IMPACT

AUTOMATIC MONITORING OF LIVESTOCK FOR THE BENEFIT OF ALL

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Automatic monitoring of livestock for the benefit of all

*The **EU-PLF** project was established to develop management tools that enable continuous automatic monitoring of animal welfare, health, environmental impact and production. Ultimately, the findings have been translated into a practical PLF-Blueprint that benefits animals, farmers, consumers and the environment*

As the world's population continues to grow at unprecedented rates, incomes are rising and more and more of the world is becoming urbanised. All of these factors combine to significantly increase the demand for high quality animal protein. Indeed, a report by the World Health Organization suggests that while 218 million tonnes of meat was produced in 1999, by 2030 this is projected to increase to around 376 million tonnes.

As this global demand for animal products (meat, milk, eggs) is set to increase by up to 70 per cent in 2050, so too does the pressure on the livestock farming sector. As such, fresh approaches to livestock production are required to improve efficiency, whilst still acknowledging the health and welfare of the animals and the environmental impacts of intensive animal food production systems.

In an attempt to address these concerns, the EU Precision Livestock Farming (EU-PLF) project has been established. This four-year project, coordinated by Professor Daniel Berckmans (KU Leuven, Belgium), began in November 2012. It is funded by the EU through the FP7 initiative, and is composed of 20 research, industrial and business partners. Moreover 20 farmers spread over Europe have participated in the project in several workshops, meetings and conferences.

A BLUEPRINT FOR THE FUTURE

Precision livestock farming (PLF) is a means of enabling farmers to take care of the animals they produce in a satisfactory manner. As the size of livestock farms grows, so too does the burden of caring for the increased number of animals. Ultimately, this can lead to a decrease in the technical and economic performance of the farm, as well as the health and welfare of the animals. EU-PLF therefore seeks to translate the tools and methods developed in laboratories into practical applications that farmers can employ to assist in the management of their farms.

In order for these tools and methods to be successfully translated from the lab to the farm, the researchers have studied them in detail, with the end user in dairy, pig and poultry farms actively participating in the project. From this, a generic manual – known as the PLF-Blueprint – has been established to help others install, use and develop PLF concepts into operational tools. 'The PLF-Blueprint serves as a manual on how to bring PLF technology into a farm,' explains Berckmans. 'It shows how the farmer and companies can check whether PLF technology is feasible in a specific farm, what steps should be taken, and how to prevent problems that might occur. In future the farmer can also check existing commercial PLF systems for different species with objective scientific information on these systems and contacts for the producers.'

THREE MANAGEMENT TOOLS, LIMITLESS POSSIBILITIES

Thus far, EU-PLF has developed several management tools for continuous automatic monitoring in real time. Importantly, these tools also give consideration to the animal health, welfare, productivity and environmental impacts of farming methods. First, the eYeNamic system can give an early warning to the farmer when some problem is reported from the behaviour of the broilers. Tests have shown that 95 per cent of all problems – such as with the feeder line, drinking line, temperature and light – can be detected by the system. Second, the SoundTalks system is able to provide real-time analysis of the sounds pigs make to give an early warning for potential respiratory problems and infections in buildings used for the fattening of pigs. Third, the CowView

‘The PLF-Blueprint serves as a manual on how to bring PLF technology into a farm’

system can monitor the location of cows in a barn through a positioning system. Through this, the system can show the relationships between cow activity, feed intake and milk yield – essential information for the farmer when attempting to understand whether or not a cow is unwell and, importantly, why this might be so.

MANY HANDS (AND TOOLS) MAKING LIGHT WORK

The consortium involved in the project has combined different types of expertise to ensure the aims of EU-PLF are achieved. ‘The farmers know what they want to realise in their farm and are the first ones to evaluate the PLF systems when installed, while the animal researchers have expertise on how to measure animal welfare and animal health,’ explains Berckmans. ‘The researchers have developed many PLF techniques and have knowledge on how they should function, whereas the Work Package partners are experts in training potential starters in writing a business plan, attracting money and starting four new PLF companies.’

With involvement from so many partners in different fields across several countries, ensuring effective communication across the collaborators was a chief concern. This was achieved through the employment of a variety of methods and tools, including a central database of measured data, a professional digital management tool, a dissemination committee, a monthly conference call, several technical meetings between Work Package partners, an independent advisory board giving feedback, and an annual meeting between all the stakeholders. This ensured that the benefits from such a substantial pool of experts were realised through adequate tools and methods.

SHARING FINDINGS WITH FARMERS AND THE PUBLIC

Another key aspect of EU-PLF is the dissemination partner who has considerable expertise in ensuring that the results from the project are translated to the outside world. For while what the project collaborators are attempting to achieve is patently important, both farmers and industry need to be aware of it in order to buy in to the initiative.

Berckmans has 30 years’ experience in performing research for the livestock sector and he and his colleagues believe the best way to convince farmers is through testimonials from other farmers. ‘The project embraced the participation and opinions of farmers by inviting them to workshops. Furthermore, there was one partner who had the task of visiting all the farmers involved to listen intently to their experiences with PLF technology,’ he explains. ‘When farmers are interested, industry becomes interested, since they are their customers.’

In addition to communicating with farmers, EU-PLF has given consideration to enlightening the public about what is happening, especially as animal welfare is a growing consideration for people around the world. The fact that PLF technology monitors animals every second during 24 hours a day, seven days a week, demonstrates that such systems enable the maintenance of animal health and welfare. Instead of using hidden cameras to highlight the plight of animals in these farms, the farmers are using cameras, microphones and sensors to monitor them continuously – all data are available as the whole management of the livestock is predicated on them. The consortium will therefore inform the public through articles, documentaries, interviews and videos.

