

Contemporary and Emerging Issues and International Animal Agriculture Symposium: Ahead to 2050—Global livestock production challenges: Current status, future needs, production obstacles

551 Global livestock production challenges: Current status, future needs, and production obstacles—North America. Michael Galyean*, *Texas Tech University, Lubbock, TX.*

Feeding a rapidly growing global population is an enormous challenge. Livestock ownership and production is common in all economies, and demand for animal products grows as economic standards rise, suggesting that livestock will remain an integral component of worldwide food production systems. To achieve global food security, resources used for livestock production must be managed efficiently and sustainably. Current North American (NA) livestock numbers are decreasing or stable, reflecting greater market weight and production efficiency of individual animals and stable or decreased demand for products in NA. Exports of NA livestock products, largely to middle- or upper-income countries, have increased steadily in recent years. Rebuilding animal numbers in some NA livestock segments (e.g., beef cows) will be challenging, which could diminish growth potential. Consolidation in the NA livestock industry has been extensive, which could limit or redirect investments in production infrastructure. Urbanization of agricultural land, increasing regulation, consumer concerns for food safety and environmental effects of livestock production, and a general backlash against technology-based approaches to increase animal growth and efficiency are obstacles to increased production in NA. Challenges associated with climate (e.g., increased drought, decreasing water for irrigation, and shifts in crop production and availability of traditional feedstuffs) are likely but difficult to predict. With these obstacles and challenges, what role will NA livestock production systems play in meeting global food needs? Exporting livestock products should remain an important feature of the NA role, but expansion could be limited by trade issues and will likely continue to focus on developed countries. A potentially significant role for NA to play in meeting worldwide food production needs is to provide leadership in research and development related to sustainable livestock production systems that fit economies and cultures in developing nations. This will require renewed national commitments to support agricultural research and a recognition of the historical and cultural importance of livestock production.

Key Words: livestock production, research and development, sustainability

552 Opportunities and challenges in animal nutrition. Leo A. den Hartog*^{1,2}, ¹*Nutreco, Boxmeer, the Netherlands*, ²*Wageningen University, Animal Nutrition Group, Wageningen, the Netherlands*.

The global livestock sector is characterized by differences in dynamics. In developing economies, the livestock sector is evolving in response to rapidly increasing demand for livestock products. In developed economies, demand for animal products is stagnating. Livestock production will increasingly be affected by external factors. These include surging demands for animal products and struggling supplies of feed raw materials, resulting from the competition for natural resources and trade barriers. Simultaneously, there is growing concern about food and its impact on health, and the effect of production systems on animal welfare and the environment. Optimization of productivity and efficiency within such constraints are important objectives, as well as maximization of the profit for all stakeholders. Animal feed and nutrition are the essential

link in the livestock production chain, i.e., between crop cultivation and animal protein production and processing. It is usually the biggest cost factor in livestock production. Several indicators demonstrate that further optimization of animal feed and nutrition is potentially possible. The genetic potential is only partially utilized. The utilization of most nutrients appears to be low and there is a huge variation in performance among farms and within farms, among animals. In addition, environmental performance can be improved significantly. New science and technologies seem to offer many opportunities for innovation in animal feed and nutrition. Key drivers for future innovation are basically (gen) omics, microsystem- and nanotechnology and information and communication technology (ICT). These mainstream technologies are the foundation of many application technologies of relevance for animal feed and nutrition. Acceptance by consumers and society is a critical success factor. In conclusion, animal feed and nutrition are crucial in livestock production. Innovations have the potential to meet the challenges and to result in resource efficiency, healthy livestock and people, responsible production systems and optimal profit throughout the value chain.

Key Words: animal nutrition, livestock production, innovation

553 The future of feed business and live animal production in Asian and Chinese markets to year 2050. Genfeng (Ian) Yi*, *Aquaculture Science & Technology Group of Beijing Dabeinong (DBN) Technology Group Co. Ltd., Beijing, China.*

