PRECISION LIVESTOCK FARMING APPLICATIONS

edited by:
Ilan Halachmi
Precision livestock farming applications
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Making sense of sensors to support farm management

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Ilan Halachmi
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Editorial

In 2014, the EU-PLF\(^1\) dissemination committee and the EAAP\(^2\) program committee made a creative and farsighted decision to associate EU-PLF with the EAAP annual meeting in Copenhagen in August 2014. As far as I am aware, this was the first international symposium on Precision Livestock Farming (PLF) that was held by an animal science federation. This symposium was a joint-venture of the EU-PLF project and the three EAAP scientific commissions ‘cattle production’, ‘pig production’, and ‘health and welfare’. The special joint-session held on 25 August 2014 finally resulted in the publication of this book.

The aim of the joint-session was to facilitate ‘cross-disciplinary’ discussions focusing on real-time interpretations of animal response and its associated management actions. Several livestock sectors and multidisciplinary science participated in the discussions: (1) animal sensing technology (start-up companies and sensor developers, either active in research institutions and universities or in the R&D departments in the private-sector); (2) matured industries, such as retailers, animal feed suppliers, farm equipment providers, farm designers and vets (all active in the livestock sector, animal farms and other industries along the animal and human food chains); and (3) animal geneticists, nutritionists and health experts (i.e. all aspects of animal-focused scientists, zoology, biology and environment scientists and farmer organizations that usually participate in an EAAP annual meeting). Unique of this ‘cross-disciplinary’ approach is that ‘animal-focused’ scientists, engineers, companies, as well as farmers’ organizations interacted and combined their strengths and views. ‘Precision Livestock Farming Applications – making sense of sensors to support farm management’ therefore provides an update on the state of the art of PLF in interaction with the other scientific and applicative expertise.

The structure and strategy of the joint-session encouraged a ‘cross-disciplinary atmosphere’ – an occasion for fruitful discussions between people with a wide range of specialisations. At the end of each topic, such as lameness, added value, genetics, or rumen sensing and animal health, all presenters of that topic were invited on the stage and answered questions from the audience in what was called a ‘panel discussion’. I take the opportunity to gratefully thank Anne Verbrugge, Andrés Schlageter Tello, Alberto Peña Fernández, Tom van Hertem, Vered Sibony, Sarah Weyl-Feinstein, and Rebecca Neilson who punctually, quickly and efficiently wrote the questions in real-time during the discussions. It is known that the most vivid part in a typical scientific lecture is the discussions, without their help this book could not include the discussions nor could they have been documented. The note takers did their best to describe all the discussions, however, in some cases where the debates were in exceptional high speed, not all details were taken.

This book follows the same format as the joint-session; the separate parts of the book concern the specific topics of LPF. The discussions at the end of each part relate to the specific topics and are based on the ‘meeting-minutes’ taken during the panel discussions. The selection of the papers for this book (based on presentations given in the joint-session) was performed by the presidents of the EAAP study commissions (Marija Klopčič, Charlotte Lauridsen and Hans Spoolder) and the EU-PLF dissemination committee members (Marcella Guarino, Michel Bonneau, Rebecca Neilson, Kees Lokhorst, Thomas Banhazi, Heiner Lehr, Anne Verbrugge, Per Peetz Nielsen and

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2 European Federation of Animal Science (EAAP).
Ilan Halachmi. Each member reviewed several papers and I would like to thank them all. Their names are listed in the acknowledgements.

Part 1 of the book provides an introduction to precision livestock farming from an European and an American perspective. The following parts of the book concern the specific topics of PLF; the chairpersons for each topic, Daniel Berckmans (Part 3), Bernadette Earley (Part 4), Marcella Guarino (Part 5), Kees Lokhorst (Part 6), Hans Spoolder (Part 7) and Marija Klopcic (Part 8) are hereby gratefully acknowledged.

Part 2 of the book contains papers on early detection technologies for animal lameness. Lameness in cows, sheep and pigs can be detected by either camera-based sensors, weight response surface matrix, or by leg and neck activity sensors. The discussion focuses on what can be learned from the different species and the different lameness sensing technologies presented. For example, are there any common health, genetics, and nutrition issues that can be generalised by comparing the different species management practices and comparing the different technologies?

Part 3 of the book ‘How does PLF deliver added value to farmers’ brings together various case studies about PLF’s added value in pigs and cattle farms from the Netherlands, Spain and Australia. The ‘added value’ discussion follows the chapters of the book. In addition to technology comparison used with different species and estimating their added value to the farmer, wider questions, such as what is the PLF added value to the food consumer (human), to the animal-care activists, to the retailers, to the global environment and to the local nearby rural community were frequently asked in the discussions (see Discussion Chapters 2.5, 3.5, 4.6, 5.7, 6.4, 7.4 and 8.5).

Part 4 of the book presents studies on PLF in the area of genetics and health of beef, calves and heifers. Presentations in this session looked at monitoring stress responses and rumination among beef, calves and heifers applying various sensing technology. Part 5 focuses on ‘Rumen sensing in relation to feed intake’. Part 6 of the book concerns ‘PLF for automatic detection of animal health in poultry and pigs’ while Part 7 covers the same subject but for cows. Finally, Part 8 ‘Sensors for milk quality and milk contents and their applications’ contains questions and answers on the topic, as well as a finalizing discussion.

Overall, it is clear that the joint EAAP/EU-PLF approach has a distinctive and valuable role, facilitating cross-disciplinary discussion among the technology-oriented scientists, animal scientists, farmers, industries and other players. The content of this book provides evidence of the initial integration of PLF into the animal-scientists community, while a widening and deepening of research, development and evaluation of underlying concepts of PLF (defined as real-time measurement and management of the smallest manageable production unit temporal variability) to a vast and diverse world of livestock production. The prospects for further developments are manifold.

Ilan Halachmi
Editor