A NEW ERA OF LIVESTOCK FARMING

As the project nears its conclusion, many results have been obtained. Berckmans and his colleagues were particularly encouraged by the attitude of the majority of farmers regarding the new technologies, and the project has provided insight into what problems must be overcome when installing the modern technology. Ultimately, what the EU-PLF consortium has achieved is the identification of a means of adding value to the European livestock sector that helps it to stay competitive.

As the population increases and the pressure on livestock farmers becomes greater and greater, EU-PLF has provided a way for farmers to maximise efficiency in a way that encourages sustainable solutions, whilst maintaining the health and welfare of the animals. A new era of livestock farming is being ushered in to address the concerns of the future, thanks in no small part to the efforts of all the partners in this exciting project.

Project Insights

FUNDING

European Union FP7

PARTICIPANTS

Catholic University of Leuven • Swedish University of Agricultural Sciences • University of Bristol • French National Institute for Agricultural Research (INRA) • University of Milan • Agricultural Research Organization of Israel • Teagasc – Agriculture and Food Development Authority • Royal Veterinary College • Wageningen University and Research Centre – DLO • Fancom BV • SoundTalks NV • PLF Agritech Europe Ltd • Xenon New Technologies GCV • Abrox • Syntesa sp/f • Nutrition Sciences • European Federation of Animal Science • M&M Corporation • GEA Farm Technologies

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PROJECT COORDINATOR BIO

Professor Daniel Berckmans leads the M3-Biores (Measure, Model and Manage Bioresponses) Division in the Department of Biosystems at the Catholic University of Leuven. His research team is considered a pioneer and global leader in PLF. Berckmans is co-author of some 273 scientific articles in peer-reviewed journals and 389 papers in conference proceedings. He is member of several international advisory boards, visitation commissions in several European countries, and six international professional organisations worldwide. Since 1982, his team has supported the development of 15 products for the world market in cooperation with industrial partners with whom royalty agreements were concluded. He is coordinator of several EU projects with a total value of over €10 million and co-founder of two spin-off companies: BioRICS NV in 2006 and SoundTalks NV in 2011.

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Impact Objectives

- Determine key indicators for animal welfare, productivity and health
- Install the Precision Livestock Farming (PLF) products in 20 livestock houses spread over Europe
- Perform extensive field tests, analyse the data obtained, and derive integrated solutions to ensure PLF creates value and becomes a service to the farmer
- Define the value created by the use of PLF tools, facilitate PLF-related innovation through high-tech SMEs, and create a PLF-Blueprint on how to install PLF technology in farms

PLF-Blueprint for the future of livestock farming

***Professor Daniel Berckmans** is the Coordinator of a project that seeks to improve a multitude of facets relating to the livestock sector. Below, he discusses the extensive collaborations involved, the benefits to animal welfare, and what the future holds for precision livestock farming*

Could you begin by explaining the ways in which the EU Precision Livestock Farming (EU-PLF) project is supporting leadership and European collaboration in animal welfare research?

Precision livestock farming (PLF) research began in Europe and Europe continues to drive it. Now, we are bringing it out of the laboratories and into real farms in the field – we want to check how the PLF technology can create value for European farmers. European farmers need technology to be able to guarantee animal health and welfare with high performance and lower environmental impact, in order to bring a quality product to the public in ways that society endorses.

Who are the different stakeholder groups you are hoping to create value for, and in what ways do you see this will be realised?

Firstly, there is the farmer, in terms of getting real-time control of animal health and welfare and consequently the productivity of the animals. But then there is the consumer, in terms of receiving transparency; the general public, in terms of getting more objective information and reducing the environmental impact; veterinarians, in terms of providing them automated monitoring and reports; policy makers, in terms of giving them information to inform their decisions; feeder companies and breeding companies, in terms of providing big data regarding the performance of genetic lines in practice; technology companies; and researchers, in terms of collecting new types of information on a large scale.

Working across so many countries can be very challenging. How have you overcome these barriers?

Our research team in the last seven years has involved researchers from 14 different countries. Over the many years that we have been working together with people from different cultures, the collaborations have proved to be very enriching. It is not the number of countries that counts; what matters is whether people really want to collaborate. The problem is that there can be different objectives between different research fields and cultures. Animal scientists are further away from the development of technology and valorisation because they focus on the scientific results. Within this project the aim is to get PLF systems evaluated in the field – to apply the research.

What we have seen is confirmation that modern communication techniques cannot replace physical meetings. This obviously requires large travel budgets, but when so many people from so many countries across so many disciplines are working together it can be difficult to understand what is happening outside of your immediate environment. In addition, some researchers might not be working on anything else to gain recognition, so egos can be a problem. We have specifically worked with those partners who have the intention to collaborate to ensure the process runs as smoothly as possible.

What do you think the future holds for PLF once the project has been completed?

For me, the results from PLF will drive different stakeholders from totally different disciplines and origins to work together to realise that the new world of farming can be more sustainable in all definitions of that word. The future signals a path where all the stakeholders and partners involved can truly collaborate in an efficient way to change the world. The so-called transitional economy, where users help each other (as is shown in services such as Uber and Airbnb), will also be tested in the livestock sector; PLF offers new opportunities to do this based on evidence and measurements.

PLF technology offers totally new possibilities to cooperatives and farmer organisations – which is extremely important in strengthening the position of our farmers, especially in terms of the way they run their businesses and produce healthy and high quality food products.