

More Meat Produced with Greater Efficiency and Less Greenhouse Gas (?)

Scott L. Kronberg, Mark A. Liebig, and J. R. Hendrickson

¹USDA-ARS, Northern Great Plains Research Laboratory, Mandan, North Dakota, USA

Background

Meat is popular food world-wide.

FAO estimates world food production will need to increase 70% by 2050 to feed 2.3 billion more people.

Hungry people are a threat to social stability and national security, and provision of plant protein may not satisfy many who hunger for animal protein.

Demand for fossil fuels as well as potassium and phosphorus fertilizers may soon exceed supply, and production of bio-fuels may compete with food production.

Research leading to production of more meat with less fuel and less GHG output is needed.

We should encourage proactive social changes now within our traditions of meat production and consumption in order to eventually have more meat with less environmental impact in future decades.

We should continue research on improving production efficiency and reducing environmental impact of ruminant production from less productive lands and with by-products from which it is impractical to produce monogastric livestock.

For our higher quality crop and pasture lands we should focus some of our efforts on improving production of more efficient monogastric animals such as poultry and rabbits.

A cow managed to produce less methane only produces one offspring per year and if her calf is also managed to produce less methane, it and its mother are still inefficient converters of forage or grain to muscle.

Sheep are more efficient meat producers than cattle, but in contrast to ruminants, rabbits and turkeys produce many offspring per year and their offspring convert feedstuffs to muscle relatively efficiently.



Pasture with high stocking rate for 87 years



Mobile pen for pasture-based rabbit production



Steers grazing windrows of proso millet that turkeys can also graze

A Radical Comparison (Food for Thought)

We estimated that a productive pasture on the northern Great Plains of North America grazed at a high stocking rate (typical for the area) for 87 consecutive years had a net global warming potential of -618 kg CO₂equiv/ha/yr when used to grow yearling cattle (28.3 kg gain/ha/yr over 3-year study; -26 kg CO₂equiv/kg animal gain; Liebig et al. 2010. J. Environ. Qual. 39:799-809).

Little information on methane and GHG production is available for rabbits, so to be safe we assumed pasture-based production of young rabbits would have similar GHG intensity as pasture-based cattle production.

Forage quality could be adequate in this pasture for rabbit production from mid-May through June.

With each rabbit consuming 150 g of forage DM/d for 45 d until slaughter at 2.1 kg (35 g/d gain), the same pasture could produce 431.7 kg of rabbit gain/ha; 15 times the cattle gain for the same pasture.

This illustrates potential efficiency gains from utilizing small, fast-growing animals for meat production in a potentially very climate-friendly system.

Evaluation of GHG benefits from alternative forms of meat production is needed.

Evaluations should include integrated (mixed) production of ruminants and monogastrics.