to the foetal calf in utero. Instead, transfer of passive immunity in bovines occurs through maternal colostrum, and new-born calves gain antibodies from their mother's first milk. This “passive transfer” is crucial for new-born calves to establish their disease-fighting immune systems until they can actively produce their own antibodies.

When neo-natal calves fail to absorb adequate immunoglobulins (Ig) from maternal colostrum within the first hours of life, the result is Failure of Passive Transfer (FPT). FPT is a significant challenge for both beef and dairy farmers in terms of both herd health and herd economics; 39% of calf mortality is attributed to FPT.

Research to address the challenge of FPT was undertaken by the VistaMilk team at Tyndall in partnership with Teagasc, the Agriculture and Food Development Authority. **Dr. Emer Kennedy, Research Officer at Teagasc**, commented on the results, saying “Previously it has taken 24 hours to obtain results from IgG analyses, but this new immunosensor can deliver results in 15 minutes. It will now be possible to easily monitor colostrum management on farms and, based on the results achieved using the immunosensor, ultimately improve the health and welfare of calves.”

These point-of-care immunosensors utilise electrochemical transducers, which convert the chemical change detected in the tested blood to a signal that reports positive or negative for FPT. Electrochemical transducers are increasingly the preferred option for point of care due to their low cost, simple use and fast delivery of diagnostic information.

Dr. Alan O'Riordan, Principal Investigator at Tyndall and lead VistaMilk researcher on the project, explained “Early monitoring of IgG absorption in a calf allows faster treatment of inadequate colostrum levels and prevention of FPT. This immunosensor device will enable rapid confirmation of FPT for farmers and veterinarians, thereby improving calves' vitality and survival rate.”

Image: *Dr. Emer Kennedy, Research Officer at Teagasc, which partnered on the FPT Detection Device.*
Photo: *Teagasc*

About VistaMilk

The €40m VistaMilk SFI Research Centre leads fundamental and translational research in precision pasture-based dairying. Representing a unique collaboration between Agri-Food, information communications technology (ICT) research institutes and companies, and leading Irish and multinational food companies, the centre is hosted by Teagasc, the Agriculture and Food Development Authority. VistaMilk operates in partnership with the Tyndall National Institute, the Telecommunications Software & Systems Group (TSSG) at Waterford Institute of Technology, and the Insight Centre for Data Analytics (UCC, UCD, DCU and NUIG) and the Irish Cattle Breeding Federation. The VistaMilk SFI Research centre is funded by industry, Science Foundation Ireland and the Department of Agriculture, Food and Marine.

About Tyndall National Institute

Tyndall is a leading European research centre in integrated ICT (Information and Communications Technology) materials, devices and systems. It is one of Ireland's five National Labs, specialising in both electronics and photonics. Tyndall works with industry and academia to transform research into products in its core market areas of electronics, communications, energy, health, agri-tech & the environment. With a network of over 200 industry partners and customers worldwide, they are focused on delivering human and economic impact from excellence in research. A research flagship of University College Cork, Tyndall is home to a research community of 600 people of 52 nationalities.

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