LIVESTOCK PRODUCTION SYSTEMS AND PLANNED CHANGE

Most livestock production systems aim to produce high quality products efficiently and profitably. There are three broad classifications.

LIVESTOCK PRODUCTION SYSTEM	DESCRIPTION	GHG OPPORTUNITIES
GRAZING SYSTEMS	• almost exclusively pasture and grazing systems	• improved pasture • intensive grazing management • energy conservation • protection of natural areas from grazing livestock
MIXED SYSTEMS	• may include grazing • most feeds are grown on-farm • livestock and crop production systems are highly interrelated (e.g., manure used on farm)	• genetic improvements for production • improved nutrition and feeding • improved ventilation • energy audit of livestock facilities • removal of manure to storage • nutrient use efficiency • crop rotation and cover crops • intensive grazing management • management of natural areas
INTENSIVE SYSTEMS	• most feed is grown in another operation or is purchased from feed industry • some or all of the manure is exported to other cropland or for other uses (e.g., compost, growth substrates, feeds)	• genetic improvements for production • improved nutrition and feeding • improved ventilation • energy audit of livestock facilities • green energy production • reduced nutrient loss from application • protection of natural areas

For the most part, BMPs that focus on atmospheric and other environmental improvements share farmers' goals of improved efficiencies and reduced waste.

COMPONENTS OF A LIVESTOCK PRODUCTION SYSTEM

Every livestock production system (LPS) includes these key components:

- ► **infrastructure** – housing, system design, fields, topography
- ► **production and quality control management practices** – breed, handling system, genetics, nutrition, grazing management, health and quality control
- ► **nutrient and natural resource management** – manure storage, handling and application, crop management
- ► **marketing and business management** – markets, financing, etc.

Naturally, the relative importance of each component varies with each issue. For example, the food quality and safety component would rank higher in a discussion about the production and marketing of livestock products.

OPPORTUNITIES

For the purpose of presenting **opportunities** for greenhouse gas BMPs, we've categorized LPSs for beef, dairy, swine, sheep and poultry in the following ways:

- **genetics and breeding** – improvements in production, reproduction and feed conversion
- **nutrition and feeding** – reducing, modifying, supplementing and targeting diets and feeding practices to improve use efficiency and reduce inputs
- **other LPS components** – the combination of animal handling practices, food quality and safety and animal care to reduce stress and increase efficiency
- **housing and environment** – livestock housing, bedding selection, layout, interior climate control, and ventilation to promote health and reduce emissions
- **energy** – the impact of conserving energy in an LPS and the opportunities to produce energy on-farm
- **manure management** – manure and other waste collection, transfer, storage and handling systems to reduce emissions
- **nutrient management** – manure transfer, application and environmental protection measures
- **cropland management** – BMPs protecting soil and water plus practices to reduce nutrient loss
- **pasture and grazing management** – techniques that improve production and reduce emissions
- **natural areas management** – protection of natural areas (wetlands, watercourses) and other areas with permanent vegetation (windbreaks, buffer strips, woodlots).

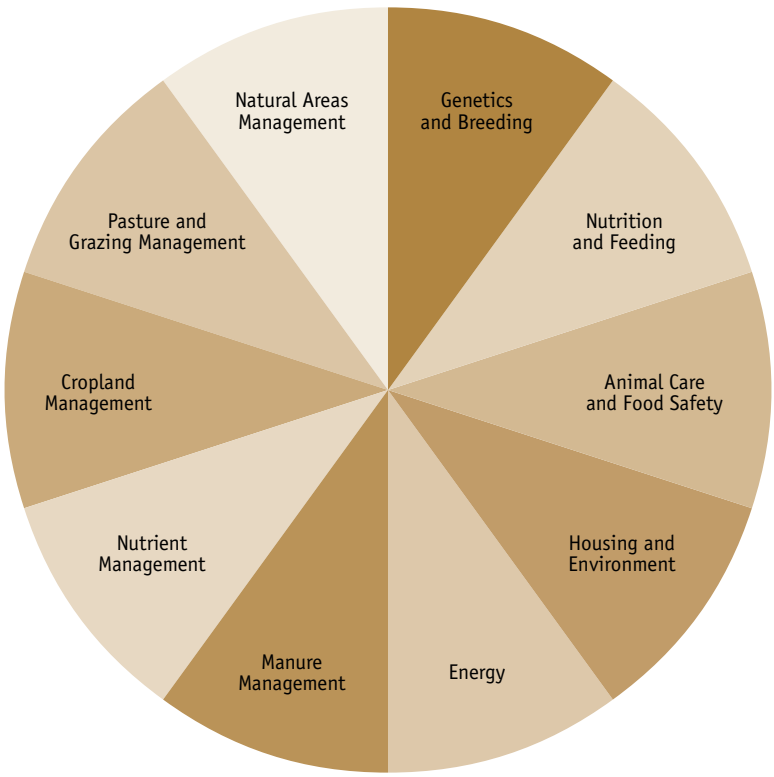
We'll explore all these areas in the following chapter.

Genetic improvements have led to marked improvements in reproductive and production efficiencies – particularly in the poultry sector.

Ventilation will reduce humidity and the moisture content of bedding and manure. Dry bedding and manure emit less methane, nitrous oxide and ammonia.

Dry manure emits fewer greenhouse gases.

OPPORTUNITIES FOR GHG REDUCTION IN LIVESTOCK PRODUCTION SYSTEMS



Changes to one component usually require changes to at least one other component. Implementing BMPs for emission reductions is no different. Plan in accordance with a systems approach.

PLANNING CHANGES AND PREDICTING IMPACT ON YOUR SYSTEM

Incorporating measures for emission reductions works best with an interactive systems approach. In other words, the impact of each modification (e.g., reduction in crude protein in diet to reduce nitrous oxide emission) on the other parts of the system (e.g., alternative nutrient management strategies, application method and timing) is identified and everything is adjusted accordingly.

Those who try to make substantial changes to their operation without regard to the systems approach risk failure.

Here's an example of how practices that lead to reduced methane in a beef manure handling system can have implications for other components.

✔ Sample BMP: **Meet minimum requirements for effective fibre with the use of high-quality forage feeding.**

possible consequences:

- ▸ less manure volume generated means more space in solid **manure storage**
- ▸ more storage capacity could mean more room for scrapings from more frequent yard maintenance **(handling)** and less methane from wet, manured yards and lots
- ▸ improved storage capacity could impact **nutrient management** (timing/application) by increasing the number of application options

✔ Sample BMP: **Clean lot and yard frequently to promote aerobic conditions.**

possible consequence:

- ▸ herd remains off pasture **(grazing management)** until conditions are less damage-prone (wet soils, compaction)

Less fibre will generate less manure, which leads to more effective storage space and better application opportunities.

Well-maintained yards generate less greenhouse gas than those cleaned infrequently.

Improved storage in semi-confined operations facilitates more frequent yard cleaning and delayed grazing until pasture conditions are drier and less prone to compaction.