HOUSING

Proper ventilation design makes the animal environment, bedding and manure drier. Fewer greenhouse gases are emitted from dry manure.

Greenhouse gas emissions from livestock and poultry facilities can be reduced with proper siting, design, ventilation and bedding/manure management. Energy savings indirectly reduce emissions. Again, it's a win–win for you and the environment.

VENTILATION AND HEATING

✔ **Provide adequate ventilation to make bedding areas drier and cooler.** This can reduce methane and ammonia emissions. Basic, natural ventilation systems use sidewall openings or combinations of sidewall and ridge or stack openings. Their insulation is similar to mechanically ventilated barns, and must be able to respond to changes in winds (speed and direction) and air temperatures.

✔ **Manage ammonia levels through ventilation.** Ammonia is produced by the decomposition of the nitrogenous compounds (e.g., non-degraded proteins) in manure. High levels of ammonia (over 15 ppm), irritate the eyes, nose and throat.

Ammonia's characteristic strong odour makes it easily detectable as soon as levels reach 5–10 ppm. To control ammonia levels:

- ✔ **reduce moisture content** in manure and humidity in facility
- ✔ **increase ventilation rate** (may need additional heat to offset lower barn temperature)
- ✔ **increase aeration of pack manure and housing area** where and when possible (with the help of improved ventilation) – can reduce methane and N-oxide losses by 10%.

✔ **Use higher R-value insulation** to decrease conductive heat loss.

Increased ventilation will reduce ammonia levels in barns.

Research on feed additives, manure handling and proper management are underway to solve the ammonia problem. It's known that you can maintain acceptable levels of ammonia with proper manure management and adequate ventilation and heating in all livestock and poultry barns.

DESIGN AND BEDDING

For dairy

✔ **Choose bedding carefully.** Bedding is a key source of greenhouse gases. Straw contributes approximately 80% of the manure methane produced in tie-stall operations. Bedding is the largest source of N_2O, doubling the total greenhouse gas emissions from cattle.

✔ **If you're expanding your operation, consider free-stall.** Tie-stall operations with straw generate more methane than free-stall housing

✔ **Manage the system with less confinement.** The greater the confinement, the higher the emissions of methane and nitrous oxides.

Bedding is the largest source of nitrous oxides.

For beef

✔ **Manage the system with less confinement.** The more confinement, the higher the emissions of methane and nitrous oxides. Confined systems generate more greenhouse gas than pasture-based, as there is more opportunity for anaerobic and partially anaerobic conditions in yards and feedlots.

✔ **Manage the manure.** Frequent cleaning and removal to storage will reduce manure build-up and anaerobic conditions that produce methane and nitrous oxides.

Management-intensive grazing systems produce fewer emissions than confinement systems.

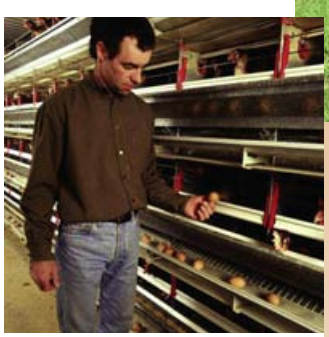
For swine

✔ **Bedding is not better.** Bedding increases N_2O emissions by 10-fold over liquid systems with anaerobic conditions that generate methane.

For poultry

✔ **If you're expanding – consider free range.** Free range produces less greenhouse gas than caged systems. The highest levels of N_2O come from caged systems.

✔ **Increase ventilation with conveyor transfer and storage.** This will reduce moisture contents and emissions of nitrous oxides and, to a certain extent, methane.



Caged systems emit more nitrous oxides than free-range systems.