Global demand for food, and more specifically for protein from meat, has been and is expected to continue to increase. However, land available for food production is not increasing and may, in fact, be reduced in the future due to climatic changes. Furthermore, the impact of animal production on natural resources and the environment must be addressed. Thus, to produce more food for more people on less land with fewer resources, production efficiency must be increased. In other words, the performance of meat production systems must be enhanced through the use of technology. However, the use of technologies and even the need and implementation of particular technologies differ throughout the world based on production system, cultural approaches to meat consumption, and the availability of technologies themselves.

Previous editions of Animal Frontiers (January and July 2013) focused on the contributions of animal production to global food security, emphasizing both agriculture in developing countries and the application of technologies in animal production. The current issue expands on those ideas with more detail regarding the use of performance-enhancing technologies in the production of meat from cattle, swine, small ruminants, poultry, and fish. This issue also strives to present the diversity of technologies employed globally. While some might find performance-enhancing technologies synonymous with animal pharmaceuticals, technologies used in animal production also encompass genetic and reproductive technologies, feed processing and additives, and animal management and production practices. The contribution of these other technological advancements in production should not be overlooked and continue to be refined.

The critical need for performance-enhancing technologies is detailed in the article by Dunshea et al. (2016). They highlight technologies that reduce the amount of inputs (mainly feed) needed to produce meat, increase the amount of meat obtainable from animals, or both. These improvements directly benefit livestock producers by reducing their costs and increasing their revenues. However, consumers of meat benefit from these technologies as well as meat is less expensive and more plentiful. Less apparent, but no less meaningful, is the direct benefit to the environment of these technologies as more meat is produced with less of an environmental impact.
However, there exists tension between the users of these technologies and the consumers of meat. This tension creates barriers to the implementation of technologies and discourages the development of new ones.

Swine production, particularly in the United States and other developed countries, has made vast improvements in efficiency through the use of various technologies detailed by Tokach et al. (2016). Improvements in animal health, biosecurity, and the production of replacement breeding stock free of many endemic pathogens have greatly elevated the “baseline” health status of individual and the national herds. This improvement in health, coupled with advancements in reproductive technologies has allowed for progress in genetic improvement to be realized throughout the industry.

The use of technology in the production of beef, detailed in the article by Strydom (2016), includes the use of conventional technologies such as genomic-assisted selection, anabolic implants, and ionophores as well as new innovations such as functional genomics, alternative antimicrobials, improved fiber digestion through processing and exogenous enzymes, and β agonists. While technology use has traditionally focused on higher yields and return on investment for producers, the development of technologies now includes considerations of sustainability.

Focusing specifically on lamb production in Mediterranean areas, Campo et al. (2016) detail new husbandry practices. The use of centralized finishing units allow for lambs from different farms to be fattened together, resulting in more homogeneous live weight at slaughter and a more efficient use of nutrients and space. However, these improvements in production introduce new challenges. More meat is available on a more continuous basis, necessitating different marketing strategies to entice consumer demand. Different preservation techniques are also needed to allow for the storage of meat while still meeting consumer expectations for a product that is typically purchased fresh and consumed quickly.

The article by Tavárez and de los Santos (2016) addresses the technologies used for improvements in the genetics and breeding of poultry, an issue especially important in developing countries where the growth of poultry production outpaces other animal production systems. While poultry productivity is at peak levels in some countries like the United States, other parts of the world have not yet implemented the full range of technologies available. Therefore, meat yields from poultry and the efficiency of production differ greatly between developed and developing countries. These authors from the Dominican Republic emphasize this concern as the use of ‘modern’ germplasm is one technology that can be rapidly deployed in developing countries.

Aquaculture is the globally fastest growing of the animal protein industries, and advances in all manners of performance-enhancing technologies support that growth. Small et al. (2016) detail technological advancements in aquaculture including refinements in nutrient requirements, improved feed delivery through cooking-extrusion technology, and advancements in culturing systems. By leveraging the diversity of fish, rapid gains in production have allowed aquaculture to now provide more than half of the global consumption of fish.

The article by Dilger et al. (2016) further discusses these barriers to performance-enhancing technologies. Barriers to the use of current technologies and development of new technologies exist but differ between developing and developed countries. In developing countries, lack of education and economic resources, infrastructure, and access to marketplaces are barriers to technology implementation. However, in developed countries, lack of consumer understanding of agriculture and the changing view of risk hampers the use of technologies in livestock production.

In closing, both sustainability and food security concerns necessitate the use of performance-enhancing technologies in animal production. Technology use in all facets of animal production already has improved the efficiency and sustainability of meat production, but even more is needed to meet future demands for meat. The use of technology is critical to providing enough meat for a growing population while safe-guarding the environment. However, the ability of producers to continue to use technology and incentives for scientists and companies to develop new technologies is threatened. Now, more than ever, clear communication to consumers regarding the need for and safety of technologies in meat production is warranted. We are pleased to offer in this issue of Animal Frontiers information to be used for communication with consumers.

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