

Stepwise Data-Driven Innovation to Support Sustainable Dairy Transformation in Developing Countries

H. Soyeurt^{1*} and M. Shaffer^{2*}

¹University of Liège - Gembloux Agro-Bio Tech, Gembloux, Belgium

²DataGene Limited, AgriBio, Bundoor, Australia

***Corresponding author: Hélène Soyeurt: hsoyeurt@uliege.be; Matthew Shaffer: mshaffer@datagene.com.au**

This abstract illustrates a perspective inspired by discussions held during the recent FAO Regional Forum on Innovations for Sustainable Livestock Transformation in Asia and the Pacific. Enhancing dairy production in developing countries necessitates a strategic, phased approach that begins with simple, cost-effective data recording practices and gradually integrates advanced technologies. This progression has the advantage of maximizing farmers' engagement and comprehension of the benefits while minimizing their initial financial investment. The first step involves the systematic recording of individual milk yield per cow. This practice, requiring no expensive equipment, is a crucial starting point for improving herd management and initiating selective breeding programs. By regularly monitoring milk production, farmers can identify high-performing animals, which enables targeted genetic selection and accelerates long-term improvements in productivity, herd resilience, and profitability. Additionally, regular milk yield data facilitates early detection of management issues such as nutritional imbalances or diseases, supporting more effective, timely decision-making. Once farmers have recognized the benefits of data-driven management, the introduction of advanced technologies becomes feasible. Mid-infrared (MIR) spectroscopy, for example, offers a low-cost yet powerful method to analyze milk composition. By utilizing MIR analysis, farmers gain access to a broad range of phenotypes, which supports refined breeding strategies, proactive health monitoring, improved milk quality control, and allowed an early identification of metabolic disorders, reproductive inefficiencies, and other production-related challenges. Implementing this stepwise approach can reduce resistance to technological innovation by demonstrating immediate, tangible benefits. Awareness campaigns, farmer training programs, and cooperative support networks are also essential to help farmers progress through each stage of this transformation. In addition, standardized data collection and analysis protocols ensure that the data generated are reliable, comparable, and actionable across various contexts. To further support this process, financial and technical assistance is critical. Subsidized technologies, access to cooperative funding mechanisms, and expert advisory services can ease resource constraints for farmers. Continuous technical support also helps maintain equipment and ensures proper data management and interpretation. This phased strategy not only fosters sustainable dairy production but also builds farmers' long-term trust in data-driven innovations. Through coordinated efforts involving governments, research institutions, non-governmental organizations, and private stakeholders, the dairy sector in developing countries can enhance productivity, efficiency, and economic stability, contributing to a resilient and sustainable agricultural landscape.

Keywords: Mid-infrared spectroscopy, herd productivity, awareness campaign.