Editorial: Integration of Ethical and Social Aspects Into Precision Livestock Farming—Achieving Real-World Impact Responsibly

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Editorial on the Research Topic

Integration of Ethical and Social Aspects Into Precision Livestock Farming—Achieving Real-World Impact Responsibly

Precision Livestock Farming (PLF) uses technology to monitor and manage animals—often in real-time and at the individual animal level (Berckmans, 2014). Such technology can range from wearable sensors providing data related to animal activity and/or location to computer vision solutions using cameras that can provide relevant animal data in a less intrusive way.

The challenges of developing PLF solutions capable of monitoring individual animals who often live in large groups with other animals of nearly identical appearance and in a tough farm environment, where equipment and data transmission are often affected by dirt, moisture and by the animals themselves, are considerable (to say the least). However, solving technical problems alone is not enough. The developed PLF solutions will be implemented in real-world scenarios, in farming systems where humans and animals interact, and in societies where there may be ethical or cultural ramifications to replacing human labor and decision-making with machines and artificial intelligence.

Research underlying the development of the PLF solutions is often presented as benefiting both humans and animals (Guarino et al., 2017; Werkheiser, 2020). For humans, using PLF is proposed as a way to use limited human resources to better effect by giving farmers tools to keep track of more animals and to intervene earlier when problems arise. For animals, it is touted as a way to give them more individualized care, tailored to their unique needs, which should improve their quality of life. Yet, as with all technology, there can be unintended consequences or alternative uses that should be considered, before the technology is developed too far or widely adopted (Russell et al., 2015; Werkheiser, 2020). For example, will use of technology to directly monitor and manage animals result in objectification of the animal and destroy the human-animal relationships farmers care so much about (Bos et al., 2018; Werkheiser, 2018).

Schillings et al. examined the likely impacts of PLF on animal welfare through the lens of the Five Domains Model. They concluded that while current PLF technologies broadly have abilities to reduce obvious negative welfare issues, such as injuries or illness, they are not yet able to promote positive welfare. However, such limitations may not be entirely the fault of technology, as there is an active scientific inquiry into what parameters are reliable indicators of positive welfare states, regardless of what approach is used to detect such indicators in an animal.

Dawkins posits that whether PLF will improve the welfare of livestock on commercial farms will depend on exactly how welfare is defined and agreed upon by the various human actors developing

and using the technology as well as the wider public. Only by having a common definition, and one that truly considers quality of life from the perspective of the animal, Dawkins argues, can the impact of PLF on animal welfare truly be assessed. Where animal welfare was once a term to be avoided by mainstream animal scientists, it has now become adopted so widely that it is often used or defined incorrectly, whether deliberately or not, by those that hope to benefit from including the term in their papers and presentations. Thus, the importance of a common, robust and meaningful definition remains as critical for animal welfare as we strive to monitor it with technology as it did at the inception of the scientific study of the subject. Dawkins also argues that high standards of animal welfare must be an explicit priority when developing PLF so that systems are trained to recognize and promote welfare to the satisfaction of animal caretakers and also the public (which circles back to the importance of that common definition).

Analysis of manuscript topics and text using both Natural Language Processing and manual examination of articles by Guzhva et al., reveals that relatively few technical papers related to development of PLF technologies make even a general mention of social or ethical implications of their work. When outcomes with social or ethical implications are stated, they are often presented as sweeping generalizations of "improving welfare" or "helping farmers." Few concrete or explicit links are made between the data generated by the technology and how this information will translate into a tangible benefit for either the human user or the animal recipient. In the few papers found to acknowledge downsides to the adoption of PLF, the most common pitfalls described were farmer frustration with technology failures or limitations, need for farmers to learn new skills and the potential for PLF to increase intensification and size of farms.

In addition, there may be unintended societal or ethical consequences to the widespread use of technology and algorithms that the technical experts have not yet considered. For example, computer scientists working on designing algorithms that can recognize sick or diseased animals should explicitly consider that this technology could be used to automate decisions related to veterinary treatment or euthanasia. Developers should be trained to look beyond the immediate technical challenge they are solving to anticipating practical applications of their work and the ethical consequences. How might farmer personality and interaction with technology affect whether humans care more or less for their animals (Kling-Eveillard et al., 2020). Finally, what is the potential for a particular technology or algorithm to have crossover applications related to monitoring humans or automating important decisions about human health or life (Werkheiser, 2020).

Solving a technical problem in a vacuum ignores the fact that the technology will be used in the real world and may lead far down a path unacceptable to society before this disconnect is acknowledged. The articles in this special topic are intended to encourage thoughtful development of PLF and to create awareness in PLF developers of the social and ethical ramifications that they may not have considered previously. While it is not reasonable to expect all PLF developers to be philosophers or social scientists, it is possible to consult with colleagues who are or to work on interdisciplinary teams when developing PLF.

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