

# Production, Management and the Environment Symposium: Confinement Animal Agriculture Sustainability

**783 Navigating sustainability.** J. L. Capper\*<sup>1</sup> and R. R. White<sup>2</sup>, <sup>1</sup>*Livestock Sustainability Consulting, Bozeman, MT*, <sup>2</sup>*Washington State University, Pullman*.

Sustainable livestock production may be defined as: “a system that meets the needs of the present without compromising the ability of future generations to meet their own needs.” As the global population increases, livestock production sustainability necessitates providing sufficient safe, affordable food to supply societal needs, while balancing 3 key metrics: economic viability, environmental responsibility, and social acceptability. Systems that fail to achieve a balance between these 3 metrics will ultimately cease to exist. In contrast to historical systems in which economic viability was the most important metric, growing consumer awareness of food production systems has led to an increased focus upon the environmental and social consequences of dietary choices. This has been highlighted by the increasing popularity of “Meatless Mondays” campaigns in recent years. System-wide changes in US beef, dairy and swine industries over time have demonstrated the positive environmental effects of improved productivity through intensification, which has also facilitated decreases in economic costs of production and thus retail prices. However, although environmental impacts (resource use and carbon emissions) are increased in extensive compared with intensive production systems, philosophical concerns relating to conventional livestock production impacts upon biodiversity, animal welfare and human health are difficult to address scientifically and may lead to a lack of consumer confidence. Sustainability is theoretically irrespective of size or system, however it may only be achieved providing that a consumer willingness to pay (WTP) exists for the product. Although the stated WTP is often greater than the actual WTP for livestock products, data indicates that consumers show a greater WTP for perceived health benefits than for environmental indicators, although quality indicators are more important than either health or environmental metrics. Sustainability will continue to be a key focus for all food production stakeholders—the challenge facing the livestock sector is to find appropriate messages to address consumer concerns that tend toward philosophical ideology rather than scientific fact.

**Key Words:** sustainability, livestock, consumer

**784 The US Swine Industries Carbon Footprint.** R. Ulrich\*, G. Thoma, J. Popp, and G. Rodriguez, *University of Arkansas, Fayetteville*.

The greenhouse gas footprint of confinement-based pig production facilities was compiled and, based on this LCA, an emission model was constructed to be used as a tool in identifying infrastructure and operational parameters to reduce emissions in a cost-effective manner. The LCA indicated that the main contributors to GHG emissions is methane from on-farm manure handling systems and carbon dioxide from feed production resulting from fertilizer manufacture and crop handling. The emissions model is built upon a detailed pig production model that predicts the required usage of electricity, gas, propane, water, and feed along with the expected manure amount and composition. These overheads are used to calculate the emissions of carbon dioxide, methane and nitrous oxide from the various parts of the pig farm. Since the user does not have to enter in the amount of consumables, the model can be used to predict the effect of infrastructure and operational changes on GHG emissions. An economic module calculates the dollars per kg

of equivalent carbon dioxide avoided. The model indicates that one of the easiest ways to reduce GHG emissions is to build manure handling facilities to avoid seasonal high temperatures in the system.

**Key Words:** greenhouse gas emissions, pig farm, modeling

**785 Nutrient management and environmental and societal issues affecting sustainability of feedlot finishing systems.** N. A. Cole\*<sup>1</sup>, R. W. Todd<sup>1</sup>, H. Waldrip<sup>1</sup>, K. Hales<sup>2</sup>, and J. C. MacDonald<sup>3</sup>, <sup>1</sup>*USDA-ARS-CPRL, Bushland, TX*, <sup>2</sup>*USDA-ARS-MARC, Clay Center, NE*, <sup>3</sup>*Univ. of Nebraska, Lincoln, NE*.

Cattle evolved on a diet consisting primarily of forages. Thus, it is often assumed that the “ideal” system for producing cattle is pasture-based. In contrast to much of the world, beef cattle in North America typically spend a portion of their life in feedlots where they are fed diets high in grains and/or by-products. Feeding cattle nutritionally balanced, high-energy diets in confinement has many advantages over pastoral systems. However, feeding cattle in confinement leads to a concentration of nutrients into a small geographic area. Significant environmental and economic concerns include accumulation of nutrients, extraneous losses of nutrients to ground and surface water, removal of accumulated manure, excretion of pathogens and physiologically active compounds (PAC), and emissions of ammonia, greenhouse gases (GHG), odors, and dust. The public often views with concern, animal welfare and the use of growth promoters and antibiotics. Nutrition and management practices influence the quantity of nutrients excreted by the animal, transformations and movements of those nutrients, as well as losses of ammonia, volatile organic compounds, particulate matter, GHG, and PAC. Fortunately, ruminants can readily utilize a variety of high-fiber by-products to produce high-quality protein. The growth of the grain-based bio-fuel and corn sweetener industries has provided cattle feeders with a large supply of by-products (distillers grains, corn gluten feed, etc.) that can be substituted for feed grains. Because these byproducts are usually high in fiber, N, P, and S, when fed at high dietary concentrations, manure production, N, P, and S excretion, enteric methane emissions, and ammonia, nitrous oxide, and hydrogen sulfide emissions from manure are all increased. However, feeding lower concentrations (<30% of DM) of these by-products and use of grain processing techniques such as steam flaking may actually decrease the environmental footprint of feedlots by decreasing the quantity of feed grains required.

**Key Words:** beef cattle, feedlot, sustainability

**786 Nutrient management, environmental issues and societal issues affecting confinement dairy sustainability.** J. H. Harrison\*, *Washington State University, Puyallup*.

Management on dairy operations has become more complex as society demands more attention be placed on environmental stewardship. During the past 2 decades most emphasis has been placed on nutrient management in the context of nitrogen and phosphorus. With this effort there has been a need for dairy operations to focus on nutrients at a whole-farm level. The emphasis of contemporary integrated nutrient management should be placed on 3 areas: reducing imports, enhancing within farm efficiencies (both cropping and cow efficiencies), and seeking export opportunities for excess nutrients not utilized for crop production on the

farm. Emerging areas of concern are the fate and transport of pharmaceuticals in the environment. Management of nutrients and pharmaceuticals at the whole-farm level needs to be accompanied by an effort to inform the public and environmentally concerned groups about the proactive efforts that producers have adopted to protect the environment. To be sustainable, integrated nutrient management will require an expanded

effort to reconnect the nutrient cycle and link the movement of nutrients between sites of feed production and feed utilization. Resources need to be focused on clearly defining the fate and transport of pharmaceuticals so that effective management practices can be developed to minimize movement of pharmaceuticals into air and water.

**Key Words:** sustainability, nutrient, pharmaceutical