Predict, Prescribe, Perform: integrating traditional and new data sources to enable Smart Herd Management

S. van der Beek[1], H.M. Knijn[1], D. Zouari[1]

[1]CRV, Box 454, 6800 AL, Arnhem, The Netherlands

Abstract

The world of animal identification and recording is faced with rapid developments in fields like genomics, sensor technology, robotics, lab-on-a-chip, internet-of-things and big data analysis. These new technologies have the potential to help farmers to do what they always have done: to take good care of animals from the moment they are born till the moment they leave the farm, but to do so in a more efficient way. Just as easily, however, improper implementation of new technologies leads to confusion, complexity and in the end to farmers not embracing or utilizing new technologies. It is therefore very important to take an integrative approach that leads to decision support for farmers that is simple and relevant. To realize this at CRV, we are rebuilding our development platform from scratch. The new platform uses the newest tools to capture data (real-time), process data, analyse and visualize data, and uses state of the art machine learning tools. The platform captures genomic data and both traditional phenotypic (milk recording, herd book, ..) data and modern phenotypic (activity, rumination, automated milking parlour ..) data. With the platform we develop algorithms using machine learning tools. To test the usability of an algorithm we build dedicated prototype Apps. The App links to the development platform and allows pilot farmers to test the App and the functionality included in it. Based on the feedback from the pilot farmers, we can go back to either the algorithm development phase or to the App development phase. It will take a few iterations of prototyping before the prototype is ready. The prototype will either be the base of a new product, or can be incorporated as additional functionality in an existing product.

The new development platform has an integrative setup. Alerts, analyses and advices are based on phenotypic predictions. The algorithms that underlie the phenotypic predictions make use of genomic predictions and all information available from the cow and herd. Due to iterative prototyping, the alerts and advises will be simple and relevant. This results in Smart Herd Management tools that predict, prescribe and in the end help farmers to perform.

Keywords: Phenotypic Prediction, Prototyping, Sensor Data