By 2050, the world's population will be 9 to 10 billion people, with at least 40% from Asia. Currently, the feed production volume of Asia contributes about 40%, with Chinese production of 190 million metric tonnes (MMT). The major live animal production countries include China, Indonesia, Thailand, Vietnam, India, Malaysia, and Japan. China is the dominant animal producer, with live pork production about 53 MMT, aquaculture 46 MMT, egg 27 MMT, white and yellow poultry 6 MMT, and ruminant (lamb, sheep, and beef) 5 MMT. With fast economic growth and increasing revenue, urbanization, a growing middle-class population, food safety concerns, environmental pressures, and progress of science and technology, the Asian market, especially the Chinese market, faces numerous development opportunities and challenges. The major challenges for Asian feed and live animal production are as follows: (1) how to supply sufficient safe animal protein and milk to the growing demands of consumers; (2) how to run large-scale and high-input farms efficiently; (3) how to train and attract professionals for live animal production; (4) how to find financial resources for modern agribusiness; (5) how to ensure biosecurity and disease control; (6) how to deal with the conflict of the environment and increased live animal production; (7) how to control soaring feed ingredient costs and reduce overall live animal production cost; (8) how to solve international trading interests and conflicts; (9) how to upgrade and use Internet and "web of things" technology for modern agribusiness; (10) how to integrate and consolidate industry chains and face international competition; (11) molecular and disease-resistance breeding technology; (12) how to innovate and apply new science and technology; (13) organic animal production; (14) antibiotic residue issues; (15) impact of climatic change on animal and aquaculture production (Asia accounts for 90% of world aquaculture production); (16) limited water and land resources; (17) GMO and transgenic issues of plants and their effect on animal produc-

tion; (18) nanotechnology; (19) bioactive substances and biotechnology application; and (20) local governmental policies and regulations. The future of live animal production must include high production efficiency, low carbon production, organic foods, and minimal production cost and maximal production profitability. Asian live animal production needs to be more environmentally friendly, health-oriented, nutritious, safe, sustainable, and affordable to consumers.

554 Ahead to 2050—Latin American livestock production challenges. Fernando Rutz*, *Universidade Federal de Pelotas, RS, Brazil.*

According to FAO, the world's population will be over 9 billion people and food production will need to be increased by 70% by the year 2050. Latin America (LA) has the potential to be an important player in providing food to fulfill this requirement, having the largest global fresh water reservoir, and one third of the world's available land for sustainable livestock production. With a wide range of climate zones, LA has diversified agriculture capabilities, ranging from tropical- to temperate-zone products. However, there is a lot of productivity variation among countries and even among different regions within a country. From the ruminant side, LA has suitable production conditions for increased beef, dairy and sheep production. From the monogastric point of view, the swine, poultry and aqua industries are well developed and constantly growing. This capability is exemplified by the fact that Brazil is now the largest beef and chicken meat exporter in the world. The dairy industry has also been experiencing significant growth and development during the last 2 decades. In almost all LA regions, milk (M) and milk-derivatives (MD) are increasing and diversifying into more complex products. In addition, M and MD export have been increasing in some LA countries. In spite of that, within some countries in LA and Caribe the average consumption of milk is below 25% of requirement. This fact shows the need to stimulate production and consumption of milk in some regions. To cope with the demands of food production, LA needs to increase the efficiency of production. To do this it can use technologies to supplement on pasture, increase grazing-tillage integration, and use more intensive livestock systems to shorten the time to slaughter. Use of tools like predicting feed efficiency with in

vitro fermentation, development of DNA technology, exploring gene expression (nutrigenomics), genetic improvement and crossbreeding, artificial insemination, embryo transfer and sexed semen, can improve production capabilities too. Improvements in livestock health, product safety and quality, and control global warming gas emissions are also essential. Increased LA livestock production efficiency will result in decreased land degradation, and natural resource conservation.

Key Words: ruminant, monogastric, climate

555 Global livestock production challenges: Current status, future needs, production obstacles in Africa—The Uganda

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The livestock sector in Uganda contributes 5.2% to the national gross domestic product and 18% to the overall agricultural GDP. National livestock numbers consist of 12.8 million cattle, 12.5 million goats, 4 million sheep, 3.6 million pigs and 42 million chickens. A total of 5 million households in Uganda own livestock (UBOS, 2008). Farming households that include livestock in their enterprise mix tend to have higher incomes than those involved only in crop farming. This is a result of livestock ownership and also improved crop productivity in that livestock manure improves nutrient availability to plants and increases soil organic matter. Economic benefits of including livestock production within farming enterprises are the greater accumulation of assets and the ability to secure credit. Uganda leads Africa in pork consumption, but cattle, goats, poultry and fish still provide significant sources of dietary animal protein. The expansion of meat and milk production in Africa has been disappointing despite efforts to stimulate increased production. Constraints cut across socioeconomic, technological, institutional and financial sectors. As well, little attention has been given to the development of the livestock value chain due to uncertainty in feed availability, reproductive inefficiency, the lack of livestock genetic improvement, public and animal health issues, and the prevailing policy environment.

Key Words: Africa