



DeepTech Device Improves Survival Rates for Vulnerable Newborn Calves

As humans we almost take for granted that we possess a form of protection from the moment we enter this world. We are fortunate that we receive passive immunity passed on from our mothers at birth via placental transfer of antibodies.

Passive immunity can be defined as the short-term immunity which results from the introduction of antibodies from another person or animal. Passive immunity like that of the “fighter” immunoglobulin G ‘IgG’ antibodies received at birth are vital in protecting infants in early days of development and growth.

Unfortunately, this is not the case for the bovine ‘cow’ species. Bovine antibodies that cannot pass the placental barrier and as such are not transferred from the mother to the foetus.

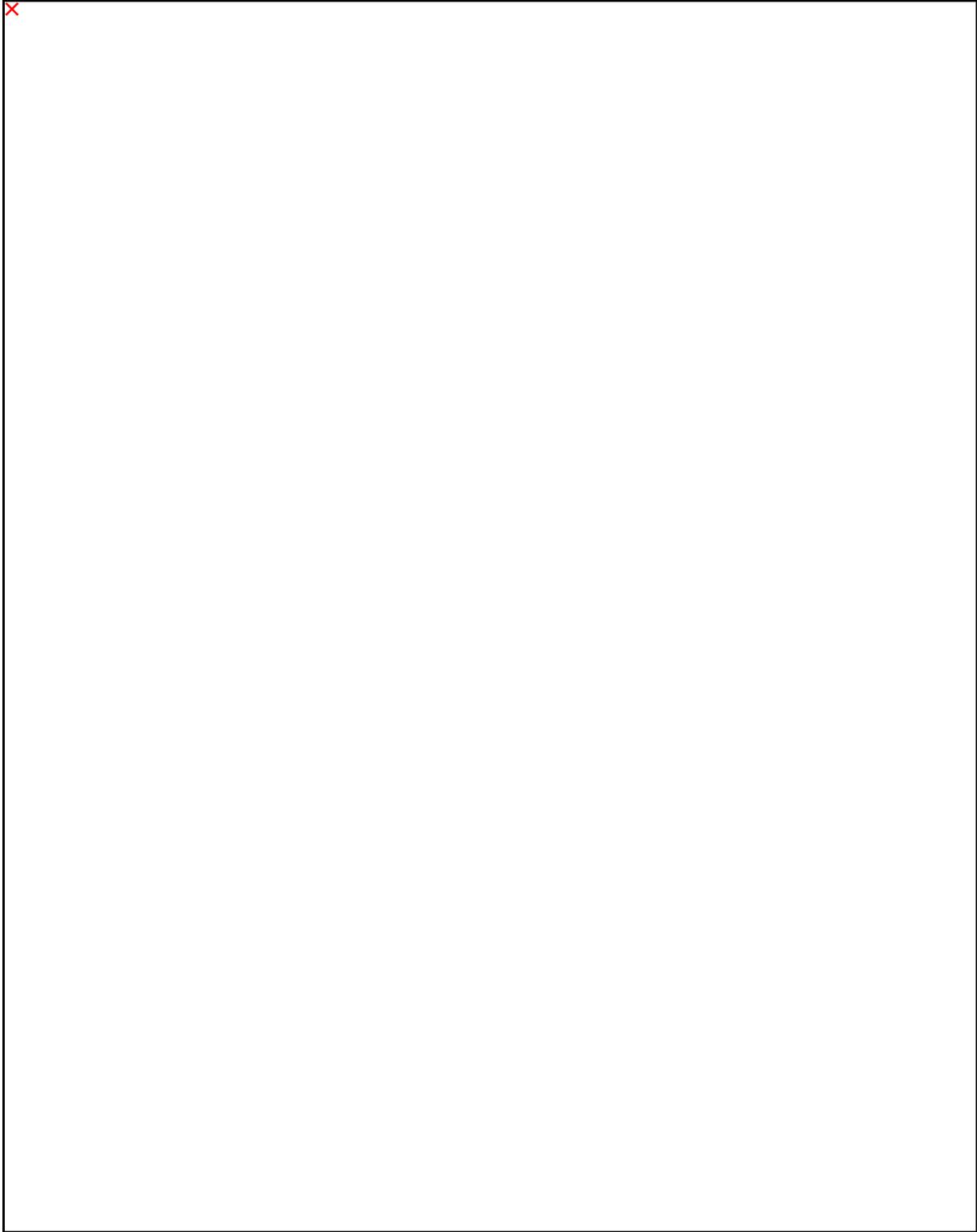
Transfer of passive immunity in calves

Transfer of passive immunity in cows occurs solely through maternal colostrum whereby new-born calves instead gain all their antibodies from their mother's first milk. This passive transfer is crucial for new-borns to establish an immune system to fight diseases until they can actively produce their own antibodies.

Continuous early monitoring of IgG absorption in a calf, within the first 6 to 12 hours of life, is critical to allow faster treatment and prevent Failure of Passive Transfer (FPT) - a condition that predisposes calves to development of disease and increases the risk of mortality.

In Ireland, **39% of calf mortality is attributed to FPT**. This is an ongoing societal challenge for both the Irish and global farming sector which seeks to enhance sustainable agricultural production. Consequently, there is an urgent need to develop an economical point-of-care device capable of rapid detection of IgG on-farm to provide informed decision support to both farmers and veterinarians.





Immunosensor device improving detection of passive immunity

[Alan O’Riordan](#), Principle Investigator, Caoimhe Robinson, PhD student at Tyndall, Niamh Creedon former Technology Commercialisation Manager at MCCI Tyndall in collaboration with colleagues in Teagasc, have developed an impactful solution. In their recently published paper entitled ‘Electrochemical detection of bovine immunoglobulins G to determine passive transfer of

antibodies to calves', the team present the development of a label-free immunosensor device for detecting bovine IgG in serum and prove its suitability to determine early FPT in new-born calves.

Electrochemical transducers have been a favourable option for point of care immunosensors due to their low cost, simple and fast method of delivering diagnostic information, thereby improving diagnostic efficiency.

The developed sensors were challenged to distinguish between new born calf blood, both pre- and post-colostrum feeding, and demonstrated efficient detection of IgG in under 15 minutes. This immunosensor device will enable rapid confirmation of FPT for farmers and veterinarians, thereby improving calves' vitality and survival rate.

Read more on the research paper [here](#).

Special edition of Analytical Methods journal

The research paper was recently published in a special edition of the Analytical Methods journal which related to bio-sensors for real life applications.

As the review panel rated this particular paper strongly, the team were given the opportunity to also feature on the cover.

The artistic cover, was designed in collaboration with Bri Hyland, a graphics design intern student from CIT. The image comprises stylized electronics component symbols superimposed on the image of a cow to reflect the confluence of Deep Tech with Agriculture.

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