Report identifies research priorities to sustainably meet expected increase in global demand for animal protein

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Meeting the expected growth in global demand for animal protein in a way that is economically, environmentally, and socially sustainable will require a greater investment in animal science research, says a new report from the National Research Council. The report identifies research priorities and recommends that governments and the private sector increase their support for this research.

Dramatic increases in global demand for food from animal agriculture—meat, fish, eggs, and dairy – are projected to occur by 2050, due to a predicted increase in world population to between 9 billion and 10 billion and to an expected growth in demand for animal protein as developing countries urbanize and see increases in individual incomes. The United Nations Food and Agriculture Organization estimates that by 2050 there will be a 73 percent increase in meat and egg consumption and a 58 percent increase in dairy consumption over 2011 levels. While models indicate that North America and Europe will see little growth in per capita animal protein consumption, per capita consumption in Asia and Africa will more than double, and it will rise significantly in Latin America and the Caribbean.

"Animal agriculture is facing substantial challenges, including a steep projected increase in demand and the need to adapt to changing environmental conditions," said Bernard Goldstein, chair of the committee that wrote the report and professor emeritus in the

department of environmental and occupational health at the University of Pittsburgh Graduate School of Public Health. "Animal science research needs to be reinvigorated if our agricultural system is to meet these challenges in a sustainable way."

In the past two decades, public funding of animal science research in the U.S. has been stagnant, essentially declining in terms of real dollars, and it has not kept up with the rising costs of conducting research, the report notes. Industry support for research has increased but has tended to focus on applied areas that can be commercialized in the short term. Public support for animal science research—especially basic research—should be restored to at least past levels of real dollars and maintained at a rate that meets or exceeds the annual rate of research inflation, the report says.

Increasing efficiency while reducing the environmental impact and cost of animal protein production is essential to achieving a sustainable, affordable, and secure animal protein supply, the report says. Three criteria of sustainability should guide funding decisions about animal science research and technology development: reducing animal agriculture's environmental footprint, reducing the financial cost per unit of animal protein produced, and recognizing societal values and impacts as an essential component in defining sustainable global animal agriculture.

Priorities for U.S. Research

The report identifies specific research areas that are of high priority for reinvigorating the science of animal agriculture and its associated infrastructure in the United States, including:

Breeding technology and genetics. These have been major contributors to past increases in animal productivity, efficiency in production, and

environmental and economic advances, and further development of these approaches is needed, the report says. Research is also needed to understand societal concerns about these technologies and to develop effective ways to respectfully engage and communicate about them with the public.

Environmental changes. Environmental changes, including climate change, will impact animal agriculture in diverse ways, from affecting the quality and quantity of feed to causing environmental stress in animals. Animal agricultural production affects and is affected by climate change, and adaptations will be necessary, the report says. Strategies to adapt animal agriculture to climate change and to mitigate its effects on climate change are often interrelated and should be considered together. Research should also explore how to more precisely quantify greenhouse gas emissions and pollutants from agriculture and the economic and social viability of mitigation strategies. Economic modeling of animal agriculture's impacts on the environment could help guide decision makers' technical and policy responses, the report notes; for example, reducing the greenhouse gas emissions of beef cattle through investments in technology could improve both the bottom lines of ranchers and the economic sustainability of the industry.

Animal health. Sub-therapeutic use of medically important antibiotics in animal production practices is being phased out and may be eliminated in the United States in an effort to combat the rise of antibiotic resistance in humans consuming the animal protein. Research should explore alternatives to these antibiotics that provide the same or greater benefits in terms of improved feed efficiency, disease prevention, and overall animal health.

Animal welfare. Compared with Europe, less research currently focuses on animal welfare in agricultural production systems in the United States, and funding for this research should increase. Research should

include the development of alternatives and refinements for painful management procedures like beak trimming and dehorning; improvements in handling, transportation, and slaughter methods to reduce injury and distress; and new or modified production systems that provide animals with more opportunities to express natural behaviors.

Priorities for Global Research

To sustainably meet increasing demands for animal protein in developing countries, stakeholders at the national level should be involved in establishing animal science research priorities, the report says. It also recommends that research be devoted to understanding barriers to the adoption of new technologies, such as lack of access to credit, production resources, markets, information, and training and strategies to overcome them. Efforts should focus on the education and communication role of local extension personnel in supporting successful adoption of the technology, with particular emphasis on the training of women. Research is also needed to alleviate the problems of animal and zoonotic diseases that result in enormous losses in animal health, livelihoods, national and regional economies, and human health.

Many, if not most, smallholder animal producers in developing countries worry more on a day-to-day basis about survival than about increasing the productivity and profitability of their animal products, the report notes. Research needs to be directed toward the successful development of locally relevant technologies that require minimal risk to adopt and thereby augment livestock use as a source of wealth and a means of survival during lean times. Financial support for research to help developing countries achieve these goals should take community welfare into consideration, the report adds.

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