# National Research Council of the National Academies Critical role of animal science research in food security and sustainability The National Academies Press, Washington, D.C., 2015, vii + 415 pp. Paperback US$ 79, ISBN 978-0-309-31644-6

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Critical role of animal science research in food security and sustainability

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Many of the readers of *Food Security* may find themselves being critical of animal science in the context of food security and sustainability, rather than trying to see what animal science research can contribute to this area of study. After all, food animals are implicated in rain forest destruction, water pollution and greenhouse gas emissions (methane emissions in particular have been emphasised). Also, it is argued that land used to produce feed for animals could be used to produce food for humans instead, and that excessive consumption of animal products is harmful to human health. The emphasis in sustainability debates has therefore tended to be on advocating reduced meat consumption (and more rarely, reduced consumption of dairy products). Why then should readers of *Food Security* be interested in this book?

Many will argue that food animals have an important role in food security, although it is not the place of this review to make those arguments. Suffice to mention that key arguments advanced include the ability of animals to convert grass and waste products not usable by humans into valuable sources of protein,

the role of grazing animals in maintaining biodiversity, the role of manure in maintaining soils and the ability of food animals to sustain rural livelihoods in marginal areas. Whatever the case, the premise of this book is the often quoted statistic that global demand for animal products is predicted to almost double by 2050.

This book is one of a series of expert reports produced by the US National Research Council, and their website indicates that one of its intentions is informing government policies. It is a result of the deliberations of an *ad hoc* Committee of ten specialists, including animal scientists but also specialists in nutrition, human-environment relationships, human and veterinary medicine and aquaculture, plus representation from industry. This group was tasked with evaluating animal agriculture research needs in order to meet future global demand for animal products, in the face of climate change and limited natural resources. Examining these underlying assumptions is explicitly excluded from the remit.

The book covers a huge range of subjects, including breeding and genetics, nutrition, and animal health and welfare, as well as emphasising socioeconomic considerations and integration of research areas. It is refreshing to see aquaculture included, as this is often left out of such discussions. A particularly interesting aspect of the coverage is the Committee's reflections on the need for trained human capital and infrastucture.

Some of the recommendations relate to production orientation, for example understanding animal nutrient metabolism. Others are more systems oriented, for example identifying alternative animal feed ingredients from human food waste, biofuels and industrial production processes. Animal welfare research and identifying alternatives to the use of antibiotics are also mentioned. Research related to climate change includes both adaptation to the effects of climate change and a better understanding of greenhouse gas emissions from animal agriculture.

The book doesn't shy away from considering some of the more controversial aspects of animal agriculture, such as genetic modification, the use of growth-promoting feed additives such as beta-agonists, and irradiating meat to kill potential pathogens. But in a book of this kind, none of these issues can be covered in depth.

As well as identifying the research needs of the United States, global needs are also given a chapter, with an emphasis on the needs of low income countries. Existing documents, such as from the EU Animal Task Force, are also referred to.

As is perhaps inevitable with what is effectively a Committee report, the book is a rather turgid read, and is perhaps best approached by dipping into specific sections of interest rather than reading it from cover to cover, although there is

of course a synopsis of the recommendations. There are few surprises in the book for those already familiar with the field, but a great deal of complex information is concisely summarised, and the book is a very good source for up-to-date references. I will certainly use it as a resource for key references in specific areas to give to students. The breadth of coverage is impressive, and the book is best understood as a map of pertinent research areas. The downside of such breadth of coverage is that it is difficult to see where priorities might lie among such a range of research needs; it would not help a science administrator decide which areas of research to give more funding to or to cease funding, as all are given equal importance.

One of the main emphases of the book is the need for greater integration of different disciplines; for more holistic approaches rather than merely furthering each individual disciplinary area. The need for research on economic, environmental and social sustainability concomitant with research on productivity is emphasised. A key area identified is communication between researchers and the public, and the understanding of societal concerns regarding adoption of technologies. However, at this point I found myself hearing mixed messages from the book. On the one hand, emphasis is given to the need for increasing public understanding of science, and understanding barriers to consumer acceptance of technologies, seemingly implying that if scientists give scientific knowledge to consumers in appropriate ways, then consumers will

accept the technologies. On the other hand, reference is made to 'respectful engagement', which seems to encompass respecting stakeholders' divergent values and beliefs, although quite what this means in practice remains unclear. From a European perspective, assuming that one-way communication is sufficient in contentious areas of research in food production seems rather naïve. The current wisdom, in the UK at least, is that researchers need to learn to listen to the public, and frame problems and communicate their research ideas accordingly, in a more two-way engagement process. How this can best be done when there is no consensus among the public remains a challenge, so perhaps the report is wise to remain silent on the issue.

While this book is partly a manifesto for increasing public funding for animal agriculture research, it is not just an apologia for more animal production science. The question of sustainability (and its complex definitions) as well as its agricultural corollary, sustainable intensification, is grappled with. This book provides a rich source of information on myriad aspects of animal agriculture. If you are unwilling to ignore animal agriculture altogether, then this book provides very useful reference material. I am not sure, however, how it will be used by the US government, who I presume is the main intended audience, in informing its various debates concerning research policy and funding.