

The importance of research applicability

Commentary on [Marino & Merskin](#) on *Sheep Complexity*

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Abstract: Marino & Merskin’s (2019) review contains key information about the complexity of sheep and their intelligence level, but lacks practical application. The key to making any long-term changes to sheep welfare at an industry level is by generating research that is practically relevant to the sector. The practical application of research should be considered at the design stage and in consultation with producers. Additionally, thought needs to be given to how the practical application of the research will be transferred to those people directly involved in animal care (e.g., producers, stockpersons, etc.). Focusing on the practical relevance and application of research at all stages of the process will foster changes to long-held beliefs and attitudes.

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1. Introduction. Marino & Merskin’s (2019) review highlights key research demonstrating that sheep are complex, intelligent individuals, dramatically contrasting the [often still held] view that sheep are “unintelligent and passive.” In their conclusion, the authors state that they “... hope that this comprehensive analysis ... will serve as a foundation for reconsidering the use of sheep as commodities in modern agricultural production...” How do we do this? How do we ensure that the valuable research that has been reviewed actually makes a difference to sheep within the production industry?

2. Application of research. Echoing the comments of **Horback** (2019), we need to apply this knowledge effectively in order to make a difference to sheep welfare, and this means more than simply carrying out the research (Grandin, 2003; **Baker**, 2019). The main area in which sheep are used is agricultural production and therefore that will be the focus of this commentary. In order to get scientific research into agriculture, three key components are required: (1) consider the practical applications of the research at the project’s design stage, (2) transfer the practical application of the knowledge to those people directly involved in animal care (e.g., producers, stockpersons, etc.), and (3) change long-held beliefs and attitudes.

2.1. Research design. As scientists we need to understand the differences between what makes good experimental design and what is practically transferable to the sector. The methods and procedures that might be suitable for a research or clinical setting are often not suitable for the everyday workings on a farm (Grandin, 2014). **Phillips** (2019) rightly points out that “sheep

are as intelligent as they need to be,” and **Vonk** (2019), **Peña-Guzmán** (2019) and **Pellis** (2019) discuss in their commentaries the importance of considering research from the sheep’s point of view. The consideration of the practical application of the research should be intrinsic at the stage of conception. This should include implementable changes that can be of actual benefit to the sheep within a production-based setting.

2.2. Knowledge transfer. Grandin’s 2003 paper details just how difficult the transfer of research to industry can be. Uptake of any new method of handling, technology, and welfare assessment tools takes time; and a lot of effort is required by the researcher to ensure that it is correctly maintained. Dodunski (2014) states that producers are more hands-on learners and like to see and understand practical examples demonstrated by other successful producers in their local area. Producers are more likely to implement changes if they see them being successful on other farms (Dodunski, 2014; Wood et al., 2014). There are a number of schemes that promote producer-to-producer knowledge transfer (e.g., In England, [LEAF demonstration farms](#), in Wales, the [Farming Connect](#) project, and the global [McDonalds Flagship Farmers](#) project). If research is conceptualized alongside the producer and carried out on the farm, transfer of knowledge should be easier. Researchers need to work closely with a few select producers who are able to then show other producers the benefit of the research. It is the producers that make a direct difference to the welfare of their animals (Hansson & Lagerkvist, 2014), and therefore they need to play a key part in the transfer of knowledge.

2.3. Changing attitudes. One of the most important aspects of making long-term changes in animal welfare is changing attitudes, but it is also the most difficult. Even if one or two producers do make practical changes which bring about welfare and production improvements, it does not mean that these changes will continue (Grandin, 2003), or that they will be transferred to others. Successful knowledge transfer is based on mindset and interpretation of information (Hoischen-Taubner et al., 2018). A person’s emotions and personality will affect whether they take up any changes (O’Kane et al., 2017), not evidence, as **Porcher** (2019) rightly points out in her commentary. Evidence is still an important aspect of knowledge exchange, but the evidence must be strong enough (Higgins, 2013). At the moment, there are aspects of the evidence reviewed by Marino & Merskin that are still open to question.

3. Conclusions. In order to make a difference to animal welfare, research needs to be successfully applied to industry. This will be easier if research is planned alongside those that have a direct involvement in the care of sheep. Carrying out research on the farm demonstrates its practical application and provides a working example to other producers. Practical evidence-based research should allow for long-term changes to attitudes and behavior in those directly involved in sheep welfare. Changes take time and effort, and it should not be left just to the producer to make them. Researchers need to consider the practical application at all stages of the research process if it is to succeed in making a difference to the welfare of sheep.

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