

Research priorities on the use of sensor technologies to improve productivity and sustainability on dairy farms

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Executive Summary

Precision Livestock Farming (PLF) can be defined as the management of livestock farming by continuous automated real-time monitoring of the health and welfare of livestock and the associated impact on the environment. The benefits associated with PLF are far-reaching: improved animal welfare, improved profitability, improved product quality, minimised adverse environmental impacts and reduced use of antibiotics through preventive health measures and early treatment of disease. Thus, PLF contributes to the wider goal concerning productivity and sustainability of livestock production.

Several key areas have been shown to determine productivity in dairy farming. These include udder health, lameness, nutrition, data management, milking data, dairy cow activity and behaviour, metabolic diseases, calves and young stock, grassland management, and housing. The wider negative impact of health management and productivity in dairy farming has been widely documented. For example, poor udder health has been associated with increased usage of antibiotics, poor animal welfare, and reduced production efficiency while diseases such as lameness have been shown to hinder the animal to express normal behaviour; less interaction with the rest of the animals in the herd thus reduced activities such as oestrus behaviour. Undeniably, these problems justify a cognisant effort on the part of every dairy to invest in whatever technology is needed to optimise good cow health for improved productivity.

Sensor technologies are used in dairy farming to electronically monitor livestock, their environment, and to collect real-time data to make more informed decisions. Currently there are several sensors which are being used in a number of dairy farms across Europe and other countries. Examples of such sensors include those which can be used to monitor movement, rumen pH, milk and body temperature among others.



The need for further research on use of sensor technologies cannot be ignored thus a questionnaire survey was developed to investigate the use of sensor technologies in relation to improved productivity and profitability on dairy farms, in order to give some guidance for further research priorities in the 4D4F research project for funding organizations around Europe. The survey was sent to actors in different occupations (farmers, veterinarians, farm advisors and researchers) across nine countries in Europe. In total, there were 103 replies with the majority (45%) having come from farmers. Overall, the majority identified the following areas of dairy farming productivity to be core; lameness, udder health, metabolic diseases, nutrition and reproduction. On experiences in the use of sensors, most respondents seem to have experience in more than one sensor while pressure sensor were least common on farms and very few had experience from this device.

The study has highlighted the following areas as the top priority for research;

- Research on refining sensors which can provide rapid information on health issues, reproduction, nutrition. Precisely on the following areas; lameness, mastitis, and metabolic diseases. In particular, the sensors ought to have better algorithms for health. More research in the area of integration of information was stressed by researchers.
- Further research on wide spectrum sensors i.e. those which can capture and differentiate between multiple dairy cow health issues.
- Simplifying the data so that it would be easy to understand in order to enable prompt action with regards to areas of dairy farm productivity.

In conclusion, the survey has highlighted several areas where research on sensor technologies should focus on in order to improve productivity and sustainability on the dairy farms in Europe and other parts of the world.